FACT SHEET

NEPA DOCUMENT

This environmental impact statement (EIS) is issued under Section 102 (2) (C) of the National Environmental Policy Act (NEPA) at 42 U.S.C. 4321 et seq. Since changes to the Draft EIS were relatively minor, BPA decided to publish the changes, comments, and responses as the Final EIS rather than rewrite and circulate the Draft EIS.

NATURE AND LOCATION OF THE PROPOSAL AND ALTERNATIVES

The original proponents and developers of the Northwest Regional Power Facility were KVA Resources, Inc. (KVA) and Central and South West Energy, Inc. (CSWE). Recently the development agreement was amended to include KLT Power Inc. The proponents have created a Limited Liability Company, KVA Power LLC. KVA Power LLC is composed of KVA Resources Inc., and KLT Power Inc. KLT Power Inc., is a wholly-owned subsidiary of KLT Inc., which is a wholly owned subsidiary of Kansas City Power and Light Company. References to KVA and CSWE throughout this EIS should be regarded as reference to KVA Power LLC.

KVA Power LLC proposes to construct and operate a 838 megawatt (MW) gas-fired combustion turbine facility (Northwest Regional Power Facility or NRPF) near the town of Creston, Washington. The project site is approximately 1,200 acres, of which less than 140 acres will be impacted. The footprint of the facilities permanently impacts 75 acres; 70 acres of agricultural lands and 5 acres of three-tip sagebrush/Idaho fescue habitat. The remaining 65 acres will be temporarily disturbed during construction of an underground gas pipeline, an underground water pipeline, and grading for the area used for the collection of stormwater runoff into the stormwater retention pond.

Alternatives to the proposed action evaluated in this EIS include alternative gas pipeline routes (evaluated at a corridor level).

PROPONENT

The proponent is KVA Power LLC (referred to in the EIS as KVA and CSWE).

PROPOSED DATE FOR IMPLEMENTATION

Assuming all permits and approvals are obtained, the proposed Northwest Regional Power Facility would begin operation in 1999. Construction is scheduled to begin in 1997.

LEAD AGENCY

Bonneville Power Administration (BPA) is the lead federal agency under NEPA for the EIS. EFSEC and BPA issued a joint Draft EIS in October 1995. EFSEC issued a separate Final EIS for the Northwest Regional Power Facility in May 1996.

FEDERAL COOPERATING AGENCIES

The Council on Environmental Quality regulations implementing NEPA encourages early participation in the environmental process by other federal agencies having jurisdiction by law. The U.S. Department of the Interior Bureau of Reclamation and National Park Service, and the Federal Energy Regulatory Commission are cooperating agencies in preparation of the EIS.

RESPONSIBLE OFFICIALS AND CONTACTS

Nancy Wittpenn, ECN, Bonneville Power Administration, 905 NE 11th Avenue, Portland, OR 97232, 503/230-3297 (fax 503/230-5699).

REQUIRED PERMITS AND LICENSES

Table 1 presents a list of federal, state, and local permits and licenses required for the proposed action and alternatives and the agency or department that administers them.

The EFSEC site certification agreement would provide EFSEC construction and operational requirements and all other relevant state permits and approvals. No other state or local permit is required. For convenience, Table 1 lists the major state and local permit requirements preempted by EFSEC.

AUTHORS AND PRINCIPAL CONTRIBUTORS

Resource Management International	Project Management Engineering and Energy Systems	Water Supply Transportation
ENSR Consulting and Engineering	Earth Resources Climate and Air Quality Water Quality Plants and Animals	Natural Resources Environmental Health and Public Safety
EDAW, Inc.	Public Services and Utilities Recreation Socioeconomics	Visual and Aesthetic Resources
BOAS	Historic and Cultural Resources	
Highlands Associates	Land and Shoreline Use	

NOTICE OF AVAILABILITY OF FINAL EIS

Friday, July 5, 1996.

NATURE AND DATE OF FINAL ACTIONS

Final action by BPA would be a Record of Decision for a transmission services agreement with the proponent and a decision to construct and operate transmission facilities that will enable the output of the NRPF to be integrated into the regional transmission network. BPA will not issue a Record of Decision until the Federal Energy Regulatory Commission (FERC) completes an environmental review of the pipeline. If FERC does an EIS, BPA will be a cooperating agency in the process.

ADDITIONAL ENVIRONMENTAL REVIEW

During the first three quarters of 1995, EFSEC conducted its adjudicative hearing process. By state law, this is a quasi-judicial set of hearings similar in nature to a courtroom proceeding. The hearings were held in October 1995. All state agencies represented on EFSEC may become parties to the hearing. Interested individuals,

groups, tribal governments, or agencies were invited to petition the EFSEC for designation as intervenors and 18 individuals, agencies, and organizations met the legal criteria for formal participation in the hearings.

EFSEC held the adjudicative hearings and scoping meetings in Lincoln County to hear public comments. A hearing record has been produced by EFSEC documenting the adjudicative hearings.

LOCATION OF BACKGROUND ENVIRONMENTAL DATA

Background material for this EIS, including the Application for Site Certification and supporting data submitted by the proponent, is available from the Washington Energy Facility Site Evaluation Council, 925 Plum Street SE, Building 4, Olympia, WA 98504-3172. Materials relating to transmission facilities are at the Bonneville Power Administration, 905 NE 11th Avenue, Public Information Office, Portland, Oregon, 97232. Supporting technical reports and applications to this EIS include:

- Application for Site Certification for the Northwest Regional Power Facility (Application 93-2) submitted to the Washington Energy Facility Site Evaluation Council, December 1994.

- KVA Resources Natural Gas Pipeline Routing Study, prepared by PGT (undated).

- Northwest Need for Power Analysis submitted to CSW Energy, Inc. and KVA Resources Inc. by W.T. Trulove, 30 May 1995.

There will be no cost for the FEIS.

Table 1 Permits and Approvals Required for the Proposed Action and Alternatives

Agency/Department	Permit/Approval	Required For
Federal Agencies		
Army Corps of Engineers	Individual/Nationwide Section 404 Permit (Clean Water Act, 33 USC 1341)	Discharge of dredge/fill into Waters of the United States, including wetlands
Fish and Wildlife Service	Section 7 Consultation, Biological Opinion (Endangered Species Act, 16 USC 1531-1544)	Ensures Endangered Species Act compliance
State Agencies		
Department of Ecology	401 Certification (Clean Water Act, 33 USC 1341: if the project requires Army Corps of Engineers 404 permit and Chapter 173-225 WAC)	Discharge into waters and wetlands (see U.S. Army Corps Section 404 Permit)
	Temporary Modification of Water Quality Criteria	Temporary violation of state water quality criteria (particularly the turbidity criterion) during construction activities.
	General Construction Activity Stormwater Permit (Section 402 of the Clean Water Act)	Stormwater discharges associated with construction activity
	General Industrial Activity Stormwater Permit (Section 402 of the Clean Water Act)	Stormwater discharges associated with industrial activity
	New Source Construction Approval	New source construction and/or additions or modifications to existing sources that may emit pollutants from a stationary source
	Air Contaminant Source Registration	Major stationary air contaminant sources
	Prevention of Significant Deterioration of Air Quality Permit (Chapter 43.21A RCW and Chapter 173-400 WAC)	Preventing substantial degradation of air quality in areas that are in compliance with national ambient air quality standards, while maintaining a margin for future industrial growth.

Department of Health Eastern Drinking Water Operations	Public Water Supply Approval	Review and approval of water system plans, engineering reports and plans, and specifications for new public drinking water systems.
Department of Wildlife, Region 1	Hydraulic Project Approval (Chapter 75.20 RCW and Chapter 220-110 WAC)	Work that will use, divert, obstruct, or change the natural flow or bed of any marine or fresh waters of the state.
Department of Natural Resources, Northeastern Region	Forest Practices Permit (Chapter 76.09 RCW and Chapter 222 WAC)	Any forest practice (harvesting, reforestation, road construction, or chemical application) occurring on state or private lands.
Office of Archaeology and Historic Preservation	Section 106 Consultation (National Historic Preservation Act, 16 USC 470)	Historic, architectural, archaeological, or cultural characteristics of properties that qualify to meet National Register Criteria (State Historic Preservation Officer responsible for administration) Note: Also refer to National Natural Landmarks Program (36 CFR 62) and National Historic Landmarks Program (36 CFR 65)
Local Agencies		
Lincoln County Planning Department	Conditional Use Permit or Special Use Permit	Activities where use is conditional in a particular zone
	Building permit	Construction of structures
Lincoln County Highway Department	Franchise Agreement	Use of county right-of-way for construction and maintenance activities
	Approach Permit	Preforming work on county road rights-of-way
Lincoln County Health Department	Onsite Sewage Disposal Permit	Sewer systems that treat and dispose of sewage on the property where it originates through septic tanks and subsurface disposal fields

SECTION 1 CORRECTIONS AND MODIFICATIONS TO THE DEIS

FACT SHEET

Page i, second paragraph, line 1. Replace "KVA Resources, Inc., and Central and Southwest Energy, Inc. (CSW) propose to construct a..." with "KVA Resources, Inc. (KVA) and Central and South West Energy, Inc. (CSWE) propose to construct..."

Page i, second paragraph, 2nd sentence. Replace sentence with "The project site is approximately 1,200 acres, of which less than 140 acres will be impacted. The footprint of the facilities permanently impacts 75 acres; 70 acres of agricultural lands and 5 acres of three-tip sagebrush/Idaho fescue habitat. The remaining 65 acres will be temporarily disturbed during construction of an underground gas pipeline, an underground water pipeline, and grading for the area used for the collection of stormwater runoff into the stormwater retention pond."

Page i, fourth paragraph. Replace "The proponents are KVA Resources, Inc. and CSW Energy, Inc." with "The proponents are KVA and CSWE."

SECTION 1 - SUMMARY

Section 1.1 Background

Page 1-1, first paragraph, lines 5 and 6: Currently reads "...independent power producers: KVA Resources, Inc. and Central and Southwest energy, Inc. (CSW)." Should read "...independent power producers: KVA Resources, Inc. and Central and South West energy, Inc. (CSWE)."

Section 1.2.2 Bonneville Power Administration (BPA)

Page 1-2, add after 1st paragraph: "Following completion of the Final EIS, BPA will delay making a decision on whether to construct and operate transmission facilities to the generation plant. A new pipeline will be needed to provide natural gas to the facility. If the developers decide to proceed with studies of the gas pipeline with Pacific Gas Transmission, PGT will submit a permit application to FERC for approval. As required by NEPA, FERC will then proceed with environmental analysis of the gas pipeline. BPA will be a cooperating agency in that environmental review, and the environmental impacts associated with the gas pipeline will be considered by BPA before making a final decision on the project. A Record of Decision will then be issued."

Section 1.3.1 Proposed Action (Preferred Alternative)

Page 1-4, first paragraph in section, line 8: Currently reads "resulting in zero surface water discharge." Should read "...resulting in zero discharge to surface water."

Page 1-4, second paragraph in section, lines 2-4: Currently reads "The NRPF will require approximately 55 to 70 gallons per minute (gpm) (3.5 to 4.4 liters per second) for use in boiler makeup, cooling, general process applications, and as a domestic water supply. Should read "...approximately 55 to 75 gallons per minute..."

Page 1-5, Figure 1-1: See revised Figure 1-1.

Section 1.4.1.2 Climate

Page 1-9, All Other Facilities Impacts: Delete last sentence, revised section now reads "***All Other Facilities***—No impacts of the transmission facilities are expected on climate or local meteorology. Construction and operation of the natural gas pipelines are not expected to impact the regional or local climate of the project area."

Page 1-9, Mitigation Measures: Delete last sentence, revised section now reads "The NRPF has attempted to identify potential environmental issues and incorporate measures to reduce or avoid significant environmental impacts as part of its overall project development. No mitigating measures have been proposed for the potential impacts to climate. With the best available control technology (BACT) controls described in the permit application and detailed in the Application for Site Certification, Part 6, no mitigation is required."

Page 1-9, Significant Adverse Impacts that cannot be Avoided: Replace paragraph with "No significant, unavoidable adverse impacts to climate are anticipated after implementation of BACT. However, carbon dioxide (CO_2) emissions from the NRPF may contribute to the greenhouse gases. The incremental contribution of the NRPF is in itself not considered significant. This relationship of carbon dioxide emissions from the NRPF site to global warming is discussed in Section 4.2."

Section 1.4.1.3 Air Quality

Page 1-10, fourth full paragraph, lines 3 and 4: Currently reads "Air quality impacts of the natural gas pipeline (e.g., compressor stations) have not been assessed for this EIS." Should read "Incremental air quality impacts of the existing natural gas pipeline have not been assessed for this EIS. Now new compressor stations are required."

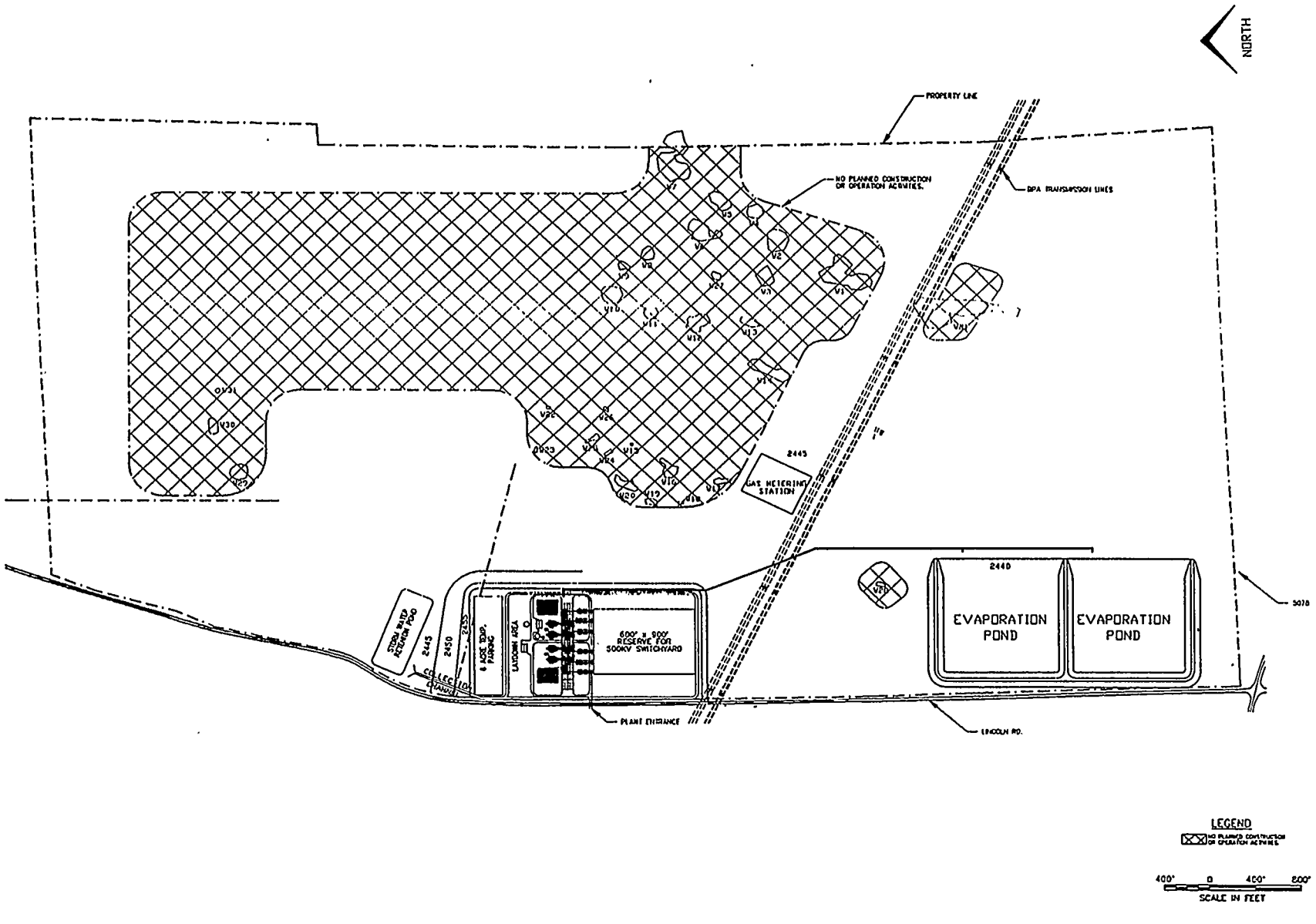


FIGURE 1-1
Conceptual Site Layout

Page 1-10, fifth full paragraph, line 6: Currently reads "...construction management measures, such as water spraying and washing vehicle wheels." Should read "...construction management measures, such as water spraying, washing vehicle wheels, and reduced speed limits for construction vehicles."

Section 1.4.1.5 Water Quality

Page 1-11, first paragraph in section, line 1: Currently reads "On-Site Retention Pond." Should read "On-Site Ponds."

Page 1-11, first paragraph in section, lines 4 and 5: Currently reads "whether the lined ponds are leaking and whether contaminants from the unlined pond are leaching. Should read "...whether the lined evaporation ponds are leaking and whether contaminants from the unlined stormwater pond are leaching..."
Page 1-12, 1st paragraph, 1st sentence: Change "Wastewater from employee sanitary facilities, service sinks, etc., will be routed to a septic system and transferred to the wastewater discharge pond." to "Wastewater from employee sanitary facilities, service sinks, etc., will be routed to a package sewage treatment system and transferred to the evaporation pond."

Page 1-12, fourth paragraph: Replace ***Natural Gas Pipeline*** paragraph with "***Natural Gas Pipeline***—Potentially significant surface water quality, wetland, and upland habitat impacts might be caused by the proposed construction activities. If streams are crossed using open cut methods, the natural banks, riparian vegetation and bottom of the streams often suffer extended degradation. Established bank vegetation could be removed and this would increase the potential for erosion and stream channel migration. In turn, the potential for siltation downstream may increase significantly."

Page 1-12, fifth paragraph, first sentence: Change "...the project site and transmission line corridor, as required ..." to "...the project site and transmission and gas line corridor, as required ...".

Section 1.4.1.6 Plants and Animals

Page 1-13, third paragraph in section, lines 3 and 4: Change "There could be significant impacts could in tall shrub..." to "There could be significant impacts in tall shrub..."

Page 1-14, second full paragraph, second sentence: Change "Any wetlands near proposed construction and operations activities will be flagged in the field, ..." to "Any wetlands and undelineated seasonally wet areas near proposed construction and operations activities will be flagged in the field, ..."

Page 1-14, third full paragraph, second sentence: Change "Although no significant impacts to native plants or wildlife habitats are predicted from the construction at the NRPF site, the

applicant has agreed to consider implementing a wildlife enhancement plan developed in consultation with the Washington Department of Fish and Wildlife (WDFW)." to "Impacts to native plants and wildlife habitats related to the construction and operation of the NRPF would be mitigated by implementing a habitat/wildlife enhancement plan developed in consultation with the Washington Department of Fish and Wildlife (WDFW)."

Section 1.4.2.2 Land and Shoreline Use

Page 1-17, second paragraph, line 1: Change "...is not considered necessary in given..." to "...is not considered necessary given..."

Section 1.4.2.3 Recreation

Page 1-17, second paragraph in section, lines 2 and 3: Currently reads "Although BPA is coordinating with the city on tower placement, the project could permanently lessen the park's usefulness, and would lead to a significant impact." Should read "Although BPA is coordinating with the city on tower placement, the project could permanently lessen the park's aesthetic and recreational value, and depending on the degree of intrusion could lead to a significant impact."

Section 1.4.2.4 Visual and Aesthetic Resources

Page 1-18, second paragraph in section, lines 3 and 4: Change "...facility's night-time security lighting and would directly see the anti-collision lights on the emission stacks." to "...facility's night-time security lighting."

Pages 1-18 and 1-19, last paragraph that begins on 1-18 and continues on 1-19: Currently reads "Measures designed to mitigate visual impacts of the proposed facility include planting pine tree stands to screen the facility as much as possible, painting the buildings earth-tone colors to blend with the landscape, painting the exhaust stacks a light color to blend with the sky and mountains, and planting deciduous and evergreen trees to blend with the rural aesthetic of the project area. Should read "Measures designed to mitigate visual impacts of the proposed facility include planting native trees to screen the facility and painting the buildings earth-tone colors to blend with the landscape."

Section 1.4.2.6 Transportation

Page 1-20, last line: Change "The impacts will be concentrated on State Route 2..." to "The impacts will be concentrated on U.S. Federal Highway 2..." Throughout the document, State Route 2 should be changed to U.S. Federal Highway 2.

Section 1.4.2.7 Public Services and Utilities

Page 1-22, third paragraph, line 3: Currently reads " A good faith effort will be made to hire approximately half of the permanent workers for the project from the local communities. In addition, a good faith effort will be made to hire as many construction workers from the local labor pool." Should read "A good faith effort will be made to hire construction and permanent workers for the project from local communities."

Section 1.5 Areas of Controversy and Issues to be Resolved

Page 1-23, first bullet: Change "... the natural gas pipeline." to "... the natural gas pipeline and transmission."

Page 1-24, after last bullet: Add "Aesthetic and air quality impacts to the Coulee Dam National Recreation Area."

Section 1.6.1 Natural Gas Pipeline

Page 1-2, second full paragraph: Replace paragraph with "FERC is responsible for the review and approval of all interstate pipelines before construction, which is accomplished by issuing a Certificate of Public Convenience and Necessity. When Pacific Gas Transmission Company (PGT) submits an application for the gas pipeline, FERC will conduct a NEPA review of its potential impacts. BPA plans to be a cooperating agency in FERC's gas pipeline review and the environmental impacts associated with the gas pipeline will be considered by BPA before making a final decision on the project after FERC's analysis is complete. EFSEC, however, will have no further formal role in evaluating the formal gas pipeline application."

SECTION 2 - ALTERNATIVES INCLUDING THE PROPOSED ACTION

Page 2-3, Figure 2-1: See revised Figure 2-1.

Section 2.1.2.1 General Plant Description

Page 2-2, first paragraph in section, lines 2 and 3: Change "...consisting of four MS7221FA combustion turbines..." to "...consisting of four General Electric MS7221FA combustion turbines or equivalent..."

Page 2-2, first paragraph in section, lines 5 and 6: Change "Chilling capability of the inlet air will be provided." to "No inlet air cooling is provided."

Page 2-5, Figure 2-2: See revised Figure 2-2.

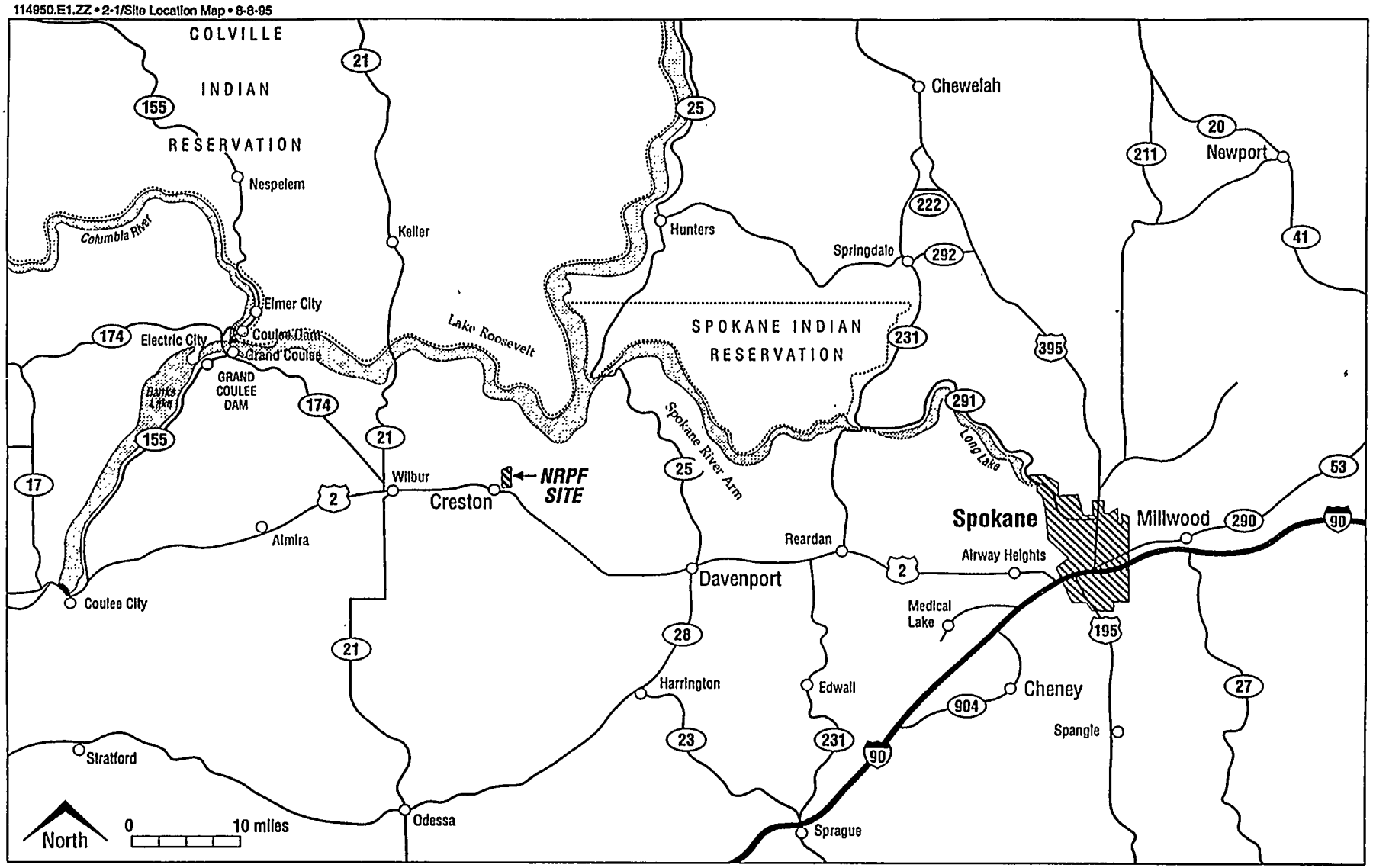


FIGURE 2-1
Site Location Map

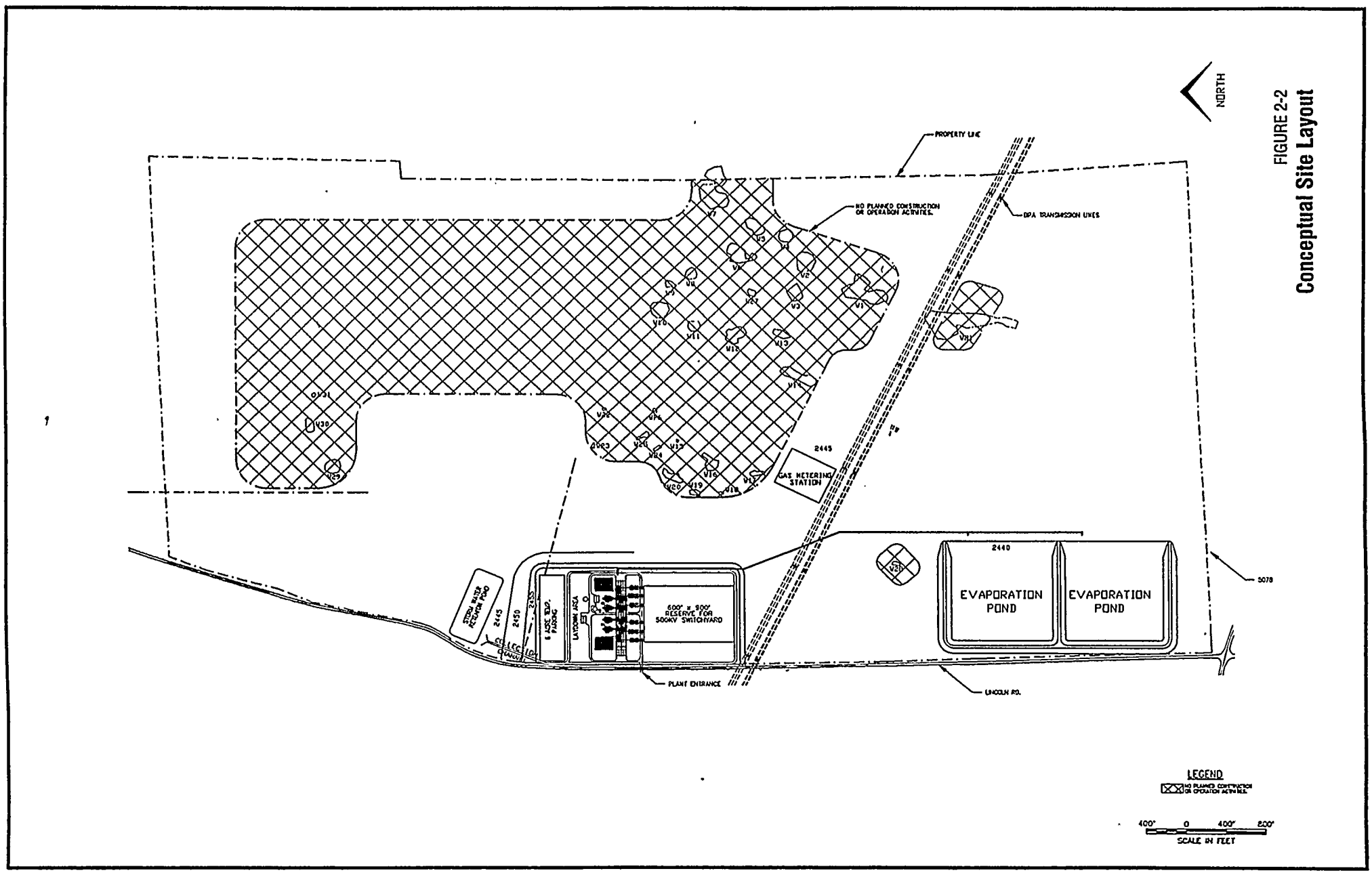


FIGURE 2-2
Conceptual Site Layout

Section 2.1.2.3 Cycle design

Page 2-13, last paragraph (continuing on page 2-14): Currently reads "The generating facility consists of two combined-cycle units, each containing two combustion turbine generators, one steam turbine generator, and two HRSGs. The combustion turbine section is natural-gas-fired. The combustion turbine discharges hot exhaust gases to the HRSG for the production of steam for use in the steam cycle. Steam from each pair of HRSGs is combined and routed to a separate steam turbine generator. Main steam conditions will be 1,400 pounds per square inch, gauge (psig), or 9.7 MegaPascal (MPa-g) at 1,000°F (538°C), and reheat conditions will be 318 pounds per square inch, absolute (psia), or 2.2 MegaPascal (Mpa-a) and 1,000°F (538°C). In addition, a low-pressure (LP) evaporator will be provided to produce steam at 80 psig (0.5 Mpa-g) and 432°F (222°C) for injection into the LP turbine for additional output. Each HRSG is of triple-pressure design, which includes a separate deaerator."

Should read "The generating facility consists of two combined-cycle power blocks, each containing two combustion turbine generators, one steam turbine generator, and two HRSGs. The four combustion turbines are natural gas-fired. Each combustion turbine discharges hot exhaust gases to an HRSG for the production of steam. Steam from each pair of HRSGs is combined and routed to a steam turbine. Each of the four combustion turbines and two steam turbines rotates a direct coupled electric generator. The steam will be delivered to the steam turbine at approximately 1,485 pounds per square inch absolute (psia) or 10.2 MegaPascal (Mpa-a) at 884°F (473°C), and reheat conditions will be 357 pounds per square inch, absolute (psia), or 2.5 Mpa-a and 838°F (448°C). In addition, a low-pressure (LP) evaporator will be provided to produce steam at 80 psia (0.55 Mpa-a) and 487°F (253°C) for injection into the LP turbine for additional output. Each HSRG is of triple-pressure design, which includes a separate de-aerator."

Page 2-14, first full paragraph, lines 6 and 7: Currently reads "Steam from the LP turbine is exhausted to the surface condenser where it condensed." Should read "Steam from the LP turbine is exhausted to the air-cooled condenser where it is condensed."

Page 2-14, third full paragraph, line 2: Currently reads "Each turbine will exhaust downward to a surface condenser." Should read "Each turbine will exhaust to an air-cooled condenser."

Page 2-15, fourth paragraph, lines 6 and 7: Currently reads "The HP (about 1,400 psia/1,000°F or 9.7 Mpa-a/538°C), IP (about 320 psia/1,000°F or 2.2 MPa-a/538°C), and LP (about 70 psia/432°F or 0.5 MPa-a/222°C) levels are..." Should read "The HP (about 1,485 psia/884°F or 10.2 Mpa-a/473°C), IP (about 357 psia/838°F or 2.5 Mpa-a/448°C), and LP (about 80 psia/487°F or 0.55 Mpa-a/253°C) levels are...."

Section 2.1.2.6 Balance-of-Plant—Mechanical

Page 2-16, third bullet: Currently reads "Three half-capacity circulating water pumps." Should read "One air-cooled condenser, with approximately 24 cells."

Page 2-16, fifth bullet: Currently reads "A full-capacity closed-cycle, air-cooled, heat exchange system." Should read "A full-capacity closed-cycle, cooling water, heat exchange system."

Section 2.1.2.7 Balance-of-Plant—Electrical

Page 2-17, last bullet on page, lines 5-8: Currently reads "All of the breakers in a ring bus are of sufficient capacity to carry all of the local generation capacity. If there is a fault on any part of the ring, the power may be routed in the opposite direction around the ring. Metering of net output will also be coordinated with BPA." Should read "Either a ring bus or a breaker-and-a-half configuration is anticipated. All of the breakers in the switchyard are of sufficient capacity to carry all of the local generation capacity. If there is a fault on any part of the bus, the power may be routed through another path to the transmission interconnect. Metering of net output will also be coordinated with BPA."

Page 2-18, first bullet: Change "...medium voltage (4kV) motors..." to "...medium voltage motors..."

Page 2-19, second full paragraph: Currently reads "The design and installation of the electrical system will be in compliance with the National Electric Code." Should read "The design and installation of the electrical system will be in compliance with the National Electric Code and the National Electric Safety Code."

Section 2.1.2.8 Other Site Improvements

Page 2-20, third paragraph: Currently reads "A conventional farm fence of woven wire topped with two strands of barbed wire will be constructed around the entire site boundary." Should read "A conventional farm fence with five strands of barbed wire will be constructed around the entire site boundary."

Page 2-21, second full paragraph, line 1: Currently reads "The stormwater retention pond will..." Should read "The evaporation pond will..."

Section 2.1.4 Water Supply System

Page 2-23, only paragraph in section, lines 1-4: Currently reads "The NRPF project will require approximately 79,200 to 100,800 gallons per day (gpd) (55 to 70 gpm), or 300 cubic meters per day for use in boiler makeup, general process applications, and as a domestic water supply for the facility. The nominal water usage is expected to be in the range of 55 to 70 gpm. Should read "The NRPF project will require approximately 79,200 to 100,800 gallons per day (gpd) (55 to 75 gpm), or 300 cubic meters per day for use in boiler makeup, general process applications, and as a domestic water supply for the facility. The nominal water usage is expected to be in the range of 55 to 75 gpm."

Section 2.1.5 Wastewater Discharge System

Page 2-23, first paragraph in section, line 3: Currently reads "...resulting in zero water discharge." Should read "...resulting in zero process wastewater discharge."

Section 2.1.5.1 Pretreatment System

Page 2-24, only paragraph in section. Currently reads "In the pretreatment system, lime, coagulant air may be used in a clarifier to reduce suspended solids, silt, turbidity, color, and colloids if required. Chlorination is also added at the clarifier. The product water is then filtered for further solids removal. The filter residue is routed to the evaporation pond."

This paragraph has been deleted.

Section 2.1.5.2 Demineralizer System

Page 2-24, only paragraph in section, line 1: Currently reads "The demineralizer is used to further treat a portion of the filtered water to use as makeup..." Should read "The demineralizer is used to treat a portion of the water supply to use as makeup..."

Section 2.1.5.3 Steam Cycle Blowdown

Page 2-29, only paragraph in section, third line: Currently reads "...bottom of the evaporator where particles collect." Should read "...bottom of the HSRG drums where particles collect."

Section 2.1.5.5 Pretreatment System Wastewater

Page 2-29, only paragraph in section: "This wastewater is composed of a high concentration of the solids found in the water supply with lime, coagulant, coagulant air, and chlorine from the clarifier."

Paragraph deleted.

Section 2.1.6 Stormwater Control System

Page 2-30, third paragraph in section, lines 1 and 2: Currently reads "All storage tanks will have secondary containment with discharge valves kept in the closed position." Should read "All oil storage containers, such as lube oil storage tanks, transformers, etc., will have secondary containment as required by federal and Washington State spill control regulations.

Section 2.1.6.1 Construction Plan

Page 2-31, first bullet: Change "Installation of an 8-foot-high enclosure fence." to "Installation of a 7-foot-high enclosure fence."

Section 2.1.7.1 Proposed System of Heat Dissipation

Page 2-33, first paragraph in section: Currently reads "The cooling system that will serve the condensing and cooling needs of the facility has two major components: a steam turbine condenser, and circulating water for cooling major equipment within the facility."

Paragraph deleted.

Page 2-33, fourth paragraph in section, lines 1 and 2: Currently reads "The condenser finned tubes or elements are arranged in an A-frame orientation so that the steam passes through the tubes in a counterflow orientation." Should read "The condenser finned tubes or elements are arranged in the A-frame orientation. The steam passes down through the tubes counterflow to the air and condenses."

Section 2.1.8.1 Transmission Facilities

Page 2-37, Figure 2-9: See revised Figure 2-9.

Section 2.1.9.2 Construction—Craft and Non-Craft Employment

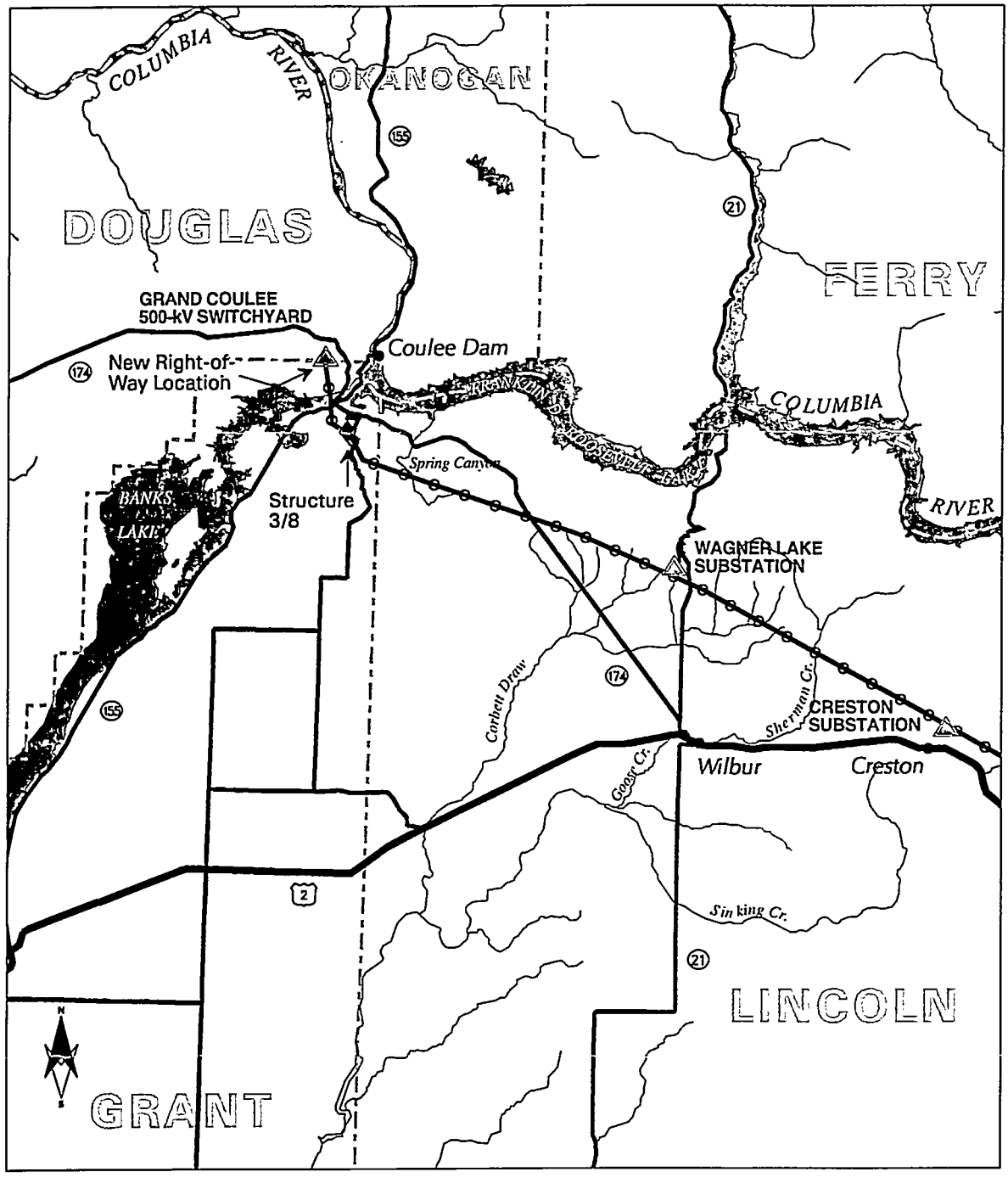
Page 2-44, last sentence on page: Currently reads "Separate contracts and independent workforces will be used to install offsite gas and water pipeline facilities." Should read "Separate contracts and independent workforces will be used to install off-site gas pipelines and transmission facilities.

Section 2.2 No Action Alternative

Page 2-48, second paragraph, second bullet: Currently reads "...by the Board of Commissioners of Lincoln." Should read "...by the Board of Commissioners of Lincoln County."

Northwest Regional Power Facility

Transmission Route –Map 1: Location Map



▲ BPA Substation/
BOR Switchyard

Existing Grand Coulee -
Bell Corridor

Primary Road

Secondary Road

SCALE 1:386300

KILOMETERS

0 2 4 6 8 10

MILES

0 2 4 6 8 10

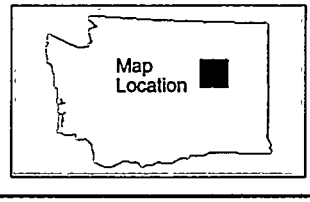


FIGURE 2-9

NRPF Transmission Route
Map 1: Location Map

Page 2-49, last two lines on page: Currently reads "The "wet" cooling system had three major components: a steam turbine, a shell and tube surface condenser, a cooling tower, a circulating water system for cooling major equipment within the facility, and a water makeup pipeline system." Should read "The "wet" cooling system had five major components: a steam turbine, a shell and tube surface condenser, a cooling tower, a circulating water system for cooling major equipment within the facility, and a water makeup pipeline system.

Page 2-53, line 1: Currently reads "An evaluating of all of the primary energy resources..." Should read "An evaluation of all the primary energy resources..."

SECTION 3 - AFFECTED ENVIRONMENT, IMPACTS AND MITIGATION MEASURES

Page 3-1, second paragraph, line 1: Currently reads "Federal and Washington state regulations..." Should read "Federal and Washington State regulations..."

Section 3.1.1.1 Existing Conditions

Page 3-2, second paragraph, lines 2 and 3: Currently reads "The rocks of Okanogan Highly are largely..." Should read "The rocks of the Okanogan Highlands are largely..."

Section 3.1.1.2 Impacts

Page 3-10, last paragraph, after first sentence: Add "In addition, at Grand Coulee, BPA would move an existing 500-kV tie line from the south side of the 500-kV Switchyard to the north side to make room for the new 500-kV line."

Section 3.1.2.2 Impacts

Page 3-25, Project Site and All Other Facilities, 2nd paragraph: Replace paragraph with "Construction and operation of the natural gas pipelines are not expected to impact the regional or local climate of the project area. This lateral gas pipeline will be covered under a separate FERC environmental review process."

Section 3.1.2.3 Mitigation Measures

Page 3-25, NRPF Site, last three sentences: Change "However, CO_2 emissions from the NRPF will contribute to the cumulative impact of greenhouse gases. The incremental contribution of the NRPF is in itself not considered significant, although the cumulative impact of global warming may be significant. This is discussed in Section 4.2." to "However, carbon dioxide (CO_2) emissions from the NRPF may contribute to the greenhouse gases. The incremental

contribution of the NRPF is in itself not considered significant. This relationship of carbon dioxide emissions from the NRPF site to global warming is discussed in Section 4.2."

Section 3.1.3.2 Impacts

Page 3-28, Table 3.2: Replace table with the following:

Table 3.2

Criteria Pollutant Emission Rates.[1]

Pollutant	Hourly Emissions (lb)	Annual Emissions (tons)
Nitrogen oxides	200	876
Carbon monoxide	~~280~~ 56	~~1,174~~ 249
Sulfur dioxide	4	17
Non-methane hydrocarbons	12	53
PM_{10}	34	151

1 - Emissions shown are the combined total for four turbines.

Pages 3-29 & 3-30, Modeled Ambient Air Quality Concentrations, 1st paragraph: Change "Two EPA-developed computer dispersion models were used to estimate the ambient air pollutant concentrations caused by the controlled emissions from the NRPF turbines: the ISCST2 model was used to evaluate close-range impacts resulting from building wake effects; and the COMPLEX1 computer model was used to calculate the long-range impacts within the elevated terrain near Creston Butte and within the Spokane Indian Reservation. The close-range impacts ..." to "Two EPA-developed computer dispersion models were used to estimate the ambient air pollutant concentrations caused by the controlled emissions from the NRPF turbines: the ISCST2 model was used to evaluate impacts in flat terrain. The COMPLEX1 model and the ISCST@ were both used to evaluate impacts in the intermediate terrain, which is defined as areas above stack top but below plume height. Creston Butte and areas within the Spokane and Colville Indian Reservations were identified as areas with intermediate terrain. The close-range impacts ..."

Page 3-30, second paragraph: Currently reads "The 'PSD increment' is the allowable increase in the ambient concentration above the background values." Should read "The "PSD increment" is the allowable increase in the ambient concentration above the baseline values.

Page 3-30, Table 3.4: Replace table with the following:

Table 3.4

PSD Increment Analysis Results.

	Class I (µg/m³)		Class II (µg/m³)	
Pollutant	**Impact**	**PSD Increment**	**Impact**	**PSD Increment**
NO_x (annual)	~~0.025~~ 0.18	2.5	~~0.86~~ 1.6	25
PM_{10} (annual)	~~0.005~~ 0.03	4.0	~~0.15~~ 0.27	17
PM_{10} (24-hour)	~~0.14~~ 0.29	8.0	~~12.0~~ 3.0	30

Page 3-31, Table 3.5: Replace table with the following:

Table 3.5

Criteria Pollutant Impacts vs. AAQS.

Pollutant	**NRPF Modeled Impact (µg/m³)**	**Background Concentration (µg/m³)**	**Total Concentration (µg/m³)**	**AAQS (µg/m³)**
NO_x (annual)	~~0.86~~ 1.6	11	~~12~~ 13	100
CO (1-hour)	~~766.0~~ 91.0	1,165	~~1,931~~ 1,256	40,000
CO (8-hour)	~~220.0~~ 68.0	1,165	~~1,385~~ 1,233	10,000
PM_{10} (24-hour)	~~12.0~~ 3.0	86	~~98~~ 89	150
PM_{10} (annual)	~~0.15~~ 0.27	13	~~13~~ 13	50

Page 3-31, Table 3.6: Replace table with the following:

Table 3.6

Tap Impacts vs. ASILs.

Pollutants	**Maximum Impact (µg/m³)**	**ASIL (µg/m³)**
Benzene	~~1.7×10^{-4}~~ 3.0×10^{-4}	0.12
Formaldehyde	~~2.0×1^{-3}~~ 3.1×10^{-3}	0.077

Page 3-32, Effects on Water Quality and Sensitive Amphibian Species, 5th and 6th sentences: Change "In all cases, the modeled changes in the rainwater pH were small relative to the assumed baseline pH, and the overall pH values of the ephemeral and permanent water bodies was within the tolerance level that might indicate adverse effects on amphibians. Therefore, it was concluded that the NRPF emissions would not cause adverse impacts on sensitive animal species in the Class I areas." to "In all cases, the modeled changes in the rainwater pH were small relative to the assumed baseline pH, and the overall pH values of the ephemeral and permanent water bodies were within the tolerance level that might indicate adverse effects on amphibians, except for one amphibian species. In the Spokane Indian Reservation, rainwater pH was predicted to be 5.3 using conservative methodology. The Tiger Salamander was identified as having a potential impact threshold of pH 5.3. Because of the conservative methodology used in the analysis, it was concluded that the NRPF emissions would not cause adverse impacts on sensitive animal species in the Class I areas."

Page 3-33, Table 3.7: Replace table with the following:

Table 3.7

Summary of NO_x Impacts on Soil and Vegetation.

Class I Area	Parameter	Background Loading Rate (kg/ha/yr)	Incremental Change (kg/ha/yr)	Predicted Impact (kg/ha/yr)	Conclusion
Alpine Lakes	Total N	2.6	~~0.004~~ 0.021	2.6	No adverse impact
Glacier Peak	Total N	2.9	~~0.002~~ 0.011	2.9	No adverse impact
Pasayten	Total N	2.6	~~0.017~~ 0.011	2.6	No adverse impact
North Cascades	Total N	2.9	~~0.002~~ 0.011	2.9	No adverse impact
Spokane Indian Reservation	Total N	~~2.9~~ 0.8	~~0.053~~ 0.376	~~3.0~~ 1.18	No adverse impact

Page 3-34, Natural Gas Pipeline, 1st paragraph: Delete 1st paragraph, section now reads "Air quality may be impacted during construction of the natural gas pipeline during trenching activities. Wind erosion may significantly increase fugitive dust concentrations during trenching activities. Fugitive dust is a known problem in the project vicinity."

Section 3.1.5.2 Impacts

Page 3-39, first paragraph under "Groundwater," lines 3 and 4: Currently reads "...is expected to provide a recharge function to the groundwater table in the Sinking Creek basin." Should read "...is expected to provide a recharge function to the groundwater table."

Page 3-39, last paragraph on page: Change "...an 8-foot enclosure fence..." to "a 7-foot enclosure fence..."

Section 3.1.5.2 Mitigating Measures

Page 3-42, last paragraph, line 3: Currently reads "...to detect if the lined pond is leaking and whether or not contaminants from the unlined pond are..." Should read "...to detect whether the lined ponds (evaporation) is leaking and whether or not contaminants from the unlined pond (stormwater) are..."

Section 3.1.6.1 Existing Conditions

Page 3-44, third paragraph, lines 1 and 2: Currently reads "The habitats were identified during surveys of the project site on 16 and 17 June 1993, 3 and 4 June 1994, and 16 through 19 May 1995. Should read "The habitats were identified during surveys of the project site on 16 and 17 June 1993, 2 and 3 June 1994, and 16 through 19 May 1995.

Page 3-45, third full paragraph, line 5: Currently reads "...long-leaf fleabane (*Ergeron corymbosus*)..." Should read "...long-leaf fleabane (*Erigeron corymbosus*)..."

Page 3-45, third full paragraph, line 8: Currently reads "*...Artemisia tridentata tridentata...*" Should read "*...Artemisia tripartita...*"

Page 3-45, fourth full paragraph, line 5: Change "... 42 ..." to "... 45 ...".

Page 3-45, fourth full paragraph, fourth sentence: Change "Most of these wetlands are in the northwest portion of the site." to "Most of these wetlands are distributed through the central portion of the site."

Page 3-45, fourth full paragraph, line 5: Currently reads "...photographs indicated 42 isolated..." Should read "...photographs indicated 43 isolated..."

Page 3-48, fifth full paragraph, line 2: Change "Grazing has degraded the plant communities ..." to "Most of this habitat is highly degraded from cattle grazing ..."

Page 3-49, second full paragraph, line 10: Currently reads "Great Basin gopher snakes (*pituophis catenifer*)..." Should read "Great Basin gopher snakes (*pituophis melanoleucus deserticola*)..."

Page 3-49, third full paragraph, line 6: Currently reads "...and mule deer have been seen at the site." Should read "...and mule deer could potentially use this habitat at the site."

Page 3-49, fourth full paragraph, lines 1 and 2: Currently reads "Waterfowl, such as mallard (*Anas platyrhynchos*) and cinnamon teal (*Anas cyanoptera*)..." Should read "Waterfowl, such as mallard (*Anas platyrhynchos*) and green-winged teal (*Anas crecca*)..."

Page 3-51, last paragraph, line 4: Currently reads "...as a result of domestic livestock grazing in the 1830s and later for croplands." Should read "...as a result of domestic livestock grazing and agricultural practices."

Page 3-54, fifth full paragraph: Currently reads "Farming and livestock grazing have reduced or degraded the original steppe wildlife community in Washington. Any steppe, especially shrub steppe, that retains native species and supports native wildlife is highly valued." Should read "Farming and livestock grazing have reduced or degraded the original steppe wildlife community in Washington. Any steppe, especially shrub steppe, that retains native species and supports native wildlife would be very valuable."

Section 3.1.6.2 Impacts

Page 3-57, first paragraph under NRPF Site, sentence 2 and 3: Currently reads "These acres will be lost as a result of the construction and operation of the proposed power plant and ancillary facilities. Losses will include about 70 acres (28 ha) of agricultural vegetation and 70 acres (28 ha) of three-tip sagebrush/Idaho fescue habitat." Should read "The footprint of the facilities permanently impacts 75 acres; 70 acres of agricultural lands and 5 acres of three-tip sagebrush/Idaho fescue habitat. The remaining 65 acres will be temporarily disturbed during construction of an underground gas pipeline, an underground water pipeline, and grading for the area used for the collection of stormwater runoff into the stormwater retention pond.

Page 3-58, first paragraph in Wildlife section, line 5: The following sentence should be added to the end of paragraph. "No critical wildlife habitat will be impacted, and all wetlands will be avoided, and wetland setbacks maintained."

Page 3-58, second paragraph under Wildlife: Currently reads "Impacts to wildlife are considered significant. This determination is based on the amount of habitat impacted and associated impacts on wildlife by increased light, noise, and increased human activity and increased industrial activities in the area." Should read "Impacts to wildlife will not be significant. The permanent construction footprint at the NRPF site is 75 acres, of which 70 acres are now agricultural fields (as noted previous 3-51). These fields are unlikely to provide resident habitat for wildlife species. Wildlife may be impacted by the construction and operation of the NRPF site, but the mitigation measures addressed in the following sections were designed to sufficiently offset any permanent habitat losses. The loss of 5

acres of three-tip sagebrush/Idaho fescue, while adverse to wildlife, is not considered significant in view of the remaining undisturbed habitat on the site and the mitigation proposed for that acreage.

Page 3-59, fourth full paragraph: Replace whole paragraph with "Tower Installation and Replacement—There could be some impacts to streams as a from erosion and sedimentation caused by construction activities. The corridor crosses several streams or tributaries, all with intermittent flows. Intermittent streams flow only during periods of snow melt or storm runoff. none of those streams have enough flow to support seasonal or year-round fisheries. Because none of the affected streams supports seasonal or year-round fisheries, there would be no impacts to fisheries."

Section 3.1.6.3 Mitigating Measures

Page 3-62, first paragraph: Change "The loss of three-tip sagebrush/Idaho fescue habitat in eastern Washington should be quantified and the conversion of agricultural land back to this type of habitat should be considered. It may be advisable to have a biologist on-site during initial grading of the NRPF site to identify sensitive species of plants during construction activities. Sensitive plants could be transplanted to a neighboring area with similar characteristics." to "To mitigate the loss of the 5 acres of three-tip sagebrush/Idaho fescue habitat and the 70 acres of agricultural land to be permanently affected by the project, the applicant proposes to temporarily eliminate grazing on the remaining portion of the rangeland for a period of three to five years to allow re-establishment of the native vegetation. Thereafter, grazing of those areas would be allowed on a managed basis consistent with the habitat quality."

Page 3-62, 3rd paragraph: Change "Weed controls will include, where appropriate, preconstruction treatment and removal, establishment of wash-down stations at the edge of infested areas, and inspection of borrow materials for evidence of weed species. At the washdown stations, high-pressure water will be used to clean construction equipment to minimize the likelihood that weed seeds could be spread from infested to non-infested areas. All borrow material areas will be inspected to ensure they do not harbor noxious weeds." to "To prevent new weed infestation by cleaning equipment travelling in and out of weed-infested areas, using herbicide or biocontrol treatments, and reseeding disturbed areas with native species."

Page 3-62, 5th paragraph: Change "***Wildlife***—It may be advisable to have a biologist on-site during initial grading of the NRPF site to identify sensitive species of wildlife during construction activities. If found, sensitive animal species could be moved to another location." to "***Wildlife***—The temporary elimination of grazing, and the management of grazing thereafter, will enhance the site for wildlife, and will offset any minimal losses of habitat functional values associated with the project. Furthermore, the stormwater retention and evaporation ponds will be designed and constructed in a manner that is as "wildlife

friendly" as the design parameters for their primary purpose will allow. Such considerations will include shallow shoreline slopes and earthen berms planted with native vegetation."

Page 3-64, first paragraph, line 2: Change "To better protect native vegetation and existing wildlife, ..." to "To better protect sensitive habitats, native vegetation and existing wildlife, ...".

Page 3-70, second paragraph under Site Conditions, last two sentences: The last two sentences should be deleted and replaced with "the Measured noise levels shown in Table 3.15 are given in terms of Leq, L25, L8.33 and L2.5. The measure Leqs can be compared directly with the WAC regulations. To compare the measured L25, L8.33, and L2.5 with the WAC regulations, 5dBA, 10dBA, and 15dBA should be added to the WAC limit, as discussed on page 3-69.

Page 3-74, sixth paragraph, line 1: Currently reads "During operation, sludge, a semi-solid, will be produced by the cooling tower." Should read "During operation, sludge, a semi-solid, will be produced by the water treatment system.

Page 3-79, third paragraph, lines 3 and 4: Change "...CSW Energy, Inc...." to "...CSWE..."

Section 3.2.1.2 Impacts

Page 3-85, first full paragraph, line 7: Currently reads "...45 dBA to 54 dBA...(Table 3.18)." Should read "...36 dBA to 38 dBA...receivers"

Page 3-85, first full paragraph, lines 9 and 10: Currently reads "These modeled levels are higher than the nighttime and daytime background levels, and are therefore expected to be audible at the residential receivers." Should read "These modeled levels are higher than the night-time background levels, and may be audible at the residential receivers if startup operations occurred at night.

Page 3-85, first full paragraph, last sentence: Currently reads "Therefore, the startup operations would comply with the state noise limits if they were conducted during the day." Should read "Startup operations would comply with the WAC daytime and night-time limits."

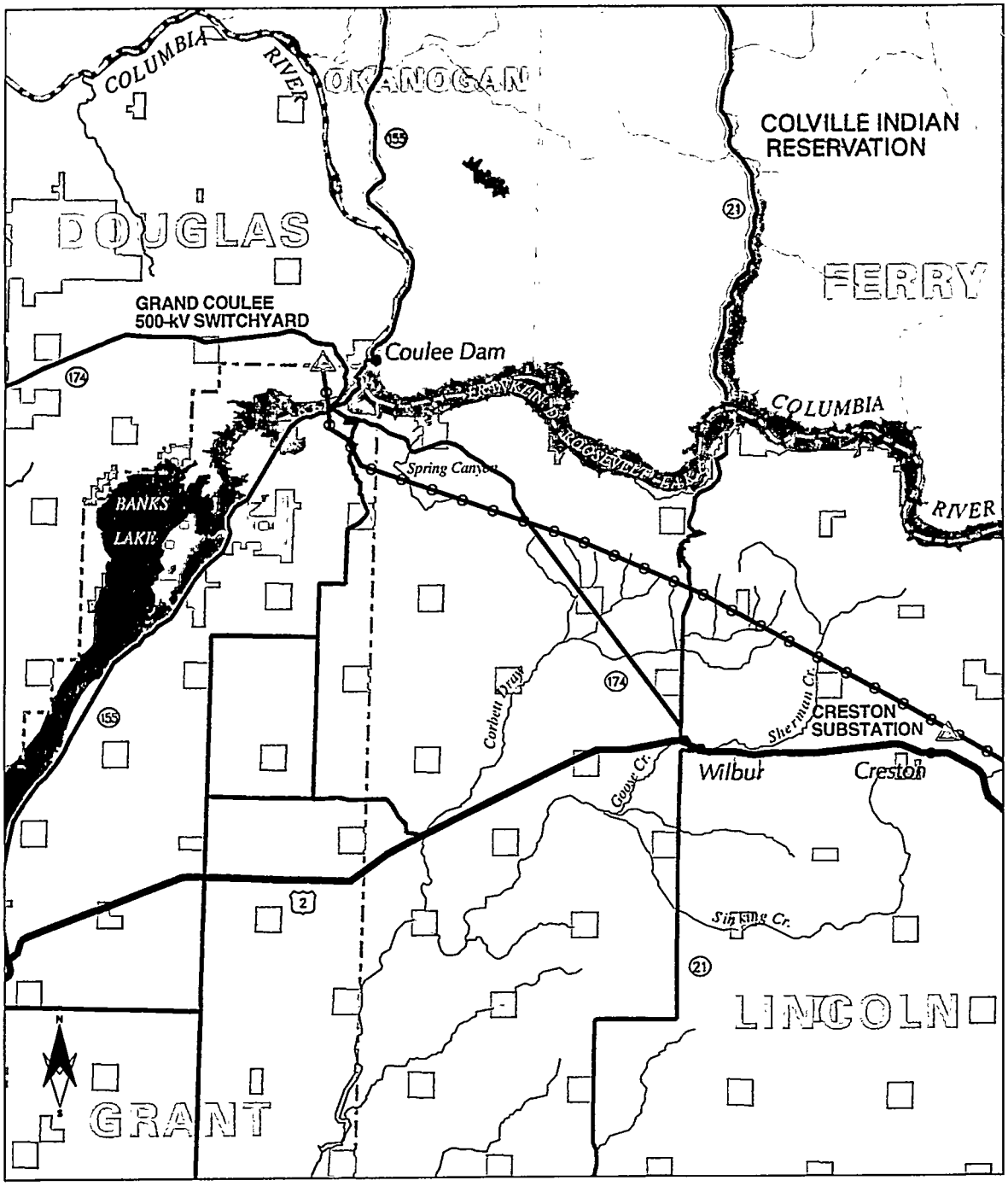
Page 3-87, first full paragraph, line 3: Currently reads "..site and burned as it is used..." Should read "..site and burned as it is used..."

Section 3.2.1.3 Mitigation Measures

Page 3-91, last paragraph on page, line 3: Change "...CSW Energy, Inc..." to "...CSWE..."

Northwest Regional Power Facility

Transmission Route –Map 2: Major Land Ownership Or Designation



- BPA Substation/ BOR Switchyard
- Existing Grand Coulee - Bell Corridor
- Primary Road
- Secondary Road
- Private or Unknown
- State Park
- National Park Service Recreation Area
- Bureau of Land Management
- State Dept. of Natural Resources
- Indian Reservation Lands

SCALE 1:386300

KILOMETERS 0 2 4 6 8 10

MILES 0 2 4 6 8 10

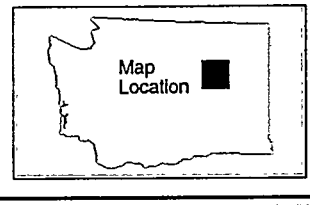


FIGURE 3-9

NRPF Transmission Route

Map 2: Major Land Ownership or Designation

Section 3.2.2.1 Existing Conditions

Page 3-93, third paragraph, last sentence: Change "The entire Lake Roosevelt is also managed for recreational use." to "The entire Lake Roosevelt National Recreation Area is managed for recreational use."

Page 3-97, Figure 3-9: See revised Figure 3-9.

Page 3-108, NRPF Site, 2nd paragraph: Delete last sentence which states "Finally, the plan proposes that the site continue to be used for agriculture."

Page 3-111, last paragraph, first sentence: change "For the City of Grand Coulee and Grant County, impacts ..." to "For the City of Grand Coulee, Grant County, and Douglas County, impacts ..."

Section 3.2.3.1 Existing Conditions

Page 3-115, second paragraph in section, lines 4 and 5: Currently reads "Three new golf courses have been proposed in the northern Davenport area at Deer Meadows, Seven Bays, and Mill Canyon." Should read "Two new golf courses have been proposed in the northern Davenport area at Seven Bays and Mill Canyon, and another one has recently opened to the public at Deer Meadows."

Section 3.2.3.2 Impacts

Page 3-119, last paragraph, lines 1 and 2: Currently reads "Only 29 permanent jobs would be created for facility operation, and KVA expects to fill approximately half of these plant jobs with local residents. The increase in local population of 14 operation workers and their families would result in an insignificant increase in demand for recreation facilities in the project vicinity." Should read "Twenty-nine permanent jobs would be created for facility operation, and KVA/CSWE expects to fill these plant jobs with local residents to the degree possible. The increase in population caused by the plant workforce should not be significant."

Page 3-120, Mitigation Measures, 1st paragraph, 1st sentence: Change "A good faith effort will be made to hire approximately half of the permanent workers for the project from the local communities." to "A good faith effort will be made to hire permanent workers for the project from the local communities."

Section 3.2.4.1 Existing Conditions

Page 3-120, first paragraph: Add to the end of the paragraph "On clear days a portion of the North Cascades, approximately 160 kilometers to the west, can be observed from Highway 2 traveling from Creston to Wilbur, Washington."

Section 3.2.4.2 Impacts

Page 3-135, second paragraph, lines 1-3: Currently reads "Lighting would consist of small, high-intensity lights to illuminate exterior portions of on-site buildings and anti-collision lights on the four 125-foot emission stacks." Should read "Lighting will consist of small, high-intensity lights to illuminate exterior portions of on-site buildings." Because the stacks are now less than 200 feet high, they do not need to be illuminated for Federal Aviation Association requirements.

Page 3-135, third paragraph, lines 4 and 5: Currently reads "...night-time security lighting and would directly see the anti-collision lights on the emission stacks." Should read "...night-time security lighting."

Section 3.2.5.1 Existing Conditions

Page 3-138, first full paragraph: Currently reads "Dr. Rob Whitlam, state archaeologist with the Office of Archaeology and Historic Preservation, notes that the 1980 study probably needs to be redone in order to meet contemporary professional standards (Whitlam 1994)." Should read "Dr. Rob Whitlam, state archaeologist with the Office of Archaeology and Historic Preservation, notes that the 1980 study probably needs to be redone in order to meet contemporary professional standards (Whitlam 1994). Hence, the NRPF project area, although partially surveyed by Morgan et al. (1980), was surveyed again by Larson et al. (1995).

Page 3-138, second full paragraph, lines 6 and 7: Currently reads "A strip along the eastern margin of the New Study Area was not surveyed, hence the abrupt straight boundary for site 45LI138." Should read "A strip along the eastern margin of the New Study Area was not surveyed."

Page 3-139, first full paragraph, lines 5-7: Currently reads "None of these appears to be eligible for inclusion in the State or National Registers of Historic Places, although Requests for Determination of eligibility have not been sought from the SHPO." Should read "None of these places appears to be eligible for inclusion in the State or National Register of Historic Places."

Page 3-139, third full paragraph, lines 5-7: Currently reads "Although no formal determination has been made, site 45LI138 is considered potentially eligible for inclusion in the NRHP. For purposes of the project, 45LI138 will be assumed eligible." Should read "Site 45LI138 is considered potentially eligible for inclusion in the NRHP."

Pages 3-142 and 3-143, first paragraph under Traditional Cultural Properties: Currently reads "Although consultation with the Spokane and Colville Confederated Tribes has been initiated, the level of consultation required to identify and document traditional cultural properties has not been completed. Standards for such studies are presented in Bulletin No. 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties (Parker and King 1990)." Should read "No traditional cultural properties potentially eligible for listing on the National Register of Historic Places were identified in the NRPF project area through consultation with the Spokane Tribe and the Colville Confederated Tribes. Adeline Fredine, however, indicated that the NRPF project area was historically a plant-gathering area, as was most of the Creston vicinity. Review of traditional cultural properties for the gas pipeline corridor has not been undertaken with the Tribes."

Section 3.2.5.2 Impacts

Page 3-144, Transmission Facilities, 1st paragraph, last sentence: Change "There is a high probability of impact to sites 45GR664 and 45GR665." to "There is a high probability of impact to sites 45GR664 and 45GR665, if the site are eligible for inclusion in the National Register of Historic Places. If they are not eligible, the project will not affect the site no matter what type of physical or other impact might occur."

Page 3-145, paragraph under Traditional Cultural Properties: Currently reads "The necessary studies to identify traditional cultural properties have not been completed. The nature of traditional cultural properties that reasonably may be anticipated in the project area varies...Unless appropriately identified so that mitigative options can be determined, any such properties will be impacted by the project."

Should read "no impacts to traditional cultural properties eligible for inclusion on the National Register of Historic Places in the NRPF project area would occur. The necessary studies to identify traditional cultural properties in the transmission and gas pipeline corridors have not been completed. The nature of traditional cultural properties that reasonably may be anticipated in the project area varies...Unless appropriately identified so that mitigative options can be determined, any such properties present will be impacted by the transmission and gas pipeline corridor projects."

Section 3.2.5.3 Mitigation Measures

Page 3-145, last paragraph: Add the following sentence to the end of the paragraph: "Other cultural resources mitigation measures that may apply to the NRPF site are listed as stipulations required by the Colville Confederated Tribes and the Spokane Tribe."

Page 3-146, first paragraph, line 6: Change "...and the President's Advisory..." to "...and the Advisory..."

Page 3-146, second paragraph, line 10: Change "...and the President's Advisory..." to "...and the Advisory..."

Page 3-146, third paragraph, lines 2-4: Currently reads "However consultation with affected tribes has been initiated, and the Colville Confederated Tribes and the Spokane Tribe have identified cultural resources decisions that require their participation." Should read "Consultation with the Spokane and Colville Confederated Tribes has resulted in two stipulation agreements that have been approved by each tribe separately."

Section 3.2.6.1 Existing Conditions

Page 3-148, second paragraph, lines 4 and 5: Currently reads "The posted speed limit is 55 mph (86 kmh), reducing to 35 mph (56 kmh) in Davenport and Reardon." Should read "The posted speed limit is 55 mph (86 kmh), and is 30 mph (56 kmh) in Davenport and Reardon.

Page 3-148, third paragraph, lines 1 and 2: Currently reads "...which connects the town of Lincoln..." Should read "...which connects the community of Lincoln..."

Section 3.2.6.2 Impacts

Page 3-153, fourth paragraph, lines 1 and 2: Currently reads "Materials would be delivered to, and workers would arrive at, the site using State Route 2 and either Lincoln Road or Creston Butte Road, depending on which site is selected." Should read "Materials would be delivered to, and workers would arrive at, the site using U.S. Federal Highway 2 and Lincoln Road."

Page 3-154, last paragraph, lines 1 and 2: Currently reads "These shipments will include the combustion turbines, condensers, steam turbines, and generators." Should read "These shipments will include the combustion turbines, condensers, steam turbines, generators, and HRSGs."

Section 3.2.6.3 Mitigating Measures

Page 3-158, first bullet: Currently reads "The applicant will fund the upgrading of Lincoln Road or Creston Butte Road (depending on alternative chosen) from its intersection with State Route 2 to the main facility entrance in order to support construction vehicle weights." Should read "The applicant will fund the upgrading of Lincoln Road from its intersection with U.S. Federal Highway 2 to the main facility entrance in order to support construction vehicle weights."

Section 3.2.7.2 Impacts

Page 3-165, Law Enforcement, 3rd paragraph: Change "... by adding one to three additional staff members. If in-migrant travel to work via car pools, there will be an estimated 100 cars used (3 people per car) and require the additional of three patrol officers and one jail/radio operator. If in-migrants travel to the site by bus, one additional Lincoln County police officer will be needed (Berry 1994)." to "... by adding one to three additional staff members. If in-migrant travel to work via car pools, there will be an estimated 100 cars used (3 people per car), which will require the addition of three patrol officers and one jail/radio operator. If in-migrants travel to the site by bus, one additional Lincoln County police officer will be needed (Berry 1994)."

Section 3.2.7.3 Mitigation Measures

Page 3-168, Mitigating Measures, 1st paragraph, 3rd sentence: Change "A population monitoring program would document the number of workers, family members, and secondary employment population that occurs in the local Lincoln County communities." to "A population monitoring program would document the number of workers, number of family members, and location of construction worker's residences in Lincoln County."

Section 4 Cumulative Impacts

Replace Section 4 with the following:

"The Council on Environmental Quality defines cumulative impact as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Potential cumulative effects include impacts to air quality, water quality, plants and animals, global warming, and socioeconomic impacts.

4.1 AIR QUALITY

The emissions from the NRPF should be viewed individually and collectively with other existing, anticipated, or planned projects. The EPA in its New Source Review Workshop Manual (EPA October 1990) suggests that sources within 31 miles (50 km) be considered in determining potential cumulative impacts. The NRPF site is in a rural area, distant from nearby sources. For the air quality impact analysis included in the SCA, conservative background values were used to account for cumulative impacts from minor sources in the area or major sources whose emissions would be transported into the area. These values were determined following discussions with the Department of Ecology (Bowman 1995).

For CO, a value was selected which had been used for other regulatory analyses in rural areas in Eastern Washington. For NOx, a value was selected from the highest range of values from a study of rural areas in the United States. For PM_{10}, data collected by the WWP for the earlier Creston SCA was used. Predicted concentrations are below acceptable regulatory levels considering cumulative impacts from existing sources.

To identify potential cumulative impacts from anticipated or planned projects, the Department of Ecology (Peterson 1995) and the Spokane County Air Pollution Authority (Vigeland 1995) were contacted to identify proposed projects in Lincoln and Spokane Counties within 31 miles (50 km) of the site. These agencies were unable to identify any proposed projects within that area. Therefore, concentrations from cumulative sources are predicted to be below acceptable regulatory levels for existing, anticipated, or planned projects.

4.2 WATER QUALITY

Runoff from agricultural lands is a major source of impairment to area water quality contributing sediment, excessive nutrients, and chemicals to streams and lakes (U.S. Department of Agriculture, Soil Conservation Service, 1984 and Washington Department of Ecology, 1992). The project would not interfere with ongoing farm conservation efforts to control erosion and maintain water quality. Although minor localized increase in erosion, runoff, and sedimentation are expected from construction and maintenance, the increases would have low impact on water quality and would not impair the current beneficial use of any water body.

4.3 PLANTS AND ANIMALS

In the Columbia Basin ecosystem, biodiversity has been reduced by loss and fragmentation of native steppe habitats. Species such as Columbia sharp-tailed grouse and pygmy rabbits have declined dramatically in the region since conversion of steppe to agriculture.

This project, however, is unlikely to contribute to further biodiversity loss. The amount and quality of habitats lost due to construction activities is relatively insignificant. Important vegetation corridors connecting key wildlife habitats, such as riparian zones, in most cases would not be significantly impacted by the project.

Wetlands - Incremental losses and degradation of wetlands over time have seriously depleted wetland resources. Wetlands have already been impacted by construction of existing transmission lines, grazing, and other agricultural activities. Because Executive Order 11990 requires Federal agencies to avoid adverse impacts to wetlands to the extent possible, BPA would avoid wetlands where possible. Where wetlands cannot be avoided, and wetland values would be affected, appropriate mitigation would be carried out. Therefore, it is not likely that wetlands would be significantly impacted by the project."

4.4 GLOBAL WARMING

The NRPF will emit "greenhouse gases," including CO_2, a non-regulated emission. Many scientists believe that the accumulation of greenhouse gases in the atmosphere is leading to a global temperature increase ("global warming") because these gases can trap heat in the atmosphere. If this hypothesis is correct, the NRPF would contribute to the global warming effect. The NRPF is predicted to emit approximately 3 million tons of CO_2 annually at full operation (838 aMW). However, NRPF CO_2 emissions would be less than from other fossil fuel power sources; to realize an equivalent generating production, natural gas combustion produces about 40 to 50 percent less CO_2 than coal and approximately 25 percent less than petroleum products.

Nevertheless, in conjunction with other regional and global sources of greenhouse gases, the NRPF may contribute additional CO_2 emissions to the atmosphere. Its contribution would not be significant, in comparison to the emissions of greenhouse gases from other sources in Washington State as well as globally. According to a recent report of the Washington State Energy Office (1994), in 1990 total Washington state gross (i.e., without reductions resulting from CO_2 removal by forest growth) emissions of CO_2 were 141.5 million tons, of which 85 million came from the energy sector (which includes transportation). By 2010, total gross emissions of CO_2 are predicted to be 177.5 million tons, of which 122 million tons will be from the energy sector. The NRPF's predicted annual CO_2 emissions of up to approximately 3 million tons would be about 1.7 percent of total Washington CO_2 emissions in 2010, and nearly 2.5 percent of the emissions from the energy sector (Kerstetter 1995).

4.5 SOCIOECONOMIC IMPACTS

There is minimal potential for socioeconomic impacts of the NRPF and associated natural gas pipeline and electrical transmission line upgrade in conjunction with planned or reasonably anticipated projects and population growth in the area. This conclusion is based on discussions with local planning agencies and public services providers between 1993 and

the present (see attached reference list), and more recent discussions and correspondence with Spokane County planning director Wally Hubbard (1995) and Lincoln County planning director Terry Goodman (1995). Neither planning director was aware of planned or anticipated projects within their counties that would have significant cumulative impacts when added to the NRPF project. Both planners were specifically asked to consider potential socioeconomic, air, and water resource impacts in their assessment.

The Spokane County planning director said there continues to be industrial growth in the Airway Heights region near the City of Spokane. However, the anticipated growth is not expected to have significant impacts on the area. Existing facilities near Airway Heights include a waste-to-energy facility and the minimum security prison. The Spokane area frequently handles temporary construction workers. Examples of significant construction projects near or in Spokane, within the last year or on-going, are the new Spokane Arena, the downtown Transit Center, the downtown Sterling Savings Bank, the Intermodal Center, and re-construction of the I-90 freeway west and south of Spokane.

Section 6.2.1 Notice of Intent and Mailings

Page 6-2, last paragraph, line 5: Currently reads "...due to the agency by May 27, and provided contacts for further information." Should read "...due to the Agency by May 27, 194, and provided contacts for further information."

Section 6.2.2 Scoping Meetings

Page 6-3, three bullets: Add "1994" after the dates in each bullet.

Section 6.4 EFSEC Adjudicative Hearings

Page 6-6, second paragraph, line 5: Change "...granted intervenor states." to "...granted intervenor status."

Section 6.5 Publication of Final EIS with Responses to Public Comments

Page 6-6, first paragraph, second sentence: Change "... the public meeting/hearing transcript, ..." to "... the public meeting transcript, ..."

Section 9 Glossary and Acronyms

Page 9-2, definition of CSW: Change "CSW" to "CSWE." Change "Central & Southwest Energy, Inc." to "Central and South West Energy, Inc."

Section 10 Distribution List

Page 10-1, Applicant: Add CSWE as an applicant.

Page 10-2, lines 1 and 4: Delete the question marks at the end of each line.

CHAPTER 2 COMMENTS AND RESPONSES ON THE NORTHWEST REGIONAL POWER FACILITY EIS

2.1 Introduction

This part of the Final EIS includes written comments received on the Draft EIS, oral comments made at the November 15, 1995 public meeting in Creston, and the lead agencies' responses to those comments. This Chapter is organized into two parts: 1) general response; and 2) written comments and specific responses. The general response addresses the issue of the level of environmental review conducted for the natural gas pipeline. In some cases, responses to specific comments cross reference the general response.

2.2 General Response #1- Level of Analysis for the Natural Gas Pipeline

The Energy Facility Site Evaluation Council (EFSEC) and the Bonneville Power Administration (BPA) in conjunction with the cooperating federal agencies determined that the detailed environmental analysis of the natural gas pipeline was beyond the scope of this EIS, and that a focused environmental review of the potential environmental impacts of the natural gas pipeline would be completed by the Federal Energy Regulatory Commission (FERC). As stated in Section 1.6 (Issues Beyond the Scope of the EIS) of the Final EIS, "FERC is responsible for the review and approval of all interstate pipelines before construction, which is accomplished by issuing a Certificate of Public Convenience and Necessity. When an application for the gas pipeline is submitted, FERC will conduct a NEPA review of its potential impacts. BPA plans to be a cooperating agency in FERC's gas pipeline review and the environmental impacts associated with the gas pipeline will be considered by BPA before making a final decision on the project after FERC's analysis is complete. EFSEC, however, will have no further formal role in evaluating the gas pipeline application.

Although not a formal part of the scope of this EIS, information about the natural gas pipeline and its potential environmental impacts has been included where available. This provides as complete a view as possible of the full range of actions associated with the development of the NRPF. The level of information available is not as detailed for the pipeline as for the NRPF and its ancillary facilities."

The construction of the natural gas pipeline would likely require one or more state and local permits, which would require compliance with the State Environmental Policy Act (SEPA). Therefore, a focused environmental review of the potential environmental impacts of the natural gas pipeline may also be completed by a state or local agency (e.g., the Department

of Ecology, Lincoln County, or Spokane County).

The information regarding the natural gas pipeline and its potential environmental impacts was drawn from the PGT pipeline routing study, some of which was included in as Appendix B of the Draft EIS. To better understand the potential environmental effects which FERC will have to address in their NEPA review please refer to Appendix A (Potential Environmental Impacts and Previously Employed Mitigation Options for Natural Gas Transmission Pipelines) of this Final EIS. This additional information more accurately characterizes the general range of impacts associated with gas pipeline projects by drawing on FERC's extensive experience in preparing and conducting numerous NEPA analyses for natural gas pipeline projects in the West. While it does not mean that all of the impacts listed will occur nor all of the mitigation is appropriate for this area, it does represent the types of impacts likely to be examined and mitigation FERC is likely to select from in the site-specific gas pipeline environmental review.

In addition, FERC's staff have developed standard mitigation plans and procedures for erosion control/restoration and wetland/waterbody construction (see Appendix B of the Final EIS), which are routinely made a part of the certificate conditions for interstate gas pipelines.

It should be noted that the gas pipeline will not be built or sited until a decision has been made to proceed with the proposed NRPF, which may not be built for up to ten years. Therefore, preparing a detailed EIS on the natural gas pipeline at this time would not be feasible.

2.3 Written Comments and Responses

This section includes written comments and responses to those comments. Table 2-1 is an index of the comments received.

TABLE 2-1
Index to Comments on the Northwest Regional Power Facility Draft EIS

LETTER	COMMENTS
	Federal Agencies
A	Robert Christensen, USDI Bureau of Reclamation
B	Charles Polityka, USDI Office of Environmental Policy and Compliance
C	Richard Parkin, EPA Region 10
	State Agencies
D	Robert G. Whitlam, State Archaeologist
E	Tony Eldred, Dept of Fish and Wildlife
F	Marvin Vialle, Department of Ecology
G	Chris Regan, WA State Parks and Recreation Commission
H	Attorney General of Washington
	Public
I	Larry Goodrow, Spokane Tribe of Indians
J	Mary and John McCaughey (EFSEC)
K	Mary and John McCaughey (BPA)
L	Bonnie Jensen, Mayor
M	Darryl Peeples and Charles Lean
N	KVA Resources and CSW Energy Comments on the NRPF Draft EIS
O	KVA Resources and CSW Energy Editorial Suggestions for the NRPF Draft EIS
P	Mr and Mrs Blake Angstrom
Q	Mr. and Mrs. Marvin Bean and Sons
R	Craig Brougher, Pangaea International
S	Jack Tenter to Jason Zeller
T	Patti Lowe, Executive Director, Greenhouse Action
U	Rachael Paschal, Center for Environmental Law and Policy
V	Jerry Robinson
W	John Cassady, Pacific Gas Transmission Company
X	Public meeting, Creston, Washington, on November 15, 1995 Mr. Purvis Pete Bean Pete Crow Joe Bean Jim Hall Craig Brougher Mrs. Bean Mr. Purvis Mayor Haydon Mr. Purvis Joe Bean Jim Hall Mr. Purvis

LETTER "A"

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
1150 North Curtis Road
Boise, Idaho 83706-1234

IN REPLY REFER TO:
PN-6519
ENV-6.00

JAN 09 1996

RECEIVED
JAN 09 1996
ENERGY FACILITY SITE EVALUATION COUNCIL

Ms. Nancy Wittpen
Bonneville Power Administration
905 NE 11th Avenue
Portland OR 97232

Subject: Northwest Regional Power Facility Draft Environmental Impact Statement (EIS)

Dear Ms. Wittpen:

Enclosed are comments on the subject document provided by our Grand Coulee Power Office. By now, you should have received comments from the Department of the Interior that indicated no comments from Reclamation on Environmental Review 95/779 of the subject document. We apologize for the error and appreciate the time extension for providing comments to you.

In addition, as recently discussed with Lola Sept of my staff, we mistakenly requested that we be relieved of our status as cooperating agency for this EIS. While our concern and involvement regarding water supply has been put to rest, because the proposed project will be tying into our power grid at Grand Coulee Dam, we still have an interest in the project. Therefore, we do wish to remain as a cooperating agency. 1

If you have questions, please contact Lola Sept at (208) 378-5032.

Sincerely,

Robert C. Christensen

Robert C. Christensen
Regional Environmental Officer

Enclosure

cc: Regional Environmental Officer, Attention: Hart Hodges, Office of the Secretary, Pacific Northwest Region, 500 NE Multnomah St. Suite 600, Portland OR 97232-2036

Bureau of Reclamation's
Comments on the Northwest Regional Power Facility Draft EIS
January 9, 1996

Page 3-10, Tower Installation and Replacement--A statement needs to be added that "Towers will be required to be relocated and/or new towers installed for the relocation of the tie line at the 500 Kv Switchyard at the Grand Coulee Power Office." 2

Page 3-13--Change paragraph title to: "Compensation Station and Tie Line Relocation Sites." 3

Page 3-33, Transmission Facilities--Need to include the relocation of the tie line; revise first sentence. "Transmission line and relocation of tie line construction would. . . ." 4

Page 3-101, Developed Land--Need to include tie line relocation; revise first sentence of first paragraph. "Figure 3-12 shows . . . where new ROW, switchyard expansion, and tie line relocation are proposed." 5

Page 3-111, Developed Land--Need to include Douglas County: revise first sentence. "For the city of Grand Coulee, Grant County, and Douglas County, impacts. . . ." 6

Page 3-134, Transmission Facilities--Need to include tie line relocation: add to first sentence. ". . . the newly proposed transmission line and proposed relocated tie line will not. . . ." 7

Page 3-144, Transmission Facilities--Need to include tie line relocation; add this statement. "There should be no significant direct impact by the tie line relocation at the 500 Kv Switchyard at the Grand Coulee Power Office." 8

LETTER "A" RESPONSES

A-1 Comment noted. The Bureau of Reclamation will remain a Cooperating Agency for this project.

A-2 The construction of a single-circuit 500-kV transmission line will not cause the relocation of the Tie Line at the Grand Coulee Switchyard. As a result Figure 2-9 (NRPF Transmission Route) has been revised. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

A-3 See response to comment A-2.

A-4 See response to comment A-2.

A-5 See response to comment A-2.

A-6 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

A-7 See response to comment A-2.

A-8 See response to comment A-2.

LETTER "B"

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
500 NE Multnomah Street, Suite 600
Portland, Oregon 97232-2036

IN REPLY REFER TO:
ER 95/779

January 9, 1996

Nancy Wittpen
Bonneville Power Administration
905 NE 11th Avenue
Portland OR 97232

Dear Ms. Wittpen:

The Department of the Interior has reviewed the Draft Environmental Impact Statement (DEIS) for the Northwest Regional Power Facility (NRPF) and the following comments are provided for your use and consideration when preparing the Final Environmental Impact Statement (FEIS).

GENERAL COMMENTS

Water Resources

The Bureau of Reclamation indicated that while they were originally a cooperating agency and an intervenor in the original project, they have withdrawn from both roles. Their concern was with loss of water potentially needed for salmon flows because Reclamation had been directed by the National Marine Fisheries Service, in their biological opinion, to acquire water to increase flows for salmon. The proposed well fields, located on Reclamation land, were in direct geologic connection with stored water from Lake Roosevelt and the proponent was requesting a new water right on a tributary of the Columbia River. However, since the proposed action has been changed to use the city of Creston's municipal water supply, there is now no need for a new water right nor use of the land adjacent to Lake Roosevelt. If you have questions concerning water resources, please contact Ms. Lola Sept, Environmental Specialist, Bureau of Reclamation's Pacific Northwest Regional Office at (208) 378-5032.

Recreation Resources

Due to the source's proximity to Coulee Dam National Recreation Area (CODA), The National Park Service (NPS) is concerned that there may be impacts to resources in the recreation area. The National Park Service Organic Act of 1916 (16 USC1, *et seq.*), mandates NPS to:

> ". . . promote and regulate the use of . . . national parks . . . by such means and measures as conform to the fundamental purpose of the said parks, . . . which purpose is to conserve the scenery and the natural and historic objects and wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

As you may know, CODA is located on Lake Roosevelt about 6 kilometers north of the proposed NRPF and is categorized as a Class II Floor Area and lies within a Federal and State designated air quality attainment area. The NPS Statement for Management (1995) for CODA states: "Air quality within the National Recreation Area is generally good, except for the Kettle Falls area." Likewise, the NPS General Management Plan (1980) for CODA states: Natural resources will be managed to perpetuate the natural and rural character of the landscape within the recreation area wherever possible, to maintain an atmosphere of scenic tranquility as viewed from the lake and to maintain

environmental quality of air and water." The following comments and questions are based on the above management directives regarding the air quality and visibility within CODA and the Lake Roosevelt airshed and the NPS mandates in the Organic Act.

In order to carry out these mandates and management directives the following comments are provided on the DEIS.

In most cases, SO_2 and NO_x do not reach concentrations high enough to injure vegetation in national parks. However, due to NRPF's proximity to the boundary of CODA, we are concerned that the facility's emissions could harm resources in CODA. Our concerns focus on the proposed SO_2 and NO_x emissions and possible impacts on resources at CODA due to acid deposition. We ask that the applicant address potential acid deposition impacts at CODA, and we encourage you to take every opportunity to minimize emissions in the area to reduce the risk of injuring sensitive resources at CODA. 1

Because of our concerns about visibility and impacts on other resources in CODA, we request that the applicant perform the following modeling analyses: (1) plume impact and regional haze, and (2) total deposition. We look forward to reviewing the results of these analyses. 2

SPECIFIC COMMENTS

Page 1-5, Figure 1.1 and Page 2-3, Figure 2.2: For clarification these need to be turned to match the other figures, i.e., Figure 2-5, 'North', and a scale need to be added. 3

Page 1-7, Section 1.3.2 (No Action Alternative): Under consequences, add a statement that the associated environmental impacts, air quality, etc., would not occur. 4

Page 1-17, Section 1.4.2.3 (Recreation): [add] At certain times the scenic view on Lake Roosevelt may be impacting a portion of the approximately 1 million visitors to CODA (Per impacts modeled and listed for the class I airshed on the Spokane Indian Reservation on page 1-10). 5

Page 1-23, Section 1.5 (Areas of controversy and issues to be resolved): Although NPS did not request to become an intervenor in the adjudicative hearing process with EFSEC, we did comment on three other occasions regarding the NRPF. The correspondences were dated August 23, 1995, regarding the Northwest Regional Power Facility SEPA/NEPA EIS; October 13, 1995, regarding the NRPF (EFSEC) tentative determination on the PSD permit for air emissions in Creston, Washington; and October 26, 1995, regarding the NRPF PSD factsheet and related information. We would request that a statement be added to this section reflecting the concerns communicated in these correspondences. The statement could read "Visibility, dispositional, and acid rain impacts to CODA." 6

Page 2-3, Figure 2-1, "Spokane River Falls Lake": This should read "Spokane River Arm" and "Franklin Roosevelt Lake" should read "Franklin D. Roosevelt Lake"; or, our preference is "Lake Roosevelt." You could also identify "Coulee Dam National Recreation Area." 7

Page 2-11, Figure 2-5: From this figure and the discussions, it could not be determined why the proposed areas with no construction activities do not extend to the eastern, northern, and part of the western boundaries of the site--perhaps because of fencing? The figure, as presented, suggests potential sediment loading impacts in the steep canyon on the northeast. 8

Page 3-30, "Impacts on Visibility at Nearby Class I Areas": We would request that other significant areas (not class I) with visibility concerns be added to this section. Under the "perceptibility parameter, Delta E" calculated by VISCREEN on page 3-31, any impacts on the Spokane Reservation would also be perceptible at CODA (on Lake Roosevelt), a resource visited by over 1 million visitors annually, and on the Colville Indian Reservation. 9

Page 3-35, Section 3.1.4 (Water supply): There was no available data in the document to verify that the two (2) Creston city wells have a capacity of 1,030 gallons per minute (gpm). The well log for one well (drilled in 1981, 776 feet deep, finished in bedrock) was initially tested at less than 200 gpm, and the log for another well (could not determine if it's the second city well or an older well that was either abandoned or deepened) was tested at 300 gpm (reported on log). The nominal average pumping rate of 64 gpm for Creston indicates that the additional 55-77 gpm for the facility could easily be met. There may, however, be a problem with a peak rate of 467 gpm for Creston and 200 gpm for the facility. Creston wells are located essentially on a ground-water divide, with ground-water in this area generally flowing northward. Out crops of bedrock (e.g., Creston Butte) define the approximate boundary where ground-water flows south. Bedrock configuration suggests a limited recharge area for the wells. South of Creston, in the Sinking Creek area, water-levels are declining; levels are also declining all along the northern tier south of the Columbia River, partly due to pumpage and partly due to long-term dry conditions. Thus, it is important to identify the amount of time that the peak pumping rates would generally be expected to be maintained. Long periods of rates at 667 gpm may potentially impact shallow ground-water levels (there are shallow wells downstream) and spring discharge that supports the perennial streams north and east of the site. 10

Page 3-37, Section 3.1.5 (Surface Water): Regarding the stormwater retention pond: Basalts will accept a reasonable amount of recharge. Thus, for filtration, fine-grained sediments, such as the onsite loess, should be considered as a natural lining in the pond. 11

Page 3-37, Section 3.1.5, (Water-quality/ground-water): The water quality of Creston's water-supply is known; all public supply wells are tested. This data should be included in the FEIS. Generalized locations of monitoring wells should be shown so as to assess reasonableness of the network. The stormwater retention pond will not recharge ground water in the Sinking Creek basin but will recharge water moving northward. This water may potentially reach several shallow wells and perhaps deeper wells because this area, being a ground-water divide, has large downward vertical gradients and wells are not cased. Thus, the recharging pond water, if carrying contaminants, may locally have an impact on drinking water withdrawals. 12

Page 3-55,"Bald Eagle": There are roosting sites and an active bald eagle nest (1995) within 8 kilometers of the proposed NRPF. 13

Page 3-93, paragraph 3, last sentence Change this to read: "The entire Lake Roosevelt is managed for recreational use." 14

Page 3-120, Section 3.2.4.1 (Existing Conditions): [add] "On clear days a portion of the North Cascades, approximately 160 kilometers to the west, can be observed from Highway 2 traveling from Creston to Wilbur, Washington." 15

Page 3-122, Section 3.2.4.2 (Impacts): As mentioned at the beginning of this correspondence, the view in and around Lake Roosevelt is of paramount importance to CODA. Impacts of the visible plume to Lake Roosevelt and the surrounding areas, especially the Spokane Reservation, should be identified. If you have questions concerning recreational resources contact Scott Hebner, Coulee Dam National Recreation Area at (509) 725-2715. 16

We have appreciated the opportunity to comment.

Sincerely,

Charles Polityka
Regional Environmental Officer

LETTER "B" RESPONSES

B-1 See Supplemental Letter "B" Responses.

B-2 See Supplemental Letter "B" Responses.

B-3 Comment noted. Suggested changes made to figure. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

B-4 Comment noted. However, Section 1.3.2 (No Action Alternative) already states that the No Action Alternative would avoid the environmental impacts associated with these actions (i.e., construction and operation of the NRPF, transmission facilities, and natural gas pipeline).

B-5 Comment noted. However, the impacts upon visibility were derived from the conservative assumptions. Some impact may be visible under proper lighting situations if one were looking toward the plant site and visibility was not obstructed by land forms. If one knew where to look, a slight distortion might be detectable. Most of the recreation on or along the rivers occurs at locations where hills will obstruct this view. The impact, if it occurs, should not be noticeable to recreational visitors. The impact to visibility is only a possibility, and, if it occurs, it should not be significant. In addition, see Supplemental Letter "B" Responses.

B-6 Comment noted. Changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

B-7 Comment noted. Suggested changes made to figure. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document. The location of the Coulee Dam National Recreation Area is shown on Figure 3-13, page 3-117.

B-8 The "Area with No Proposed Construction or Operation Activities" was established to avoid potentially sensitive environmental resources. With regard to the area outside of the of the no construction area, construction activities are only proposed in the area of the proposed facilities.

B-9 See Supplemental Letter "B" Responses.

B-10 The amount of water pumped and used by the Town of Creston varies annually and by season depending on the population and such factors as rainfall and temperature. In the past, the amount of water pumped has been substantially more than is currently being used. In 1979 the Town of Creston pumped an average of 120,000 gallons per day (gpd) to supply water service to 320 residences. Creston now supplies only about 240 residences. In 1993 Creston pumped 26,400,000 gallons (approximately 72,300 gallons per day). The NRPF's normal operating water requirements of 79,200 gpd to 100,800 gpd will increase the pumping amounts only slightly over the historically indicated amounts. These amounts are still substantially less than the amount of water rights certificates and claims held by the Town of Creston.

The Town of Creston is currently preparing a Capital Facilities Plan. Part of this plan will contain a study by Varela & Associates (Spokane, WA), addressing the

potential impact of Creston supplying water to the NRPF. This study is not yet available, but is reported to confirm the aquifers and the ability of Creston to supply the NRPF with water.

B-11 Comment noted.

B-12 Comment noted. However, it is assumed that Creston's water supply meets water quality standards for a potable water supply. To mitigate potential contamination in the recharging pond affecting local ground water quality, stormwater runoff near the exterior equipment and storage tanks will be routed through an oil and water separator prior to discharging to the collection channel.

B-13 Comment noted. See page 3-51, Sensitive Animal Species, NRPF Site, which states "Based upon review of Washington State Department of Fish and Wildlife and U.S. Department of Fish and Wildlife databases, the bald eagle (*Haliaeetus leucocephalis*) and the peregrine falcon (*Falco peregrinus*) are noted as possibly occurring in the vicinity of the NRPF site."

B-14 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

B-15 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

B-16 See response to comment B-5.

SUPPLEMENTAL LETTER "B" RESPONSES

The air quality impacts of the Northwest Regional Power Facility (NRPF) are minimized by using the least-polluting fossil fuel and the best available air pollution control technology. The equipment which will be included in this project will have the latest proven combustion turbine technology. The NRPF will result in no unacceptable adverse impacts on air quality or to air quality-related values, including visibility, regional haze, plants and soils, and impacts on Class I areas. All applicable federal and state emissions control requirements were met.

Ambient air quality impacts were analyzed using standard methods developed by the Environmental Protection Agency (EPA). The air quality models used are defined in the Guideline on Air Quality Modeling (EPA, E1-25-78-027). Receptors were defined in a grid sufficient to cover the maximum impact areas for each pollutant, as well as to estimate ambient air concentrations in Class I areas.

The results of the analysis showed that the impacts from the proposed facility, together with background values, will not exceed the applicable primary or secondary ambient air quality standards. Model concentrations for the highest impacts from the facility alone are less than 2 percent of the standard. Similarly, impacts from the proposed facility alone will not exceed any Class II or Class I area PSD increments. Maximum PSD increments are less than 8 percent of the applicable PSD increments. Impacts from the proposed facility will not exceed any Washington Acceptable Source Impact Level (ASIL). Maximum impacts of air toxic compounds are less than 40 percent of the ASIL.

The Coulee Dam National Recreation Area (NRA) is a Class II area under PSD regulations. Impacts on Air Quality Related Values (AQRVs) for Class II areas are predicted by comparing modeled concentrations to the secondary ambient air quality standards which were established to protect public welfare. Impacts to air quality including the NRPF have been shown to be below the secondary ambient air quality standards for all pollutants.

An analysis of impacts of AQRVs in Class I areas was conducted for the proposed facility. A conservative method of analysis was used and included, as appropriate for each Class I area, impacts on soils, vegetation, visibility, water quality and fauna. Results of the analysis show that there were no adverse impacts projected on vegetation, soil, visibility, water quality or fauna in the mandatory Class I areas.

Specifically, an AQRV analysis was done for the Spokane Indian Reservation Class I area, located immediately adjacent to the Coulee Dam recreation area, at about 14 km to 20 km from the proposed NRPF site. The analysis included visibility and nitrate deposition. Methodologies used were conservative and established an estimated increase in nitrogen deposition of 1.7 percent, with no significant adverse impacts. The Spokane Indian Reservation is far more sensitive regarding fauna than Lake Roosevelt because of the existence of small ponds, with a high natural water acidity due to the pine forest, in comparison to the vast amount of water existing in Lake Roosevelt and its higher buffering capacity. Visibility analysis for the Spokane Indian Reservation Class I area used a Level 2 screening methodology. As a result of the analysis it was determined that during certain times of the year at sunrise or sunset hours, when the wind is blowing from the southwest and an observer is looking at the plume at a point approximately 14 km from the observer toward the project site, there would be some minor deterioration in visibility. This minor deterioration would not be a haze, but a potentially noticeable difference in color or contrast when viewing an object through the plume. It was determined that 6 percent of total hours

in a year were within the sunrise or sunset periods and had winds blowing from the southwest. If the total hours were further reduced by limiting those with greater than 50 percent cloud cover, visibility effects may be perceptible only 2.8 percent of the year. These visibility effects, if they exist, would be extremely minor and very difficult to perceive. The methodology used was very conservative and any potential impacts would not be significant.

The analysis of the effects on the Spokane Indian Reservation can easily be extrapolated to the Coulee Dam NRA without further modeling, to conclude that there would be no significant environmental impacts due to the nitrate deposition and visibility to the Class II air shed for the recreation area. However, further modeling was done at the request of the National Park Service (NPS) regarding the Class II air shed located over the Coulee Dam NRA.

Nitrogen Deposition. An evaluation of nitrogen deposition has been conducted following the procedures defined in the EPA document Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 1 Report: Interim Recommendations for Modeling Long Range Transport and Impacts on Regional Visibility (EPA-454/R-93-015, April 1993). The analysis calls for the use of the annual average NO_2 concentration at 50 km from the project. Since the closest distance to 50 km for which ISC modeling results were available from the previous analysis was 8.3 km, this concentration was used for the nitrogen deposition analysis. The concentration at that distance was conservatively converted to a nitrogen deposition rate of 0.55 kilograms/hectare/year, using a molecular weight ratio of 0.304 and a dry deposition velocity of 2.5 cm/s. At 50 km, the nitrogen deposition rate is expected to be significantly lower due to continued dispersion of the plume over that distance. The Coulee Dam NRA encompasses Lake Roosevelt, which contains a tremendous volume of water. Considering this large water volume together with the buffering capacity from the highly alkaline soils of the area, this nitrogen deposition would be insignificant. A calculation sheet presenting the details of the analysis is attached.

Plume Visibility Analysis. A plume visibility analysis has been conducted for the Coulee Dam NRA using procedures defined in the EPA document Workbook for Plume Visual Screening and Analysis (EPA-450/4-88-015). Nitrogen oxide and particulate emissions from the proposed turbines were used in the analysis. Impacts were evaluated for receptors "inside" the NRA following the procedures defined in the above-referenced document.

In this analysis (using conservative analyses regarding wind speed and air stability), the maximum delta E was found to be 9.9 located at the closest point within the NRA, approximately 10 km from the NRPF. Although the plume from the NRPF is not visible, there would theoretically be a slight change in the color of the blue sky viewed through the plume. The plume would be visible in approximately 1 degree of the horizon, which is about twice the apparent width of the sun. This condition could occur only during times when winds are carrying the plume from the NRPF to the NRA. An evaluation of the meteorological data from the Spokane airport shows that these conditions occurred 44 percent of daylight hours in 1982. Since clouds and precipitation would obscure the plume and diminish overall visibility, periods of cloudiness and precipitation were examined. Further evaluation of the Spokane airport data for 1982 shows that winds from the appropriate direction occurred without precipitation 38 percent of the daylight hours during the year. Still further evaluation of the Spokane airport data shows that the winds from the appropriate direction occur without precipitation or cloudiness 4 percent of the daylight hours in the year.

Using these conservative assumptions, a slight change in the color blue, the width of an index finger held up at arms' length (1 degree), might be observed by one purposefully looking for it. This would occur only 4 percent of the yearly daylight hours, and would not likely be seen by a casual observer. Based on this information, plume visibility in the NRA is not expected to be adversely impacted by the NRPF.

SUBJECT _____ BY JRE DATE 5/22/96

SHEET NO. ____ OF ____

PROJECT NO. _____

Northwest Regional Power Facility
Nitrogen Deposition Analysis
Coulee Dam National Recreation Area

Annual NO_x Concentration at farthest distance available
= 0.23 µg/m3 (@ 8.3 km)

Molecular weight of N = 14, NO_2 = 46

$$0.23 \frac{\mu g}{m^3} \; NO_2 \times \frac{14}{46} = 0.07 \frac{\mu g}{m^3} \; N$$

$$0.07 \frac{\mu g}{m^3} \; N \times 3.1536 \times 10^7 \frac{\text{Seconds}}{\text{year}}$$

= 2,207,520 µg/m3 seconds/year

Deposition velocity = mid point of ranges in literature
= 0.025 m/s

$$N \text{ deposition} = 2{,}207{,}520 \frac{\mu g}{m^3} \frac{\text{Secnds}}{\text{year}} \times 0.025 \frac{m}{s}$$

= 55,188 µg/m2/year

= 0.55 kg/Ha/year

LETTER "C"

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

REPLY TO
ATTN OF: WD-126

JAN 10 1996

Nancy Wittpen
Bonneville Power Administration
905 NE 11th Avenue
Portland, Oregon 97232

Re: **Bonneville Power Administration's (BPA) Northwest Regional Power Facility Draft Environmental Impact Statement (EIS), Creston, Washington**

Dear Ms. Wittpen:

The Environmental Protection Agency (EPA) has reviewed the draft EIS for BPA's Northwest Regional Power Facility. Our review was conducted in accordance with our responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act. We appreciate the opportunity to review this project and provide comments at this time.

The proposed power facility is a natural gas-fired, generating plant with output of 838 megawatts. This draft EIS addresses the Proposed Action and No Action, and briefly discusses alternatives eliminated from consideration.

Based on our review, we have rated the draft EIS EC-2 (Environmental Concerns, Insufficient Information). Our review has identified environmental impacts from the proposed action. Our environmental concerns are based on: anticipated negative impacts to water quality, wetlands and air quality. 1

Additional information is requested to: strengthen the alternatives analysis; clarify proposed mitigation measures for wetlands and water quality impacts; clarify air quality impacts; and fully evaluate cumulative impacts.

An explanation of our rating system for draft EISs is enclosed for your reference. This rating and a summary of our comments will be published in the Federal Register.

If you have any questions about our comments (enclosed), you may contact Larry Brockman in Seattle at (206) 553-1750. We appreciate this opportunity to review and comment on the draft EIS.

Sincerely,

Richard B. Parkin

Richard B. Parkin, Manager
Geographic Implementation Unit,
Office of Ecosystems & Communities

Enclosure

cc: Federal Energy Regulatory Commission - Cashell
EFSEC - Jason Zeller

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
COMMENTS REGARDING
BPA'S NORTHWEST REGIONAL POWER FACILITY
ENVIRONMENTAL IMPACT STATEMENT

Alternatives Analysis

EPA is concerned that alternative locations for the construction and operation of the proposed power facility have not been sufficiently analyzed. Specifically, EPA believes the draft EIS should evaluate alternatives that reduce the need for such an extensive natural gas pipeline. Presently, the alternative pipeline routes evaluated in the EIS range from 58 miles to 70 miles. The preferred routing of the pipeline will cross 14,800 feet of wetlands, cross eight sensitive fish bearing streams, five perennial streams, and fifty-eight ephemeral streams. It will cross eight other sensitive biological habitats and sixty four state or federal highways. It will impact one hundred and seventy-five private property owners.

The EIS must include within its scope an evaluation of impacts, direct and indirect and effects and alternatives to the proposed action in accordance with 40 CFR 1502.14 and 1502.15. Consideration of effects include taking a hard look at the effects of transporting natural gas supplies to the facility.

The EIS must evaluate reasonable alternatives. CEQs Forty Questions states, that reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant. Consideration of reasonable alternatives would necessarily include alternate sites that may obviate the need for construction of lengthy pipelines. 2

EPA is concerned BPA has limited its alternatives analysis solely to the action alternatives proposed by the applicant. The draft EIS indicates, the applicant evaluated two types of alternatives: sites in Washington state in general and sites near the town of Creston, Washington. A siting analysis was completed by Washington Water Power Company in the late 1970's and early 1980s for a coal-fired plant in Creston, Washington. The applicant determined that eastern Washington, specifically the Creston area would be more suitable than western Washington.

According to the draft EIS, the applicant believed this coal-fired plant location near Creston, would also be appropriate for a smaller, more environmentally benign gas fired power plant. This may be true, however, the coal fire plant did not include an extensive gas pipeline. In conclusion, BPA's draft EIS analyzes sites considered appropriate for a coal-fired plant near Creston and evaluates which side of the cascade mountains the facility

should be built on. Given this limited analyses, EPA believes BPA has not met it obligations under 40 CFR 1502.14.

Those obligations include evaluation of the impacts of a 50-60 mile pipeline and the potential for mitigating those impacts by locating the plant nearer to the existing Pacific Gas Transmission (PGT) pipeline. To ensure a full and fair environmental review EPA recommends that BPA work with the Federal Energy Regulatory Commission (FERC), as describe below, to determine a lead agency and include an expanded alternative analyses in any subsequent NEPA document. 2

FERC/BPA Coordination

The BPA and the FERC have complimentary roles in this project. BPA will decide whether to construct and operate transmission facilities and FERC will decide whether to approve construction of the natural gas pipeline from PGT's pipeline near Spokane, Washington to BPA's preferred alterative. Presently, the NEPA requirements for this project are being addressed separately by the two agencies. The BPA does not evaluate alternative project sites to determine if reducing the length of the pipeline is feasible. Further, we have no indication that FERC plans to address that issue.

EPA believes the project proposal requires the designation of a lead agency (either BPA or FERC) because more than one federal agency is involved in what must be considered either the "same action" or "a group of actions directly related to each other because of their functional interdependence" 40 CFR 1501.5. If not the same action, BPA and FERC actions are, at the very least, functionally interdependent because the power facility under consideration would be useless if its power cannot be transmitted via BPA lines or if it cannot obtain natural gas via a FERC-license pipeline. 3

Having each agency conduct separate environmental reviews will result in improperly segmented consideration of environmental impacts and failure to explore viable alternatives that would mitigate impacts. Furthermore, according to the Council on Environmental Quality's (CEQ), Forty Most Asked Questions Concerning CEQs National Environmental Policy Act (NEPA) Regulations "Forty Questions," an alternative that is outside the legal jurisdiction of the lead agency must still be analyzed in the EIS if it is reasonable (see also 40 CFR 1502.14).

Once a lead agency has been identified, it must conduct the appropriate scoping in accordance with 40 CFR 1501.7, which includes among other things, determining the appropriate scope of the EIS. CEQs Forty Questions states, agencies must integrate the NEPA process into other planning at the earliest time

possible. Also the federal agencies that are likely to become involved should then be contacted and then the NEPA process coordinated to insure an early and comprehensive analysis. 3

Wetlands/Waters of the U.S.

As mentioned in our scoping comment letter dated June, 16, 1995, wetlands are one of a number of "Special Aquatic Sites" referenced in the CWA section 404(b)(1) Guidelines. These Guidelines provide the substantive environmental criteria for protecting waters of the U.S. under section 404 of the CWA. Wetlands are significant environmental resources that provide a wide range of important functions and values. They have experienced severe cumulative losses nationally. For these reasons protection of wetlands and other important aquatic resource habitats is a high EPA priority.

For purposes of section 404 permits where dredge or fill activity is proposed in waters of the U.S., all aquatic resource areas, including wetlands, should be clearly identified and assessed in relation to project affects. Presently the draft EIS does not clearly show the location of the wetlands likely to be affected. The final EIS should include maps outlining the location of the wetlands and the routing of roads, pipelines or facilities impacting wetlands. Specifically, wetlands in the project area should first be identified and delineated consistent with the Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, January 1987, Final Report and its recent guidance on implementation. Delineation should be followed by a functional assessment to determine the extent and importance of existing wetland and aquatic resources. Several options such as the Wetland Evaluation Technique are available for use in determining wetland and associated aquatic resources functions and their values. Any special features such as rare or unique habitats should receive special attention. 4

Once the wetland functions and values are defined, the possibilities for mitigating potential effects can be explored. Planning and design should seek to avoid adverse effects wherever possible, to minimize adverse effects which are unavoidable, and, as a final alternative, to provide adequate compensation for all unavoidable adverse effects. This will require a thorough evaluation of all less environmentally damaging project alternatives. For non-water dependent activities, such as roads, alternatives to siting in wetlands are presumed to be available unless demonstrated otherwise. The 404(b)(1) Guidelines and EPA Wetland Specialists should be consulted for specific guidance on the scope of avoidance and minimization alternatives that need to be addressed.

We recommend coordination with the appropriate Corps District, EPA Aquatic Resource Unit, Fish and Wildlife Service,

National Marine Fisheries Service and other state and federal resource agencies when developing alternatives to determine whether effects on to waters of the United States can be eliminated or reduced. If it is determined an individual 404 permit is required, the need to select alternatives which avoid effects on U.S. waters must be addressed during the 404 permit process. To assure consistency with the 404(b)(1) Guidelines, a thorough analysis of all possible alternatives to avoid and minimize wetland and aquatic resource habitat impacts should be addressed through the NEPA EIS process. These alternatives can include project design changes including pipeline alignment reconfiguration and alternate pipeline water crossings (i.e., tunneling, bridging). 4

The final EIS needs to discuss alternatives to avoid and minimize wetland or other aquatic resource habitat effects. If the final EIS does not fully address all less environmentally damaging alternatives, it is conceivable that a supplemental EIS may be necessary.

We suggest BPA meet with resource agencies, including EPA, to discuss mitigation options. To coordinate the wetland and aquatic resource impact aspects of this project, please contact Richard Clark, Wetlands Specialist, at (206) 553-5198 in the Seattle Regional EPA office.

Air Quality

In general, it is difficult to determine the adequacy of the air quality analyses due to the lack of sufficient explanation/documentation of the information and methodologies used to characterize current and future conditions in the area likely to be impacted by air emissions from the proposed project. For example, Section 3.1.3.2 presents projected air quality impacts from the proposed facility with essentially no explanation of the methodologies employed or the sources of data used in the analyses. We are aware that a PSD application has been prepared for the project and submitted to EFSEC, yet the draft EIS does not reference the application or include enough information from the permit application (which we assume is the basis for the results presented in the draft EIS) to allow the reviewer to understand the level of analysis the project has undergone. We recommend that the EIS be revised to include documentation of the analyses conducted and the data sources used in the development of the climate and air quality sections. This should include complete citations of all applicable reference materials as well as the documentation of estimated project emissions and the dispersion modeling analyses. 5

The draft EIS presents impacts on the Spokane Indian Reservation (a Class I area), including impacts to air quality related values (AQRVs) such as visibility, vegetation, flora and

fauna, water quality, etc. The identification of the relevant AQRVs and an understanding of what could be judged as acceptable degradation (or if any degradation is acceptable at all) should be done in close consultation with the Spokane Tribe of Indians. Based on the information presented in the EIS, it appears that the evaluation of AQRV impacts on the Spokane Reservation has not been conducted in consultation with the Spokane Tribe and therefore it is not clear that they are either relevant or important to the Tribe. We recommend that KVA/BPA work closely with the Tribe to ensure that impacts to those resources that are important are identified and evaluated with the necessary level of rigor to ensure that they receive the appropriate levels of protection. The results of this effort should be reflected in the final EIS. 6

We had some difficulty determining the precise distance between the project site and the Spokane Reservation. For example, the table presented on page 3-27 indicates that the Reservation is 15 miles from the project site while Figure 2-6 suggests that the distance is roughly nine (9) miles. Such discrepancies may have implications on model-predicted air quality impacts on the Reservation. We recommend that KVA/BPA verify the distance between the site and the Reservation and ensure that the correct distance is reflected in the air modeling analyses. 7

Specific Comments

The draft EIS briefly describes historical meteorological monitoring (Section 3.1.2.1) and ambient air quality monitoring (Section 3.1.3.1) efforts conducted between 1979 and 1981. Because no maps were included in the draft EIS indicating the locations where this monitoring was conducted relative to the proposed project site, it is difficult to determine how the meteorological and ambient air measurements relate to the EIS analysis. We recommend that the EIS be revised to include a map (or maps) indicating where historical monitoring has been conducted in relation to the project location. 8

Section 3.1.2 presents a discussion related to fog. A discussion of the frequency of heavy fog events in Spokane is presented and is subsequently followed by a brief discussion that indicates the project is not expected to significantly impact local weather or climate. First, it is unclear how the information regarding fog in Spokane relates to conditions in the vicinity of the proposed project site. Second, it is not clear that the potential impact of the project on the frequency of fog in the vicinity of the site has really been evaluated. With the location of the evaporation ponds being close to Lincoln Road and Highway 2, there is the potential for enhanced fog formation near these roadways and the safety issues associated with fog formation. We recommend that the draft EIS be revised to clarify 9

the likelihood of the project to create roadway safety hazards associated with enhanced fog formation.

Section 3.1.3.1 presents a characterization of background air quality levels in the vicinity of the site using data collected in 1980-81. While, in general, the values presented in the draft EIS are probably reasonable indicators of conditions in the vicinity of the proposed project site, we recommend that the discussion be expanded with respect to PM_{10} levels throughout eastern Washington. To summarize, eastern Washington (including the project site) frequently experiences large dust storms with resulting PM_{10} levels well above the applicable ambient standards. Current planning efforts are underway to gain a better understanding of the source areas (primarily agricultural activities) with the intent of developing a strategy for reducing the occurrence/severity of these events. While we do not view the project to be a significant PM_{10} source, we do not feel that current particulate matter levels in the vicinity of the project site are completely described by the values presented in Table 3.1. 10

We would like to clarify that the designation of the Spokane PM_{10} nonattainment area is not attributable exclusively to agricultural activities. Emissions from roadways and woodstoves have been identified, in addition to agricultural sources, as significant contributors to the PM_{10} problem in Spokane. 11

The draft EIS states that the Notice of Construction and supporting documentation are contained in Appendix E. Unfortunately, we were unable to locate this information. We recommend that the EIS be revised to include this information. 12

Pages 3-29 and 3-30 present an extremely brief overview of the modeling analyses conducted. We believe that this discussion needs to be expanded considerably in order for all interested parties to fully understand the nature and extent of analyses performed (for air quality modeling analyses, details are important). Key elements that warrant discussion include: 13

- Emissions estimation methodologies
- Identification of sources and release parameters (stack height, etc.)
- Identification of meteorological data sets used (and the justification for their use)
- Receptor deployment (spatial resolution, treatment in terrain)

The description of the PSD increment contained in the draft EIS is incorrect. It is not the allowable increase in concentration above background levels. A PSD increment is the maximum allowable increase in concentration above a baseline concentration for each pollutant. A baseline concentration is, 14

in general, the ambient concentration existing at the time that the first complete PSD permit affecting the area is submitted.

A footnote appears to be missing from Table 3.5. 15

The screening assessment of visibility impacts indicates that the potential for impacts to the visibility resource on the Spokane Reservation exists. The discussion concludes that conditions conducive to visibility impairment occur at a rate of 2.8 hours per year, yet does not provide any conclusions as to the significance of this condition. As we indicated above, we recommend that KVA/BPA consult with the Spokane Tribe to ensure that visibility impacts are maintained at acceptable levels for the Class I area that they maintain. 16

The air quality section presents no assessment of potential air quality impacts associated with the construction of the facility. We recommend that emissions from construction activities be quantified and included in the EIS. 17

The draft EIS states that corona, ozone, and oxides of nitrogen are released in quantities too small to measure or have any significant effects. We recommend that the draft EIS provide the appropriate literature citation to support such a conclusion. 18

Cumulative Impacts

Cumulative impacts are defined as "...the impact on the environment which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions." (40 CFR 1508.7)

The draft EIS does not discuss cumulative impacts to water quality and wetlands. The final EIS should include an analysis on cumulative impacts for these resources. For any resource, the cumulative impact evaluation must begin with an assessment of the degree to which impacts have already occurred. Such a baseline assessment is critical to the ability to ascribe significance to any amount of further impact. For cumulative effects in particular, the magnitude of impact may not be synonymous with the significance of that impact. A minor impact could be significant. The purpose of a cumulative impacts analysis should be to determine the relationship between these concepts. 19

At a minimum the EIS should discuss how this project will impact the waterways, area wetlands, fish and wildlife resources cumulatively with other past, ongoing and reasonably foreseeable future development.

LETTER "C" RESPONSES

C-1 Comment noted.

C-2 The need for a project defines the alternatives.

The underlying need for federal action on this project is to respond to a request from KVA Resources to provide integration and wheeling services for the output of the NRPF. The alternatives to meeting this need to respond are either to say yes (the proposed action), no (the no action alternative), or offer alternative ways to integrate or wheel over the system. For Bonneville's purposes, the EIS must analyze the impacts of the integration and wheeling because they are direct federal actions, and must analyze the facility itself because it is a connected action.

However, Bonneville is not a regulatory agency and cannot tell developers where or what type of generation facilities to build.

NEPA and its defining regulations oblige federal agencies to discuss only alternatives that are reasonable. 40 CFR §§ 1502.14(a) and (c), 1508.25(b)(2); see also, Forty Most asked Questions Concerning CEQ's NEPA Regulations, 46 Fed. Reg. 18,026, 18,027 (March 23, 1981). Recognizing that "reasonable" is not self-defining, now Supreme Court Justice Clarence Thomas, in Citizens Against Burlington, Inc. v. Busey, 938 F. 2d 190 (D.C. Cir. 1991), cert. denied, 112 S.Ct. 616 (1991), provided some clarity, as follows:

> NEPA plainly refers to alternatives to the "major Federal actions significantly affecting the quality of the human environment," and not to alternatives to the applicant's proposal. NEPA 102(2)(C), 42 USC § 4332(2)(C) [emphasis in original]. An agency cannot redefine the goals of the proposal that arouses the call for action; it must evaluate alternative ways of achieving its goals [emphasis in original] ... Congress did not expect agencies to determine for the applicant what the goals of the applicant's proposal should be.

Id. at 199.

This approach in the EIS is also consistent with Section 10 of BPA's enabling legislation, the Pacific Northwest Electric Power Planning and Conservation Act 16 USC §§ 839 et seq., as follows:

> Nothing in this Act shall be construed to affect or modify any right of any State of political subdivision thereof or electric utility to ... make energy facility siting decisions, including, but not limited to, determining the need for a particular facility, evaluating alternative sites, and considering alternative methods of meeting the determined need.

16 USC § 839g.

Accordingly, with regard to the NRPF as a whole, BPA believes that it is appropriate to limit our examination of overall alternatives to the proposed action and the no action alternative.

C-3 BPA will decide whether to construct and operate transmission facilities and FERC will decide whether to approve construction of the natural gas pipeline from PGT's pipeline near Spokane, WA to the facility. Building a natural gas pipeline is recognized as a connected action and "functionally interdependent." BPA and FERC would have preferred to analyze impacts of the facility, transmission, and pipeline in one EIS. That was impossible because site-specific pipeline information was not available at the time KVA submitted a site application to EFSEC for the facility and contacted BPA. PGT had not yet submitted an application to FERC for the pipeline. Without an application, FERC could not begin and conduct an environmental review. As a result, two EISs will be done; the first one focusing on the facility and transmission, the second one focusing on the pipeline.

FERC is a cooperating agency in this EIS. All gas pipeline information that was available at the time was added to this EIS. When an application for the gas pipeline is submitted, FERC will conduct a NEPA review of its potential impacts. BPA plans to be a cooperating agency in FERC's gas pipeline review and the environmental impacts associated with the gas pipeline will be considered by BPA before making a final decision on the project after FERC's analysis is complete. As a result, no decision is made by BPA until all environmental aspects of the facility, transmission, and the pipeline are identified and considered. Supplemental environmental review will be done on the impacts of wheeling power over the transmission line when customers of KVA are identified.

C-4 The proposed project is in compliance with Executive Order 11990 which mandates that federal agencies such as the BPA and FERC ensure that the destruction, loss or degradation of wetlands be minimized when conducting regulatory or licensing activities. The project has taken all practicable measures to avoid and minimize wetland impacts. These avoidance and minimization measures are described in Chapter 3 (Affected Environment, Impacts and Mitigating Measures), Section 3.1.6.3 (Mitigating Measures). Standard mitigations for wetlands include conditions required for Nationwide Permits (NWP) under the Clean Water Act Section 404 and NPDES requirements under Clean Water Act Section 402.

BPA has taken all practicable measures to avoid and minimize wetland impacts at this stage in the transmission line design process. BPA anticipates that wood pole removal and construction of new towers will not impact any wetlands. Based on access road design assumptions, BPA has identified four wetlands that may be affected by access road widening. Detailed access road design work will be done before construction. Road widening and positioning will be coordinated with a BPA wetland specialist. BPA will try to avoid impacts to these four wetlands by considering road design alternatives. At this time, BPA anticipates that activities potentially affecting these wetlands can be authorized by Nationwide Permits 14, 25, and 33. This will be confirmed when the amount of fill and extent of impacts are determined. BPA will then notify the appropriate agencies. Permit requirements will be followed.

C-5 It is acknowledged that detailed development of analyses was not included in the DEIS. The DEIS was prepared on the basis of information included in the PSD application. The DEIS sections on air quality were intended to focus on a description of the impact analysis results, rather than the methods. The final EIS will incorporate by reference the PSD application.

C-6 Comment noted. Several consultations regarding air quality impacts have been held between the applicant and the Spokane Tribe.

C-7 The closest distance from the facility to the Spokane Reservation used in the visibility screening analysis is 22 km (13.64 miles).

C-8 See Response to Comment C-5.

C-9 Section 3.1.2.1 describes the existing climatic conditions for the project. The evaporation ponds are not expected to increase localized fog.

C-10 Comment noted. However, Table 3.1 is intended to reflect the assumed background concentrations of pollutants for the vicinity of the project.

C-11 Comment noted.

C-12 The Notice of Construction is contained in Appendix E, the background information is included in the PSD application. The final EIS will incorporate by reference the PSD application.

C-13 See Response to Comment C-5.

C-14 Comment noted.

C-15 Comment noted. Table 3.5 has been revised. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

C-16 The impacts upon visibility were derived from the conservative assumptions. Some impact may be visible under proper lighting situations if one were looking toward the plant site and visibility was not obstructed by land forms. If one knew where to look, a slight distortion might be detectable. Most of the recreation on or along the rivers occurs at locations where hills will obstruct this view. The impact, if it occurs, should not be noticeable to recreational visitors. The impact to visibility is only a possibility, and, if it occurs, it should not be significant. Several consultations regarding air quality impacts have been held between the applicant and the Spokane Tribe. In addition, see Supplemental Letter "B" Responses.

C-17 As stated on page 3-34, Unavoidable Adverse Impacts, "Other emissions related to development and operation of the NRPF include construction activities, construction traffic automotive emissions, materials storage and handling, etc." Impacts would be mitigated with the implementation of standard construction practices, including:

(1) Construction equipment operators shall shut off equipment when not in use to avoid unnecessary idling. As a general rule, vehicle idling should be kept below 10 minutes.

(2) The contractor's construction equipment shall be properly maintained and in good operating condition.

(3) During summer morning hours, when smog accumulates, the construction period shall be lengthened so as to minimize the number of vehicles and equipment operating at the same time.

(4) The contractor shall utilize new technologies to control ozone precursor emissions as they become available and feasible.

LETTER "D"

STATE OF WASHINGTON
DEPARTMENT OF COMMUNITY, TRADE AND ECONOMIC DEVELOPMENT
OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION
111 21st Avenue S.W. • P.O. Box 48343 • Olympia, Washington 98504-8343 • (360) 753-4011

November 20, 1995

Ms. Nancy Whittpenn
BPA EIS Program Manager
Post Office Box 3612-ECN
Portland, Oregon 97208-3612

Log: 101895-13-BPA
Re: Northwest Regional Power Facility Draft EIS

Dear Ms. Whittpenn:

Thank you for the opportunity to review the draft environmental impact statement for the proposed 830 aMW Northwest Regional Power Facility located near the town of Creston in Lincoln County.

We concur with your identification of cultural resources as a topic to be addressed in the environmental impact statement. We note that not all studies have been completed, nor has Determination of Eligibility to the National Register been obtained. While specific stipulations are identified in the draft we request that you develop a Programmatic Agreement to assure compliance with Section 106 of the National Historic Preservation Act and that all necessary work and stipulations are implemented.. 1

Please feel free to contact me at (360) 753-4405 should you have any questions.

Sincerely,

Robert G. Whitlam, Ph.D.
State Archaeologist

RGW:tjt

cc: Adeline Fredin
Jason Zeller

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To Alex Fitzroy	From Nancy Whittpenn
Co.	Co.
Dept.	Phone #
Fax #	Fax #

TOTAL P.01

LETTER "D" RESPONSES

D-1 Comment noted. BPA's Cultural Resources Program Manager has contacted Robert Whitlam, State Archeologist, regarding the Programmatic Agreement. BPA has committed to working with the other Federal Cooperating Agencies to develop a Programmatic Agreement that addresses the State's concerns regarding cultural resources. Work on the Programmatic Agreement and coordination with the cooperating agencies has begun. The agreement will be sent to the State SHPO for their review before it is signed.

A copy of the Cultural Resources Report developed for the transmission portion of the project is now final and included as Appendix D.

LETTER "E"

State of Washington
DEPARTMENT OF FISH AND WILDLIFE

Mailing Address: 600 Capitol Way N • Olympia, WA 98501-1091 • (360) 902-2200, TDD (360) 902-2207
Main Office Location: Natural Resources Building • 1111 Washington Street SE • Olympia, WA

December 8, 1995

Ms. Barbara Ritchie
WA Department of Ecology
Environmental Review Section
Post Office Box 47600
Olympia,Washington 98504-7600

SUBJECT: Comments on Energy Facility Site Evaluation Council's Northwest Regional Power Facility Draft Environmental Impact Statement

Dear Ms. Ritchie:

The Washington Department of Fish and Wildlife (WDFW) appreciates the opportunity to comment on this draft Environmental Impact Statement. We worked with the applicant for many months attempting to design a wildlife mitigation agreement that we both could agree with. That effort was hampered by the lack of wildlife habitat impact studies performed by the applicant, resulting in a basic disagreement over the magnitude of those impacts. In fact, the applicant seems confused itself. On page 1-13, in a discussion of the impacts at the NRPF site, the document states: "These impacts to wildlife are considered significant but mitigable" and on page 1-14 is the statement: ". . . although no significant impacts to native plants or wildlife habitats are predicted from the construction at the NRPF site . . . ." 1

No wildlife mitigation agreement or stipulation exists for the potential impacts from this project, and the applicant has terminated discussions on the subject. We recommend that the application be denied or that the applicant be directed to perform wildlife habitat impact studies and develop a mitigation and enhancement plan that satisfies this department and the Energy Facility Site Evaluation Council (EFSEC). That plan should include the impacts to wildlife recreation, if any. As an alternative, WDFW is willing to provide EFSEC with the mitigation and enhancement requirements that we would accept as appropriate mitigation. 2

SPECIFIC COMMENTS

SECTION 1, SUMMARY

1.3.1.5 (p. 1 - 12) Water Quality; Impacts; Transmission Facilities. Construction and operation could have long-term negative effects. We recommend John Andrews, WDFW Regional Habitat Program Manager for Lincoln County, and Tracy Lloyd, WDFW Regional Habitat Program Manager for Grant and Douglas Counties, be contacted at an early date to identify areas of 3

concern and appropriate protective measures. John Andrews is located in Spokane and can be reached at (509) 456-4084. Tracy Lloyd is located in Ephrata, and can be reached at (509) 754-4624.

(p. 1-12, first sentence) Natural Gas Pipeline. WDFW recommends rewording the first sentence as follows: "Potentially significant surface water quality, wetland, and upland habitat impacts might be caused by the proposed construction activities." We also recommend rewording of the second sentence to read: "If streams are crossed using open cut methods, the natural banks, riparian vegetation and bottom of the streams often suffer extended degradation." 4

(p. 1-12, first paragraph, third line). We recommend rewording to read, ". . . and transmission and gas lines corridors, as required . . . ." 5

p. 1-12, third paragraph, first line). The term "best Management Practices (BMP)" is ambiguous and undefined in the glossary. Best for whom and how? The phrase ". . . good housekeeping standards . . ." is unlisted in the glossary and ambiguous. Good for whom and how? 6

1.4.1.6 (p. 1-13), Plants and Animals; Impacts; NRPF Site. A habitat/wildlife protection plan which is satisfactory to WDFW should be incorporated into the certification process. A major element of such a plan would be to prohibit livestock grazing on the site during the life of the certificate, except when possibly prescribed as a vegetative management tool. 7

(p. 1-13; first two paragraphs) Transmission Facilities; and (p. 1-14) Natural Pipeline. We recommend a habitat/wildlife protection plan satisfactory to WDFW be included into the certification process. This should also address timing of construction activities to avoid wildlife disturbance during the sensitive breeding season. 8

(p. 1-14, first paragraph) Mitigation Measures. We recommend rewording in the following manner: "Any wetlands and undelineated seasonally wet areas near proposed construction or operations activities will be flagged in the field . . . ." 9

(p. 1-14, second para). The statement, ". . . the applicant has agreed to consider implementing a wildlife enhancement plan developed in consultation with WDFW . . .," is somewhat misleading. Considerable negotiations between WDFW and the applicant to achieve a habitat/wildlife plan have been unsuccessful. 10

(p. 1-14, third paragraph). We recommend a habitat/wildlife protection plan satisfactory to WDFW be incorporated into the certification process. This is especially important because Priority Habitats and Species (PHS) are involved. And, the applicant should contact WDFW for Hydraulic Project Approval where work will occur in a flowing stream. 11

(p. 1-14) Significant Adverse Impacts That Cannot Be Avoided. There is no reference to or comment about the natural gas pipeline. From experience, we expect excavated stream crossings 12

of the natural gas pipeline will be difficult to mitigate and there will be significant adverse long-term impacts. Wetland damage also is difficult to mitigate adequately. The best way to avoid long-term wetland damage is by routing to avoid them.

1.5 (p. 1-23) Areas of Controversy and Issues to be Resolved. First "bullet:" after "natural gas pipeline" add and transmission line. 13

SECTION 2, ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1, Figure 2-5, Proposed Action (Preferred Alternative). WDFW recommends the many wetlands be better identified in this figure, i.e., by color. It is difficult to distinguish the outlines of the wetlands from the topographic elevation lines. 14

2.1.2.8 (p. 2-20 third para.) Other Site Improvements, Fencing and Security. WDFW recommends a conventional four-strand barbed wire perimeter fence. A woven wire fence, as stated, would be an impediment or barrier to some wildlife in their movements and migration. 15

(p. 2-20) Grading and Drainage. With regard to the first bullet, there should be no borrow pits on site, except where construction is called for. Also, any fill with subsoil should have a one foot covering of topsoil. 16

SECTION 3, AFFECTED ENVIRONMENT, IMPACTS, AND MITIGATING MEASURES

3.1.1.2 (p. 3-9, para. 3) NRPF Site. On-site excavation is estimated at 161,000 cubic yards. We emphasize only top soil be disposed of on site, then leveled. Off site, disposed subsoils should be topped with a leveled one foot of top soil. Leaving disposed subsoil exposed will impact or prevent the establishment of desirable vegetation and may encourage the subsequent domination by noxious plants. 17

(p. 3-10-11) Transmission Facilities. WDFW strongly recommends a WDFW approved habitat/ wildlife protection plan be incorporated in this certification process. The potential for adversely affecting important habitat (e.g., streams, wetlands, shrub-steppe) and wildlife breeding makes it imperative that an approved plan is in place well in advance of construction. 18

(p. 3-11) Natural Gas Pipeline. WDFW expects excavated stream crossings by the natural gas line will be difficult to mitigate, and there will be significant long-term negative impacts. Wetland damage is difficult to mitigate adequately, so the safest way to avoid long-term wetland impacts is by routing to avoid them. WDFW requests the opportunity to review and comment on the draft right-of-way location and the erosion and sedimentation control plan well in advance of construction. 19

(p. 3-12, second para., last bullet) Mitigating Measures, NRPF Site. We reiterate our previous comments regarding the necessity of one foot of leveled top soil as the top layer. 20

(p. 3-13, first bullet) Transmission Facilities. WDFW recommends we be consulted with regard to culvert sizing and installation. Experience shows these two aspects to be critical to satisfactory fish movement. What is considered hydraulically adequate for storm events often are unsatisfactory for fish. 21

(second bullet). We recommend excavated subsoil be used for access road fill, and top soil be laid down prior to reseeding at tower sites. 22

(seventh bullet). We recommend adding after wildlife breeding seasons at the end of the sentence. This addition pertains to areas that local WDFW biologists identify as sensitive. 23

(last bullet). We recommend these environmental specialists be responsible to EFSEC, not the contractor or applicant. 24

(p. 3-13) Natural Gas Pipeline. The term "Best Management Practices" is subjective and undefined in the glossary. This is why it is critically important that a WDFW approved habitat/wildlife protection plan be in place well in advance of construction. 25

(p. 3-32) Impacts, NRPF Site. Effects on Water Quality and Sensitive Amphibian Species. WDFW recommends that EFSEC request the Department of Ecology to "ground truth" the modeled impact on pH of ephemeral and permanent water bodies. If pH monitoring indicates intolerable habitat for amphibians due to NOX emissions, WDFW recommends EFSEC direct the applicant to rectify the offending pollutant. 26

3.1.5.1 (p. 3-38) Existing Conditions, Natural Gas Pipeline. Middle Route 1 is the applicant's preferred route. Although many environmental considerations do seem to make it the route of choice, it entails more crossings of sensitive streams (from Priority Habitats and Species database) than other alternatives. Fifteen of these streams have been designated as sensitive because of various fish populations. This underscores the aforementioned need for having a WDFW-approved habitat/wildlife protection plan established prior to construction. 27

(p. 3-41, first para.) Transmission Facilities. We reiterate our urging to have a WDFW-approved habitat/wildlife protection plan established well in advance of construction. As this paragraph states, "Stream crossings are sensitive sites . . . ." 28

(p. 3-42) Natural Gas Pipeline. We recommend the applicant or contractor contact WDFW well in advance of construction to obtain a Hydraulic Project Approval for work within the stream. 29

3.1.5.3 (p.3-43, next to last and last lines) Mitigating Measures, Natural Gas Pipeline. The "best" and "most reasonable" (methods of stream crossing) are not necessarily consistent nor compatible. We concur with the call for an on-site inspector(s). He/they should be responsible, not the 30

applicant or contractor, but to EFSEC. WDFW also urges Hydraulic Project Applications be submitted well in advance of construction so that Hydraulic Project Approvals can be issued in a timely manner.

3.1.6.1 (p. 3-45, fifth line) Existing Conditions, Palustrine Emergent Wetland. There are 45, not 42, isolated, depressional wetlands (Figure 1, Wetland Resources. Northwest Regional Power Facility. Draft Technical Memorandum. CH2M Hill. May 31, 1995). In 1994, a dry year, approximately 28 ponds were identified on-site. 31

(p. 3-45, seventh line). Most of the wetlands are not, as stated, in the northwest portion of the site. Both Section 2 and Section 11 are located in Range 34 E, Township 26 N. The wetlands in Section 2 are located in the southerly 2/3 of the west half. In Section 11, the wetlands are located in the easterly 2/3 of the north half, and in the central 1/2 of the north half of the southerly half. Thus, the two sections taken together, the wetlands are distributed through the central portion of the NRPF site, not the northwest portion. WDFW recommends the inclusion of Figure 1, referenced above in the "fifth line" comment, in the Final EIS. 32

(p. 3-48, line two) Sensitive Plant Species, NRPF Plant Site. It is stated that "Grazing has degraded the plant communities . . . ." We believe this is an understatement of the situation and refer to what we consider a more accurate statement in another project-associated document: "Most of this habitat is highly degraded from cattle grazing . . . ." (Wildlife Resources. Northwest Regional Power Facility. Draft Technical Memorandum 6.1 Wildlife Impacts. CH2M Hill. May 31, 1995). This documentation of overuse supports WDFW's call to suspend all grazing in the short term, with possible future grazing on a closely regulated basis if deemed desirable by WDFW to stimulate plant growth. 33

(p. 3-49) Animal Presence by Habitat Type. WDFW lists approximately 83 wildlife species which inhabit the NRPF site on a regular basis or seasonally. 34

(p. 3-51) Agriculture. Alfalfa production over the last five years averaged 200 acres + per year. Alfalfa is a favored nesting cover of ring-necked pheasants, Mule deer frequently feed on it, and coyotes often forage for small mammals in it. Conversion of alfalfa-producing land to industry will be an adverse impact to these and other species. 35

(p. 3-53) Transmission Facilities, Vegetative Habitat Types, Wetlands. This interesting narrative underscores the need for a detailed and comprehensive habitat/wildlife protection plan to be incorporated in the certification process. 36

(p. 3-54-55) Transmission Facilities, Animals. The several paragraphs describing animals, several habitat types, and Priority Habitats and Species appropriately conveys a sense of the habitat, wildlife diversity, and sensitivity. This emphasizes the need to have an adequate habitat/wildlife protection plan (including effective means to exclude off-road recreation vehicles) incorporated in the certification process. 37

(p. 3-56) Natural Gas Pipeline. We reiterate our previous concerns for habitat destruction and again recommend a WDFW-approved habitat/wildlife protection plan be incorporated in the certification process. 38

3.1.6.2 (p. 3-58, second para.) NRPF Site, Wildlife. This paragraph underscores the need for an adequate habitat/wildlife protection plan to be incorporated in the certification process. 39

(p.3-58-59) Transmission Facilities. The paragraphs describing Tower Installation and Replacement and Access Roads (wetlands) support our recommendation that an adequate habitat/wildlife protection plan be incorporated in the certification process. 40

(p. 3-59, first paragraph) Animals, Tower installation and Replacement. It is unclear what the basis is for the statement that " . . . none of the affected streams supports seasonal or year-round fisheries, there would be no impacts to fisheries."? 41

(p. 3-60) Access Roads. We reiterate that the applicant or contractor apply for Hydraulic Project Approvals for each stream crossing well in advance of construction. 42

(p. 3-60) Priority Habitats. WDFW recommends the applicant or contractor consult with Regional Habitat Program Managers will in advance of construction. 43

(p. 3-61, third paragraph) Natural Gas Pipeline. We repeat our recommendation that an adequate habitat/wildlife protection plan be incorporated in the certification process. Also, we recommend the WDFW Regional Habitat Program Manager in Spokane be consulted well in advance of construction regarding sensitive habitat and wildlife location and timing. 44

3.1.6.3 (p. 3-62). The suggestion that sensitive wildlife, if present, could be effectively relocated to another location is a fallacy. Very likely, the other location is already occupied, or the habitat is unsuitable, with the end result that some wildlife will be eliminated. Whether the subject is sensitive species or others, the ecological truth of "carrying capacity" applies. Degrading or destroying habitat is equivalent to directly harming or destroying wildlife. 45

(p. 3-63, second paragraph, third bullet) Transmission Facilities, Vegetative communities. We caution that undersoil deposited on or off site (i.e., NRPF) be covered with a leveled one foot of topsoil. Good plants flourish in good soil. Exposed underburden is a poor medium for desirable vegetation, and undesirable and noxious plants will outcompete desirable ones. 46

(p. 3-64 first paragraph) Natural Gas Pipeline. WDFW recommends the first phrase of the second sentence be reworded in the following manner: "To better protect sensitive habitats, native vegetation and existing wildlife, ..." 47

Also, with reference to this first paragraph, WDFW applauds the suggestion of having a biologist-inspector on site, but throughout construction; not just for initial grading and right-of-way clearing. This biologist-inspector should be responsible to EFSEC, not the applicant or contractor. 48

The example of transplanting wildlife or fish is, again, fallacious. As we said previously the problem with relocating them "somewhere else" is that suitable habitat somewhere else is probably fully occupied or unsuitable. 49

(second para.). WDFW recommends inserting an addition at the end of the first sentence to read "A resource management plan should be prepared to address the preservation and methodologies to minimize impacts on plan and animal populations along the pipeline during construction, restoration and operation, including appropriate penalties for violations." We also recommend a change of the second sentence to read, "This plan should be prepared and approved (including by WDFW) six months prior to commencement of construction activities." 50

(third para., third sentence). "Enforcement of the plan would be the responsibility of the pipeline construction foreman and the on-site biologist" begs the question of to whom is the biologist-inspector responsible. The biologist's expertise and authority is compromised if he is subordinate to the construction authority. WDFW suggests, again, the biologist-inspector be responsible to EFSEC. 51

3.2.4.2 (p. 3-134) Visual and Aesthetic Resources, Impacts, Natural Gas Pipeline. The statement that the pipeline construction would be limited to the short term, and no significant impacts are anticipated, is a matter of opinion. Aesthetics are in the eye of the beholder. Adverse impacts from stream and wetland crossings are often more persistent than expected. A simple matter of prolonged erosion, chronic turbidity, and silt accumulation damages the aesthetic experience of the fisherman, bird watcher, nature photographer, and observant hiker. 52

Thank you for the opportunity to offer comments on this very significant proposal.

Sincerely,

Tony Eldred for

Tony Eldred
Eastern Mitigation Coordinator
Habitat Management Program

LETTER "E" RESPONSES

E-1 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

E-2 Your comments are noted and will be considered in EFSEC's decision process.

E-3 Comment noted. BPA has contacted John Andrews and Tracy Lloyd on the issue of a wildlife protection plan. BPA has asked that the Washington Department of Fish and Wildlife (WDFW) identify mitigation measures that the BPA can do before, during, and after construction to lessen impacts to wildlife and habitat. If these measures are identified and agreed to before the FEIS is released they will be included. Otherwise, they will be included in the Mitigation Action Plan, the Stormwater Pollution Prevention Plan, and/or the Construction Specifications.

E-4 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

E-5 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

E-6 Please refer to Section 2.1.6 (Storm Water Control System) of the Draft EIS for a more detailed description of Best Management Practices and good house keeping practices (standards).

E-7 The project applicants (KVA Resources, Inc. and CSW Energy, Inc.) will prepare a habitat/wildlife enhancement plan developed in consultation with the Washington Department of Fish and Wildlife (WDFW), which would include: 1) removal of livestock grazing on the site (to the extent allowed by the existing lease) which is presently subject to grazing for a period of three to five years; 2) incorporation of native plant species into the landscape design around the plant; 3) allowing aquatic and terrestrial vegetation to naturally become established around the evaporation pond; and, 4) allowing wildlife related recreation such as bird watching, wildlife photography, and hiking on the site not used for plant purposes.

E-8 Comment noted. However, BPA would be responsible only for siting the transmission line, which is not subject to the site certification process. In addition, potential impacts from the transmission line could be mitigated, as noted on page 14, "For the transmission corridor, mitigation measures include minimizing additional vegetation clearing or the development of new access roads, minimizing construction in high-use native habitats, maintaining locked gates to limit access along the corridor, reseeding, weed controls, wetlands avoidance, redepositing excavated materials where possible, scheduling construction during the dry season, and the use of BMPs for soil, water, and hazardous materials." In addition, see Response to Comment E-3.

E-9 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

E-10 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

E-11 See response to comment E-8. In addition, BPA would consult with WDFW prior to commencing any construction activities in a flowing stream.

E-12 See General Response #1.

E-13 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

E-14 The wetlands on the NRPF site have been identified and mapped. This map is available on request.

E-15 Comment noted.

E-16 Comment noted.

E-17 Comment noted. However, it is not likely that there will be a need for the off-site disposal of subsoil.

E-18 See Response to Comments E-3 and E-8.

E-19 See General Response #1.

E-20 Comment noted.

E-21 Comment noted. WDFW will be contacted by BPA regarding culvert sizing and installation before construction and during the detailed access road design process.

E-22 Comment noted. All subsoil excavated for tower footings will be used to backfill after footings are finished. During excavation, the topsoil can be stockpiled. After excavation and backfilling, topsoil can be overlain and reseeded.

E-23 Please refer to Page 3-63, Section 3.1.6.3 (Animals), which states "When possible, avoid construction activities within high-use native habitats, especially riparian, and tall sagebrush habitats during the breeding season (March 1 to August 15)." BPA has contacted WDFW and intends to coordinate with WDFW on specific locations to avoid at certain times of the year to lessen impacts to wildlife.

E-24 These environmental specialists will be BPA personnel or contractors hired by BPA and will be responsible to BPA for the identified activities on the transmission portion of the project only. A Stormwater Pollution Prevention Plan (SWPP) will identify and describe Best Management Practices that will control erosion and encourage revegetation.

E-25 See response to comment E-6 and General Response #1.

E-26 Your comments are noted and will be considered in EFSEC's decision process.

E-27 Middle Route 1 was the preferred route identified in the routing study performed by Pacific Gas Transmission (see Appendix B of the DEIS). In addition, see General Response #1.

E-28 See Response to Comments E-3 and E-8.

E-29 See General Response #1.

E-30 See General Response #1.

E-31 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

E-32 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document. In addition, see response to comment E-14.

E-33 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

E-34 Comment noted.

E-35 Impacts to wildlife will not be significant. The permanent construction footprint at the NRPF site is 75 acres, of which 70 acres are now agricultural fields (as noted previous 3-51). These fields are unlikely to provide resident habitat for wildlife species. Wildlife may be impacted by the construction and operation of the NRPF site, but the mitigation measures addressed in the DEIR were designed to sufficiently offset any permanent habitat losses. The loss of 5 acres of three-tip sagebrush/Idaho fescue, while adverse to wildlife, is not considered significant in view of the remaining undisturbed habitat on the site and the mitigation proposed for that acreage.

E-36 Comment noted. However, BPA would be responsible only for siting the transmission line, which is not subject to the site certification process. WDFW's recommendations regarding the need for a detailed and comprehensive habitat\wildlife protection plan will be provided to the Bonneville Power Administration (BPA). In addition, see Response to Comments E-3 and E-8.

E-37 See Response to Comments E-3, E-8, and E-36.

E-38 See General Response #1.

E-39 See response to comment E-7.

E-40 See Response to Comments E-3, E-8, and E-36.

E-41 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document. In addition, BPA anticipates that construction of the transmission line would not start until after winter runoff is complete and intermittent drainages are dry. If BPA needs to start construction earlier in the spring, option may exist to avoid working in those active drainages. BPA will also be preparing a SWPP that will identify and describe Best Management Practices that will control erosion and subsequent degradation of water quality.

E-42 Comment noted. BPA would consult with WDFW prior to commencing any construction activities in a flowing stream. In addition, see Response to Comments E-21 and E-41.

E-43 Comment noted. BPA is initiating dialogue with the Regional Habitat Program Manager at the present time. BPA expects this dialogue to continue through construction.

E-44 See General Response #1.

E-45 We agree that, in general, "carrying capacity" describes the maximum number of a species that can be maintained in a given area over an extended time period. However, this limitation is defined by the complex and dynamic interaction of hundreds of variables. The science of wildlife management is based in part on the assumption that, in certain situations, these variables can be manipulated to increase carrying capacity or to remove a limiting factor that is keeping a population from reaching its carrying capacity. For example, the recovery programs of many endangered species include plans for relocation of individuals and populations (e.g., California condor, gray wolf). In this instance, the potential for successfully relocating individual animals from the project site to alternative habitats would be affected by the species involved and numerous other factors that must be considered on a case-by-case basis. Nevertheless, we acknowledge that some wildlife mortality will occur during clearing and grading operations, especially involving species of low-mobility and/or those that are habitat specialists. The proposed relocation of individual animals applies only to special-status species rather than all species occupying the project site.

E-46 Comment noted. Most if not all soil will be used for backfilling tower footings. See Response to Comment E-22. For unavoidable disturbance in wetlands, the top 12 inches of soil will be stockpiled and redeposited after construction is complete. In addition, the following mitigation measures (as identified on page 3-63 of the DEIS) would likely be employed to reduce impacts related to the establishment of undesirable and noxious plants to non-significant levels:

- Reseed newly disturbed areas.

- Prevent new weed infestation by cleaning equipment travelling in and out of weed-infested areas, using herbicide or biocontrol treatments, and reseeding disturbed areas with native species.

E-47 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

E-48 Comment Noted. See General Response #1.

E-49 Please refer to response to comment E-45. In addition, relocation is provided as an example of just one of several possible actions that could be taken if a sensitive (special-status) species is encountered within the project area during construction. Other actions, such as temporal restrictions on construction, would be considered on a case-by-case basis and in cooperation with the WDFW.

E-50 See General Response #1

E-51 Comment noted. See General Response #1.

E-52 Comment noted. See General Response #1.

LETTER "F"

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47600 • Olympia, Washington 98504-7600 • (206) 407-6000 • TDD Only (Hearing Impaired) (206) 407-6006

December 12, 1995

Mr. Jason Zeller
EFSEC
PO Box 43172
Olympia WA 98504-3172

Dear Mr. Zeller:

Thank you for the opportunity to comment on the draft environmental impact statement (DEIS) for the Northwest Regional Power Facility, proposed by KVA Resources and CSW Energy (DOE/EIS-0214). We reviewed the DEIS and have the following comments.

On October 29, 1995, Jim Lyerla with our Water Resources Program testified before the EFSEC Council in Creston, Washington on this proposal. His testimony concerned the water rights for the Town of Creston and their ability to serve water to the KVA facilities under their existing water rights. It appears from consultation with KVA consultants, Creston representatives, and various legal councils that the Town of Creston has existing water rights in excess of their present use. 1

However, it was determined that the facility proposed would have water requirements equivalent to those presently used by the town. It was recommended that KVA consider purchasing a nearby irrigation right equal to their annual requirements and retire it from active use. 2

The Creston area is within the Sinking Creek Drainage Basin and is the subject of litigation concerning groundwater and surface water continuity. Additional groundwater withdrawals would have an adverse effect on existing rights and may draw the Town of Creston and KVA into this ongoing legal battle.

If you have any questions on Ecology's comments, please call Mr. Jim Lyerla at (509) 456-6311.

Consistent with the Department of Ecology's responsibilities as Washington State's coordinator for the National Environmental Policy Act, we are forwarding the comments received from the State of Washington, Department of Fish and Wildlife.

If you have any questions on the comments made by Washington Department of Fish and Wildlife, please call Ms. Jane Banyard at (360) 902-2575.

Sincerely,

Marvin Vialle
Environmental Review Section

MV:ri
95-7788

cc: Jim Lyerla, ERO
Heidi Renz, ERO

LETTER "F" RESPONSES

F-1 Comment noted. However, as stated on page 3-36 (Creston Water Supply) of the DEIS "No significant impact on Creston's water supply is projected. The NRPF will require 55 to 70 gpm (4.4 l/s) for normal operation and 200 gpm (13 l/s) for peak operation to refill the project's water tank. Creston has adequate water rights (1,050 gpm, or 66 l/s) and pumping capacity (1,030 gpm, or 65 l/s) to provide the water supply requirements of the town and the NRPF.".

F-2 Comment noted.

.EVE PINNIX
Director

LETTER "G"

STATE OF WASHINGTON

WASHINGTON STATE PARKS AND RECREATION COMMISSION

7150 Cleanwater Lane • P.O. Box 42650 • Olympia, Washington 98504-2650 • (360) 902-8500

December 12, 1995

Northwest Regional Power Facility DEIS - Potential Impacts to Riverside/Pasco to Fish Lake Trail

Mr. Allen Fiksdal
EFSEC Project Manager
P.O. Box 43172
Olympia, WA 98504-3172

Dear Mr. Fiksdal:

Thank you for the opportunity to comment on the Northwest Regional Power Facility Draft Environmental Impact Statement (DEIS). After reviewing the document State Parks has the following comments:

State Parks supports the preferred pipeline route (Segment 1-South) as described in the DEIS. This route will intersect our Pasco to Fish Lake trail, but the alternate route, Segment 2-North, poses significant impacts to Riverside State Park and should not be considered further. In order to address all impacts of the preferred route, a more detailed route plan for the area of intersection with our trail is needed. 1

When this project is closer to implementation we would like to meet with the planners for this facility and discuss the logistics of trail crossing. The Pasco to Fish Lake trail is currently undeveloped, however,we are intending to upgrade the trail and add sanitary facilities in places. We would like to cooridinate with the facility's on-site team to ensure the trail crossing will not conflict with our trail master plan. 2

Thank you again for the opportunity to comment on this proposal. I look forward to hearing more from you as the prooject is closer to implementation. If you have any questions, please feel free to contact me at (360) 902-8633.

Sincerely,

Chris Regan

Chris Regan, Environmental Specialist,
Environmental Programs

cc: Bill Koss, Capital Programs Manager, Environmental Programs
Bill Jolly, Chief of Research and Long Range Planning
Dan Meatte, State Archaeologist, Environmental Programs
Mark Schulz, Environmental Specialist, Eastern Region
Bill Fraser, Parks Planner, Eastern Region
Ange Taylor, Eastern Region Manager
STEVE WRIGHT, P.E., PROJECT ENGINEER/PLANNER

LETTER "G" RESPONSES

G-1 Comment noted. See General Response #1.

G-2 Comment noted. This information will be provided to the Federal Energy Regulatory Commission (FERC). FERC would be responsible for the complete environmental analysis (i.e., under the National Environmental Policy Act) of the natural gas pipeline. In addition, construction of the natural gas pipeline would likely require compliance with the State Environmental Policy Act.

LETTER "H"

Christine O. Gregoire
ATTORNEY GENERAL OF WASHINGTON
Ecology Division
629 Woodland Square Loop SE 4th Floor • Lacey WA 98503
Mailing Address: PO Box 40117 • Olympia WA 98504-0117

December 18, 1995

Mr. Jason Zeller
Energy Facility Site Evaluation Council
925 Plum Street, S.E., Building 4
P. O. Box 43172
Olympia, Washington 98504-3172

Re: Comments on Draft Environmental Impact Statement
Application No. 93-2

Dear Mr. Zeller:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement (DEIS) prepared by the Energy Facility Site Environmental Council (EFSEC) and the Bonneville Power Administration (BPA) on the proposed Northwest Regional Power Facility (NRPF).

In providing these comments, I will attempt to specifically address areas in which I believe the DEIS is lacking. In that regard, while I will identify subject areas of concern, I will also attempt to avoid duplication of the substantive information already provided by myself in the adjudicative hearing. It is my understanding that material already provided in the adjudicative hearing will automatically be considered by EFSEC in its SEPA process and does not need specific reference in the SEPA process to be considered.[1] I do request that all information provided in the adjudicative hearing be considered. 1

With the above understanding, below are specific comments I have regarding the DEIS.

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[1]The DEIS indicates that the hearing transcripts "will be recorded and responded to in the final EIS". (DEIS p. 6-6.)

Natural Gas Pipeline

The DEIS is wholly lacking in analysis of the natural gas pipeline. There is no evaluation from a quantitative and qualitative point of view. What little analysis that is offered, is superficial at best. The DEIS indicates that

> The environmental impact of this lateral gas pipeline will be covered under a separate FERC environmental review process.

(DEIS p. 1-4.) In reference to the pipeline, the DEIS further indicates

> The level of information available is not as detailed for the pipeline as for the NRPF and its ancillary facilities.

(DEIS p. 1-24.) The only justification contained in the DEIS for failing to include an appropriate level of detail regarding the environmental effects of the pipeline is that FERC will site the pipeline. The fact that FERC will site the pipeline does not excuse EFSEC from evaluating the environmental effects of the pipeline. (See Counsel for the Environment's Memorandum of Authorities in Support of Consideration of the Environmental Impacts of the Gas Pipeline attached Appendix 1.)[2] This deferral to FERC is without precedent in SEPA. 2

SEPA mandates that agencies evaluate and consider environmental impacts of proposals prior to taking agency action. RCW 43.21C et.seq. Evaluation of environmental impacts is not excused because the agency lacks jurisdiction to take action.

> In assessing the significance of an impact, a lead agency shall not limit its consideration of a proposal's impacts only to those aspects within its jurisdiction, including local and state boundaries.

(Emphasis added.) WAC 197-11-060(4)(b). (Appendix 1.)

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[2]I have attached this brief again because I am unclear as to whether it would be considered as part of the hearing transcript since it is argument. I do request that the argument be considered in light of whether the DEIS sufficiently addresses the environmental impacts of the entire project.

The DEIS fails to consider all impacts in that any consideration given regarding the natural gas pipeline is superficial and/or is non-existent. As readily identified in the DEIS, the environmental impacts of the pipeline may include erosion[3] of soils, air impacts, degradation to water quality, loss of wetland habitat, negative impacts to sensitive streams, loss of habitat due to noxious weed infestation. (DEIS pp. 1-8, 1-10, 1-12, 1-14.) Yet, no more than a cursory nod is given to these potential impacts.

In several areas of the DEIS, impacts were simply not evaluated at all. For example,

1. Land use impacts of the natural gas pipeline will be covered under a separate FERC environmental review. (DEIS p. 1-17.)

2. Since there are no data regarding the operational status or existence of compressor stations along any of the proposed routes, impacts can not be assessed. (DEIS pp. 3-34 and 3-35.)

3. It is not known whether or not Washington State or federally listed sensitive, threatened, or endangered plant or animal species use areas within or along the proposed [pipeline] routes. (DEIS p. 3-61.)

4. Existing noise conditions for the alternative pipeline routes have not been analyzed. (DEIS p. 3-82.)

2

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[3]The DEIS indicates:

> Erosion during construction and restoration can impact the quality of soil and water within the ROW and surrounding areas. Erosion along the pipeline trench during the wet season can cause the loss of topsoil and vegetation, and can impact water quality through sedimentation. Erosion both during construction and operation is possible. In extreme cases, erosion can contribute to the structural failure of the pipeline.

(DEIS p. 3-11.) The above analysis is speculative and superficial at best. It does not provide any kind of quantitative or qualitative analysis. It does not comport with the intent of SEPA.

5. The risk of fire or explosion has not been analyzed for the alternative pipeline routes. (DEIS p. 3-82.)

6. Potential releases to the environment have not been analyzed for the alternative pipeline routes. (DEIS p. 3-82.)

7. No mitigation has been identified for inclusion in this EIS for environmental health and public safety impacts during construction or operation of the natural gas pipeline. (DEIS p. 3-92.)

8. Several gas line alternatives have been identified but information necessary to adequately describe land uses along each route is incomplete. (DEIS p. 3-102 and 3-114.)

9. [In relation to transportation facilities], impacts of the construction of the gas pipeline will be detailed in the FERC application. . . . At the time of the detailed environmental analysis, evaluation will be made concerning the possible impacts of these crossings and mitigation measures will be proposed. (DEIS p. 3-153.)

2

In other areas, a programmatic approach was taken.[4] This approach is not justified. This approach does not allow for full evaluation of the environmental impacts and, as such, is not appropriate. While it may be appropriate for a DEIS to approach issues programmatically under certain conditions, those conditions do not exist in the current proposal.

WAC 197-11-080 provides:

> (1) If information on significant adverse impacts essential to a reasoned choice among alternatives is not known, and the costs of obtaining it are not exorbitant, agencies shall obtain and include the information in their environmental documents.
> (2) When there are gaps in relevant information or scientific uncertainty concerning significant impacts,

[4]This programmatic approach was taken in reference to impacts on cultural resources, geology, water quality particularly as it relates to perennial streams and ephemeral streams, and socioeconomic concerns. (DEIS pp. 1-19, 3-8, 3-38, 3-181.)

agencies shall make clear that such information is lacking or that substantial uncertainty exists.

(3) Agencies may proceed in the absence of vital information as follows:

(a) If information relevant to adverse impacts is essential to a reasoned choice among alternatives, but is not known, and the costs of obtaining it are exorbitant; or

(b) If information relevant to adverse impacts is important to the decision and the means to obtain it are speculative or not known;

Then the agency shall weigh the need for the action with the severity of possible adverse impacts which would occur if the agency were to decide to proceed in the face of uncertainty. If the agency proceeds, it shall generally indicate in the appropriate environmental documents its worst case analysis and the likelihood of occurrence, to the extent that the information can reasonably be developed.

(4) Agencies may rely upon applicants to provide information as allowed in 197-11-100.

(Emphasis added.) WAC 197-11-080. These conditions are not met in this case. 2

For example, the adverse impacts on cultural resources is presently unquantified on more than a potential basis.[5] However, the costs of obtaining detailed information on the adverse impacts on cultural resource is not exorbitant, nor are the means to obtain that information unknown. In fact, the applicant will presumably be required to obtain that information in the FERC process. As such, the impact statement's programmatic approach is not justified under WAC 197-11-080.

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[5]For example, statements such as

> [t]he North Route has moderate to high cultural resource potential; that portion of the route from Deep Creek to Spokane has the highest potential both in terms of site density and diversity. The three middle routes all have moderate to high cultural resource potential. The South route has moderate cultural resource potential with localize areas of high probability.

provide no substantive information regarding the adverse impacts. (DEIS p. 1-20.)

Having two process addressing parts of a whole totally eliminates either agency from evaluating the environmental effects of the project as a whole. In essence, piecemeal review will occur. This piecemeal approach is contrary to SEPA. (Appendix 1.)[6]

In addition and most importantly, the DEIS fails to provide any qualitative or quantitative information on adverse impacts to water quality. For example, the DEIS states:

> Surface water quality will be impacted during the construction phase of the natural gas pipeline. It has been proposed that the streams will be crossed using open cut methods. This method will degrade the natural banks and bottom of the streams. Established bank vegetation will be removed, increasing the potential for erosion and stream channel migration. In addition, the potential for siltation downstream will increase significantly. Drainages adjacent to steep slopes are most likely to receive the greatest impact. The potential for erosion, significant stream channel migration and siltation in these areas will continue to exist until reestablishment of permanent cover vegetation. If mitigation measures are implemented, impacts to stream crossings <u>may</u> be less significant.

(Emphasis added.) (DEIS p. 3-42). The DEIS does not identify which streams will be crossed, fish habitat within each stream and/or any qualitative or quantitative information other than the above quote. This superficial review fails to adequately address the environmental impacts as required by SEPA.

In summary, the DEIS is fatally flawed in its failure to adequately address the environmental impacts of the proposed natural gas pipeline. This was recognized by Dr. Benjamin Zamora when he offered his testimony in the adjudicative hearing. (Appendix 2.)[7] The Final Environmental Impact

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[6]The above analysis is applicable to the programmatic approach taken in reference to other areas beside cultural resources as identified in footnote 4 above.

[7]This testimony is being attached as it is unclear whether it would be considered as being part of the adjudicative record since it was not admitted as an exhibit. While the testimony is geared toward the application rather than the DEIS, it is still highly relevant as the DEIS did not expand upon the

Statement should give a qualitative and quantitative analysis of the impacts associated with the construction of the natural gas pipeline. 2

Ozone Producing Emissions

The DEIS fails to address at any level the environmental consequences of the production of ozone as a result of the NRPF.[8] The final EIS should obtain information regarding the damages associated from the production of ozone as a result of the NRPF. This information should be demonstrated by use of a Regional Oxident Model evaluating the amount of ozone expected to be produced. The final EIS should also analyze the environmental effects of the production of ozone with and without a NO_x catalyst. This analysis should utilize the best available scientific information regarding the peculiar attributes of ozone production in rural areas[9] and should utilize information on background levels of NO_x measured by an instrument of the "Super NO_x" category.

The cost of obtaining this information is not exorbitant and the value of receiving it will substantially aid EFSEC in fully evaluating potentially significant impacts from the operation of the NRPF. This information is essential in determining whether a NO_x catalyst is appropriate. 3

In addition, the BACT analysis for use of the NO_x is flawed and should be reworked after obtaining data from the Regional Oxident Model. The cost calculations reported in the BACT Analysis Documentation (Appendix F to the DEIS) contain unjustifiable assumptions regarding the price of electricity to operate the SCR system and the useful life of the system. Correcting these assumptions would reduce the cost per ton of NO_x removed to about 20% less than the $7731/ton.

First, in calculating Capital Recovery Cost (CRC), the applicant has assumed that the SCR System (excluding catalyst) has a useful life of only 10 years and zero value beyond that point. The system includes such long-lived items as Foundations and Supports, Handling and Erection, Startup

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information contained in the application.

[8]The word ozone is not even mentioned.

[9]I have enclosed as Appendix 3 a new article regarding the attributes of ozone production in a rural environment.

Assistance, etc. Similar structures and equipment in the generating system are assumed to last much longer. The interest rate of 11% also seems high. Recalculating the Capital Recovery Factor (CRF) at 10% interest rate and 20 years life reduces the non-catalyst CRC from $1.232 million/year to $0.865 million.

Second, electricity for operating the catalyst is costed at $0.05/kWh. In contradiction, considerable evidence was presented in the adjudicative hearing to the effect that the power would be available for purchase, from NRPF or other producers, at less than $0.02/kWh. At the lower price, electricity for the SCR catalyst would cost $368,000 for one year of operation. 3

The above two corrections reduce the estimate of the 70% removal SCR catalyst by 20% from $7731/ton NO_x to $6200/ton NO_x. Other such exaggerated costs by the applicant may be present. The Final EIS should address these exaggerations.

In summary, the DEIS is wholly insufficient in its failure to consider the impacts of ozone production as a result of the NRPF.

Greenhouse Gases

The DEIS states:

> [C]arbon dioxide (CO_2) emissions from the NRPF will contribute to the cumulative impact of greenhouse gases. The incremental contribution of the NRPF is in itself to be considered significant, although the cumulative impact of global warming may be significant.

(DEIS p. 1-9). The DEIS further states: 4

> Nevertheless, in conjunction with other regional and global sources of greenhouse gases, the NRPF may contribute to global warming. Its contribution would be noticeable, but not significant in comparison to emissions of greenhouse gases from other sources in Washington State and the rest of the world.

(DEIS p. 4-2.) The evidence in the adjudicative hearing supports a finding that the NRPF's emissions of greenhouse gases will cause $4-12 million dollars of potential damage per

year.[10] This is significant. The statement of nonsignificance in the DEIS is not supported and should be changed. 4

DEIS Minimizes Impacts

The DEIS minimizes the environmental impacts in general. By way of example but not limitation:

1. In the section on noise levels (DEIS p. 3-85), it is noted that start-up operations would sometimes cause noise that would be clearly audible and higher than the night time state limits. Then it stated that "start-up operations would comply with state noise limits if they were conducted during the day." Id. The implication is that excessive night time noise levels will be mitigated by performing start-up operations during the day. However, the statement in the DEIS actually says nothing about whether start-up operations will be conducted at night or not. 5

2. Another example of somewhat oversold mitigation is in the discussion of visual effects. Pine tree plantings are suggested as a partial screen of the plant and stacks. The trees are reported to average 60-75 feet in height, about one-half the height of the stacks and transmission towers, and almost as tall as the cooling towers (DEIS p. 3-133). Not mentioned is the fact that it would take much longer than the life of the plant for the trees to reach their mature height. 6

3. Also regarding visibility is the statement that perceptible effects of the emissions on the Spokane Class I airshed would occur only within one hour of sunrise or sunset and only for a maximum of 6% of the hours in a year. (DEIS p. 3-32). Not mentioned is that only 16.7% of annual hours are within an hour of sunrise or sunset. Thus an alternative, but less comforting report of visibility effects, would be that conditions for a perceptible effect would arise 7

[10]While it is true that the specific quantification of damages is difficult due to fact that the costs of obtaining it are exorbitant and the means to obtain that information in any more detail is not known, the DEIS must still address the damages by looking at the worst case analysis. WAC 197-11-080.

during 36% of the hours immediately before and after sunrise and sunset.

4. There is no justification for the comment on p. 3-61 that the net effect in the reduction in the wildlife population would be minor. The pipeline route is not known (DEIS p. 3-110), the wildlife utilizing the lost habitat is not known, and the disruption to the habitat is unquantified in the DEIS. 8

5. There is no justification for the comment on p. 3-157 that the impacts on transportation from the natural gas pipeline will not be significant. It is acknowledged that the environmental analysis has not been done. (DEIS p. 3-157.) 9

Miscellaneous Comments

1. The background concentration of NO_x of 11 ug/m_3 as identified in the DEIS is not supported. (See testimony of Dr. Campbell in adjudicative hearing regarding "Super NO_x" instruments.) 10

2. The statement that there is a deficit of energy is misleading. (DEIS p. 2-48.) The evidence is overwhelming that the market includes the entire western coast (i.e., not just the Pacific Northwest) and that given the market, there is currently a glut of power. 11

The above comments plus the evidence submitted in the adjudicative hearing should be considered as comments on the DEIS. Thank you for the opportunity to provide my comments to the DEIS.

Very truly yours,

Deborah Mull

DEBORAH L. MULL
Assistant Attorney General
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DLM

Attachments

STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

In re Application No. 93-2 of KVA RESOURCES, INC. For Site Certification	**COUNSEL FOR THE ENVIRONMENT'S MEMORANDUM OF AUTHORITIES IN SUPPORT OF CONSIDERATION OF THE ENVIRONMENTAL IMPACTS OF THE GAS PIPELINE**

I. INTRODUCTION

EFSEC has, *sua sponte*, requested briefing on whether it has jurisdiction to consider the environmental impacts of the proposed 60 mile gas pipeline. It is Counsel for the Environment's position, that EFSEC not only has jurisdiction but is mandated under both the State Environmental Policy Act (SEPA) and ch. 80.50 RCW to consider the environmental impacts of the pipeline.

The mandate to consider environmental consequences of the entire project (including the pipeline) should not be misinterpreted as indicating that EFSEC has jurisdiction to site the pipeline. Counsel for the Environment does not dispute that the Federal Energy Regulatory Commission (FERC) has exclusive authority to site the pipeline. However, the lack of authority to site a portion of an energy facility does not excuse EFSEC from its mandate to evaluate the environmental consequences of

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APPENDIX 1

the proposal when making its recommendation decision to the Governor.

II. ARGUMENT

A. Chapter 80.50 RCW Requires EFSEC To Evaluate And Consider All Environmental Impacts (Including Those Of The Gas Pipeline) In Deciding Its Recommendations To The Governor.

EFSEC has the authority to recommend to the Governor that an energy facility be sited or not. RCW 80.50.040(8). Chapter 80.50 RCW defines energy facilities as being "an energy plant[1] or transmission facilities". (Emphasis added.) RCW 80.50.020(10). A transmission facility by itself may bring forth EFSEC's jurisdiction. A transmission facility is defined in part as:

> (b) Natural gas, synthetic fuel gas, or liquified petroleum gas transmission pipeline of the following dimensions: A pipeline larger than fourteen inches minimum inside diameter between valves, for the transmission of these products, with a total length of at least fifteen miles for the purpose of delivering gas to a distribution facility, except an interstate natural gas pipeline regulated by the United States Federal Power Commission;

RCW 80.50.020(7).[2] This definition does not indicate that EFSEC

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[1] An energy plant is defined as including

> (a) Any stationary thermal power plant with generating capacity of two hundred fifty thousand kilowatts or more . . . including associated facilities. . .

RCW 80.50.020(14). It is undisputed by any party that the proposed Northwest Regional Power Facility (NWRPF) meets this definition of an energy plant.

[2] It is presumably this definition that has raised the issue of EFSEC's jurisdiction to consider the 60 mile natural gas pipeline. The author is presuming because no party has objected to the evidence submitted on the pipeline and no argument has been brought forward challenging EFSEC's

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cannot consider the environmental impacts. This definition does indicate that the legislature recognized FERC's authority to site interstate natural gas pipelines and therefore excluded it from its definition.[3] This interpretation is supported by the fact that transmission facilities standing alone may bring forth EFSEC's jurisdiction. However, it does not make sense that the legislature intended EFSEC to ignore environmental impacts of a pipeline under FERC's jurisdiction when that pipeline is a necessary part of the energy plant which is under EFSEC's jurisdiction.

In interpreting the intent of chapter 80.50 RCW, the statute should

> receive a sensible construction which will effect the legislative intent and avoid unjust or absurd consequences.

In re Welfare of Hoffer, 34 Wn. App. 82, 84, 659 P.2d 1124 (1983). EFSEC must read ch. 80.50 RCW in its entirety, not piecemeal. Donovick v. Seattle-First Nat. Bank, 111 Wn.2d 413, 415, 757 P.2d 1378 (1988). In addition, where the legislature prefaces an enactment with a statement of purpose, such declaration serves as an important guide in interpreting the intent of the legislature. Hartman v. Washington State Game Com'n, 85 Wn.2d 176, 532 P.2d 614 (1975).

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jurisdiction.

[3]FERC's authority to site includes the authority to condition the siting of the pipeline.

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In following these rules of statutory construction, it is clear that EFSEC must evaluate the environmental consequences of the entire project. First, the intent of the legislature was to ensure that all of the environmental impacts would be addressed. The legislature found:

> that the present and predicted growth of energy demands in the state of Washington requires the development of a procedure for the selection and utilization of sites for energy facilities and the identification of a state position with respect to each proposed site. The legislature recognizes that the selection of sites will have a significant impact upon the welfare of the population, the location and growth of industry and the use of the natural resources of the state.
>
> It is the policy of the state of Washington to recognize the pressing need for increased energy facilities, and to ensure through available and reasonable methods, that the location and operation of such facilities will produce minimal adverse effects on the environment, ecology of the land and its wildlife, and the ecology of state waters and their aquatic life.
>
> It is the intent to seek courses of action that will balance the increasing demands for energy facility location and operation in conjunction with broad interests of the public. Such action will be based on these premises:
>
> (1) To assure Washington state citizens, where applicable, operational safeguards are at least as stringent as the criteria established by the federal government and are technically sufficient for their welfare and protection.
>
> (2) To preserve and protect the quality of the environment; to enhance the public's opportunity to enjoy the aesthetic and recreational benefits of the air, water and land resources; to promote air cleanliness; and to pursue beneficial changes in the environment.
>
> (3) To provide abundant energy at reasonable cost.

(Emphasis added.) RCW 80.50.010. Nothing in the above provision indicates that EFSEC is to ignore the environmental consequences of a 60 mile pipeline in making its recommendation to the Governor, especially when the pipeline is a necessary

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component of the proposal.[4] The opposite is true. EFSEC is mandated to "preserve and protect the quality of the environment". Id. This section does not say, preserve and protect the quality of part of the environment. This section mandates evaluation of all the environmental consequences of a proposal.

This analysis is further supported by RCW 80.50.080. In that section, the legislature mandated that the Council for the Environment shall be appointed to "represent the public and its interest in protecting the quality of the environment". RCW 80.50.080. Again, it doesn't specify any limitation.

In addition to the lack of limiting language, the statute empowers EFSEC

> (10) To integrate its site evaluation activity with activities of federal agencies having jurisdiction in such matters to avoid unnecessary duplication;
> (11) To present state concerns and interests to other states, regional organizations, and the federal government on the location, construction, and operation of any energy facility which may affect the environment, health, or safety of the citizens of the state of Washington. . .

(Emphasis added.) RCW 80.50.040. Had the legislature intended EFSEC to ignore the environmental consequences of interstate natural gas pipelines, it would not have given EFSEC the authority to integrate its activities with FERC or to present the state's environment, health or safety concerns to the federal government (i.e. FERC). If evidence related to the pipeline is deemed irrelevant and therefore not admissible,

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[4]It is axiomatic that the Project includes the 60 mile pipeline. Without gas, the energy facility could not operate.

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EFSEC will not even know what the state's concerns are in relation to the pipeline much less be able to present those concerns.

In addition, EFSEC is required to interpret its own laws in accordance with the policies of SEPA and its rules. WAC 197-11-030(a). SEPA requires full environmental analysis even when the parts of the proposal are outside of the lead agency's jurisdiction. (For a full discussion of the SEPA's requirements, See Argument at pp. 7-9 of this brief.)

In sum, EFSEC is mandated to preserve and protect the environment. In this context, EFSEC is empowered to "conduct hearings on the proposed location of the energy facilities". RCW 80.50.040(7). From these hearings, EFSEC is mandated to report to the Governor

> (a) A statement indicating whether the application is in compliance with the council's guidelines,
> (b) criteria specific to the site and transmission line routing,
> (c) a council recommendation as to the disposition of the application[5], and
> (d) a draft certification agreement when the council recommends approval of the application.

(Emphasis added.) RCW 80.50.040(8). Subsections (a) and (d) above have the potential to conflict with FERC's jurisdiction to

[5]The application includes discussion regarding the pipeline.

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site the pipeline.[6] It is this conflict that the definition section attempts resolve.

However, section (c) does not conflict with FERC's jurisdiction at all. EFSEC's recommendation to approve siting of the facility or not approve the siting is a wholly local decision. It is a decision that must be based upon all environmental factors.[7] The question presented is whether EFSEC has jurisdiction to consider all environmental impacts of the proposed project. The answer is a resounding yes.

B. SEPA Requires EFSEC To Evaluate And Consider All Environmental Impacts (Including Those Of The Gas Pipeline) In Deciding Its Recommendations To The Governor.

SEPA requires agencies to evaluate and consider environmental impacts of proposals prior to taking agency action. RCW 43.21C et.seq. EFSEC has interpreted this mandate in WAC 463-47-110 which provides:

> (a) The overriding policy of the council is to avoid or mitigate adverse environmental impacts[8] which may result from the council's decisions.
> (b) The council shall use all practicable means, consistent with other essential considerations of state policy, to improve and coordinate plans, functions, programs, and resources . . .

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[6]If the council's guidelines are more stringent than FERC's, this would potentially be an impermissible encroachment upon FERC's authority. Likewise, if the draft certification has mitigation procedures that are different than ultimately required by FERC, a conflict may exists.

[7]This is particularly true when you have a facility that cannot operate without the ability to obtain natural gas. The pipeline and the plant present one proposal.

[8]It is important to note, that the WAC does not limit the environmental impacts to be considered. (See discussion at pp. 4-5 of this brief.)

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> (c) The council recognizes that each person has a fundamental and inalienable right to healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.
>
> (d) The council shall ensure that presently unquantified environmental amenities and values will be given appropriate consideration in decision making along with economic and technical considerations.

(Emphasis added.) WAC 463-47-110. Evaluation of environmental impacts[9] is not excused because the agency lacks jurisdiction to take action.

> In assessing the significance of an impact, a lead agency shall not limit its consideration of a proposal's impacts only to those aspects within its jurisdiction, including local and state boundaries.

(Emphasis added.) WAC 197-11-060(4)(b). Evaluation of environmental impacts is also not excused because KVA's proposal is presented in two parts (i.e. the plant and the pipeline).

A proposal that has two parts but is "related to each other closely" shall be considered in the same environmental document. WAC 197-11-060(3)(b).[10]

> Proposals or parts of proposals are closely related and they shall be discussed in the same environmental document, if they:
>
> (i) Cannot or will not proceed unless the other proposals (or parts of proposals) are implemented simultaneously with them; or

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[9]Environmental impacts include effects upon the earth (including geology, soils, and topography), air, water, plants and animals (including habitat), energy and natural resources and built environments. WAC 197-11-752 and 197-11-444. In the present case, it is undisputed that a 60 mile natural gas pipeline will have some impact upon the environment.

[10]Phased review is not appropriate when "it would merely divide a larger system into exempted fragments or avoid discussion of cumulative impacts." WAC 197-11-060(5)(d)(ii).

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(ii) Are interdependent parts of a larger proposal and depend on the larger proposal as their justification or for their implementation.

Id.; See also, Citizens v. Klickitat County, 122 Wn.2d 619, 638-640, ____ P.2d ____ (1993); Cathcart v. Snohomish County, 96 Wn.2d 201, 634 P.2d 853 (1981). Our courts have long held that SEPA analysis is required when "any part of a project or series of projects which when considered cumulatively constitute a major actions significantly affecting the quality of the environment". (Emphasis added.) Juanita Bay Valley Com. v. Kirkland, 9 Wn. App 59, 72, 510 P.2d 1140 (1973).

> Agency decision makers must consider more than the narrow, limited environmental impact of the immediate, pending actions and cannot close their eyes to the ultimate probable environmental consequences. [cite omitted] However, SEPA does not require that every remote and speculative consequence of an action be included in the EIS. [cite omitted]
>
> An EIS need not cover subsequent phases if the initial phase under consideration is substantially independent of the subsequent phase or phases, and the project would be constructed without regard to future developments.

SEAPC v. Cammack II Orchards, 49 Wn. App 609, 614, 744 P.2d 1101 (1987). Piecemeal review is not appropriate if the first phase of the project is dependent upon the second phase and if the consequences of the ultimate development can be initially assessed. Cathcart v. Snohomish County, 96 Wn.2d 201, 210, 634 P.2d 853 (1981).

In the present case, the energy plant is substantially dependent upon the gas pipeline. The plant is worthless without a pipeline to transport the natural gas. As such, the two parts

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are co-dependent. The environmental impacts of the ultimate development must be addressed by EFSEC.[11]

III. SUMMARY

EFSEC is mandated under both ch 80.50 RCW and ch. 43.21C RCW to fully evaluate all environmental impacts of KVA's proposal. KVA's proposal is to build a natural gas power energy facility. As such, EFSEC must evaluate the impacts of the pipeline needed to transport the gas.

DATED this 16 day of October, 1995.

CHRISTINE O. GREGOIRE
Attorney General

Deborah L Mull

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Assistant Attorney General
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dlm\pipeline.brf

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[11]It is Counsel for the Environment's position that the application and prefiled testimony is insufficient to adequately address the environmental impacts. This insufficiency is due to the applicants failure to request PGT proceed with its application for the pipeline before FERC. Had the applicant not taken such a position, EFSEC would be able to fully address the environmental consequences as a joint NEPA and SEPA document with FERC could have been prepared. However, the applicant's failure does not excuse EFSEC from fully evaluating the environmental impacts of the pipeline.

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STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

In re Application No. 93-2 of KVA RESOURCES, INC. For Site Certification	PREFILED TESTIMONY OF BENJAMIN ZAMORA

Q1. Please state your name and business address.

A1. Benjamin Zamora
Department of Natural Resource Sciences
Washington State University
Pullman, WA 99164-6410

Q2. Are you currently employed?

A2. Yes.

Q3. By whom and in what capacity?

A3. I am employed by Washington State University and serve as an Associate Professor in the Department of Natural Resource Sciences.

Q4. Can you please briefly describe your educational and work history?

A4. I have a B.S. degree in Range Management from Oregon State University, a M.S. degree in Range Management from the University of Nevada - Reno, and a Ph.D. in Botany from Washington State University. I started my professional career as a Range Scientist for the USDA Agricultural Research Service in 1968 at Pullman on the WSU campus, working on range weed ecology and control. In 1973, I was appointed to the faculty of the WSU Department of Forestry and Range Management to teach and conduct research in the areas of range and wildlife habitat management. In the mid 1980s, my academic responsibilities shifted to greater emphasis

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on landscape ecology, wildland fire, and reclamation of severely disturbed lands. Currently my instructional responsibilities are in plant identification and ecology, landscape ecology, wildland fire, and rangeland rehabilitation. My current research addresses wildland fire, landscape ecology, and reclamation of mined lands. Attached as Exhibit 1 is a true and accurate copy of my vitae.

Q5. What is your field of expertise?

A5. Landscape ecology and reclamation/restoration of severely disturbed lands.

Q6. Are you familiar with the proposal by KVA and CSWE to site the Northwest Regional Power Facility?

A6. Yes.

Q7. How did you become familiar with this project?

A7. I was contacted by Ms. Deborah Mull, Assistant Attorney General of Washington, to serve as a consultant in evaluating the application.

Q8. Generally, what was your understanding regarding your duties in evaluating this project?

A8. Because of my familiarity with the landscape, vegetation, wildlife populations, and habitat types of the project sites, I was asked to evaluate the application for statements of the environmental impacts of the facility on wildlife and botanical resources, assist in the quantification of damages associated with these impacts, and identify mitigation measures. Additionally, I was asked to evaluate the EIS when it becomes available with regard to wildlife and botanical impacts.

Q9. What documents have you reviewed in evaluating this project?

A9. I reviewed the following documents provided by Ms. Mull:

1. The application submitted for the NWRPF project;

2. Copies of the direct testimony of the applicant, specifically that of Donald R. Heinle and Wilfred G. Thomas;

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3. CH2M report "KVA Resources, Inc. gas Pipeline Corridor Report, Sept. 1993;

4. PGT report "KVA Resources Natural Gas Pipeline Routing Study", June 13, 1994; and

5. Copy of "Responses to Intervenor Issues, CH2M, May 5, 1995, NPE36089.B1.

Q10. What approach did you take in evaluating the Northwest Regional Power Facility?

A10. I was a member of a team of consultants from WSU representing the scientific fields pertinent to the application. The team approached the application review from an interdisciplinary standpoint with each consultant individually addressing specific areas within the application based on expertise. The reviews were then brought together to form a more holistic view of the cumulative impacts and potential mitigation of the power facility.

Q11. Why was this approach taken by the team?

A11. The interdisciplinary approach would draw together a holistic view of the project where unmitigated environmental damages would be quantified and valued in terms of the open market system. Mitigation could then be applied in terms clearly understood by all parties involved to protect the environment. The team perceived the effects of deregulation and the open market system as a positive way to keep power costs down but felt that a purely market driven system would not adequately address environmental costs of the project.

Q12. Can you summarize the environmental damage (negative impacts) associated with the construction and operation of the Northwest Regional Power Facility in relation to wildlife and habitat issues?

A12. <u>Yes and no.</u> The information regarding impacts given in the application and supporting documents (application reports, response to intervenor issues (May 4, 1995), and testimony) is of sufficient detail and based on field verified information to accurately identify impacts at the power plant site. However, I cannot summarize environmental impacts along the gas pipeline with confidence based on information in the application and supporting documents.

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Q15. Why not?

A15. In a comparison of detail given for the facility site versus gas pipeline corridor, I concluded <u>that the information contained within the application is insufficient to quantify the environmental damage with certainty.</u> The gas pipeline corridor was defined as a two mile wide strip of land over the entire length of the corridor. Within this corridor, five potential routes were identified. National Wetland Inventory Maps and the Washington Department of Wildlife Priority Habitat System maps for critical wildlife species distribution and habitat were used to identify potential wildlife and riparian/wetland concerns. Listings of wildlife, wildlife habitat, and riparian/wetland intersections by each route were prepared and summaries of critical wildlife concerns generated from these listings. No field survey was conducted to validate the data summaries or verify potential problems identified by the data summaries. It is very likely that additional critical wildlife and sensitive botanical resources occur along each route. But because no field assessment was made to verify and determine the full extent of sensitive resource occurrence, it is not known to what extent the listings given in the application represent actual resources that would be impacted. This assessment then, is only conjectural and at best incomplete until field surveyed and verified. The tentative nature of the impact summary is clearly stated in the Response to Intervenor Issues document (question 6). <u>(Exhibit 2.)</u>

<u>Q16.</u> **<u>How is the level of detail provided for the power plant in relation to the level of detail provided for the pipeline corridor?</u>**

A16. The power plant site was more critically evaluated through field survey with exact site location clearly defined. I spoke with the two Washington Department of Wildlife personnel who were involved in the survey and feel confident that the information provided in the application and supporting documents provide an accurate appraisal of wildlife species occurrence, wildlife habitat, botanical, and vegetation assessment, along with rectification and mitigation measures to be taken.

<u>The pipeline</u> involved interpretations of map data without field verification. There is no way to correlate the final selection of the pipeline route with high impact sites until final selection of the

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route is made and field survey produces an accurate inventory of wildlife and sensitive botanical resources along that route.

In addition, until a final route is selected by FERC no definite impact assessment can be made. All that is available at this point are summaries of "all known resources reasonably likely to be found" or "may be found in each corridor, according to the PHS and NWI maps" (Response to Intervenor Issues, May 4, 1995, question 6a). It would be very difficult if not impossible to derive a realistic assessment of cumulative impacts from the information given in the application without knowing where in the corridor the pipeline will be installed and time and duration of construction or whether the corridor's proposed by KVA will be ultimately used by FERC when it sites the pipeline.

Q17. What type of information would be required in order to determine the environmental damage to wildlife and habitat associated with this facility (*in the same sense as that of your colleagues evaluating impacts on air quality, water usage, and energy production*)?

A17. First, one would need to know the exact route that the pipeline would take. (e.g. where FERC sites the pipeline.) Second, a field survey of the route selected by FERC, even of a minimal reconnaissance nature, is necessary to accurately identify all wildlife and sensitive botanical resources along the most probable route of the gas pipeline installation. This would give more credibility to the effort to correlate the route of installation with mapped elements of priority wildlife habitat, wetland areas, and sensitive botanical resources. This would additionally provide more site specific attributes which could be incorporated into the decisions regarding avoidance, minimization, or rectification of negative impacts at this stage of the evaluation. If specific situations are identified and considered unavoidable, then mitigation measures could be evaluated and selected. At this point in the process, monetary values could be assigned to clearly defined mitigation measures and compensatory mitigation initiated.

Q18. Given the limited information available, what can you state as to the environmental damage associated with the Northwest Regional Power Facility?

A18. With regard to the power plant site, the net impact to

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the site will be long-term enhancement over existing conditions because of the revegetation, grazing elimination, and habitat development commitments by KVA.

With regard to the gas pipeline corridor, if construction activity is restricted to minimum areas during installation and the duration of construction activity minimized, then timing of construction becomes the most critical determining factor of total wildlife resource impact, especially for sensitive wildlife species. Generally, the most obvious impact of pipeline installation will be short-term disruption of plant and animal communities by construction activity. The severity of this will depend on time of entry into critical habitats. If entry occurs during a critical breeding or occupancy period of the area by wildlife and the construction activity intrudes into these sensitive areas, wildlife will respond negatively in the short term.

Habitat disruption will occur as a result of construction activity, but the severity will depend on the amount of area encompassed by the construction and the intensity of disturbance caused by construction equipment and traffic. There exists a high probability that habitat deterioration may be initiated by the introduction of noxious plants which compete with the native vegetation that composes the natural habitat wildlife.

If the installation of the pipeline is not carefully engineered according to the character of the soil and topography, the possibility of erosion exists which can have considerable impact on both terrestrial and wetland habitats and wildlife. This is particularly true for wetlands where many aquatic species are very sensitive to sediment changes in the aquatic system.

Q19. Given the limited information available, can you identify what mitigation measures do you think would be appropriate in this case?

A19. For the power plant site, the mitigation measures proposed are adequate. These include revegetation, elimination or grazing, and wildlife habitat development.

For the gas pipeline, I have no answer.

/ / /

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Q20. Why not?

A20. Until a final selection of the gas pipeline is made and specific information and more complete identification of the actual impacts most likely to take place, all impacts and proposed mitigation measures are hypothetical and can only be stated in the most generic terms.

Q21. Are some of the damages associated with the wildlife and habitat issues incapable of being fully mitigated?

A21. After review of the map inventory of wildlife species to be potentially affected by the gas pipeline installation, I saw no impacts that could not be fully mitigated provided that the elements of mitigation, e.g. avoidance, minimization, reduction, and rectification, are rigorously adhered to. The greatest concern will be over those potential impacts outlined in Q18 that could have long-term deleterious effects on the quality of wildlife and plant populations occupying those habitats.

Q22. Please explain.

A22. The invasion of noxious, competitive plant species could be initiated by the construction activity, primarily through the carrying of seed by vehicles into construction areas. Extensive soil disturbance from heavy equipment is expected resulting in ideal conditions for noxious plant establishment. Once established, these kinds of plants can dramatically and negatively affect the quality of wildlife and sensitive plant habitat by altering both the structure and composition of the habitat and competing with native plants for habitat resources for plant growth. Introduction of noxious plants into riparian zones along streams is also common and can be of even greater concern. Monitoring of corridors for noxious plant invasion and control of such plants is no small task. The willingness of a company to assume this responsibility should be sought.

Soil erosion and slope failure along the pipeline trench could send substantial amounts of sediment into wetland areas which would have significant long-term negative impact on wetland ecosystems.

Q23. If these types of problems are not mitigated, what will be the consequences to the wildlife of our state?

A23. Generally, the damages will contribute to the

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deterioration of wildlife and botanical resources of the immediate area, but even though the impacts may seem small in terms of a total landscape perspective, they will perpetuate the trend of declining wildlife and sensitive botanical resources for the entire state.

Q24. **Can you fully quantify the environmental damages to the wildlife of our state?**

A24. No.

Q25. **Please explain.**

A25. Accurate quantification of potential environmental damages requires a substitive, verified data base of the resources to be encountered by the proposed pipeline construction. All that was provided in the application was an interpretive, unsubstantiated data base. Until a validated resource inventory of the final route for pipeline installation is conducted, any quantification of environmental damages or lack thereof, is a matter of conjecture.

Q26. **Have you formed an opinion as to whether KVA's proposal allows for a cumulative impact analysis given the level of detail on the pipeline?**

A26. Yes.

Q27. **What is your opinion?**

A27. KVA's proposal cannot provide a cumulative impact assessment. Unless the actual line of travel of the pipeline is established, cumulative impact analysis **cannot** be made because all impacts become a matter of probability and conjecture without verification.

I declare under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct to the best of my knowledge.

Benjamin Zamora

BENJAMIN ZAMORA

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RESUME

Benjamin Zamora
Associate Professor and Associate Range Scientist
Department of Natural Resource Sciences
Washington State University
Pullman, WA 99164-6410

CURRENT POSITION

Appointed to faculty July 1, 1973; granted tenure September 16, 1978; appointed to Graduate Faculty, June 12, 1978; promoted to Associate Professor, February 28, 1979; current appointment teaching 60%, research 40%.

EDUCATION

Ph.D Plant Ecology, Washington State University, 1975. Dissertation: Secondary succession on broadcast-burned clearcuts of the Abies grandis/Pachistima myrsinites habitat type in north-central Idaho. (published).

M.S. Range Management, University of Nevada, 1968. Dissertation: Artemisia arbuscula, A. longiloba and A. nova plant associations in central and northern Nevada. (published)

B.S. Range Management, Oregon St. University, 1965.

PROFESSIONAL EXPERIENCE

Employer	Title	Nature of Work	Dates	Years
Bur. Comm. Fish	Res. Asst.	Fisheries Research	1960	0.25
Bur. Comm. Fish	Res. Asst.	Fisheries Research	1961	0.25
Ore. Game Dept.	Student Trainee	Fisheries Mgmt.	1962	0.50
Ore. St. Univ.	Lab. Asst.	Vet. Med.	1963	0.25
Ore. St. Univ.	Res. Asst.	Range Research	1964-65	2.50
Univ. of Nev.	Res. Asst.	Range Research	1966-68	2.00
USDA, ARS	Range Sci.	Range Research	1968-73	5.00
WSU, Nat Res Sci	Assoc Prof/Rge Sci	Teacher/Researcher	1973-present	21.00

TEACHING EXPERIENCE

Teaching Emphasis: Forest & Range Plant Identification and Ecology, Wildland Fire Management & Ecology, Ecological Reclamation and Restoration of Distrubed Ecosystems

Courses Currently Taught at WSU:

- Forest and Range Plant Resources I (3 cr)
- Forest and Range Plant Resources II (3 cr)
- Forest/Range Plant Identification Lab (1-3 cr)
- Introduction to Wildland Fire (3 cr)
- Adv. Topics in Wildland Fire (1-3 cr)
- Range Devlp. & Improvements (3 cr)

RESUME

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EDUCATION

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M.S. Range Management, University of Nevada, 1968. Dissertation: Artemisia arbuscula, A. longiloba and A. nova plant associations in central and northern Nevada. (published)

Other University Teaching Activities:
Continuing Education in Forest Ecology & Silviculture program,WSU, 1975-91
Restoring/Rehabilitating Damaged Ecosystems, WSU Workshop, June 7-9, 1994

RESEARCH

Research Emphasis:
(1) Ecology of forest and rangeland vegetation: structure, composition, distribution, measurement, succession and classification, environmental relationships; (2) Rehabilitation and restoration of severely damaged ecosystems (emphasis on forest & rangeland); (3) Prescribed fire application and effects.

WSU Agricultural Research Center Projects	Date
Influence of prescribed burning following logging on forest habitat types important as winter habitat for deer in eastern Washington	1975-present
Chronosequence of vegetation succession on clearcut forestlands	1973-present
Forest ecosystem monitoring for SO_2 damage in the area surrounding Northwest Alloy's magnesium plant at Addy, Washington	1974-81
Vegetation succession after forest stand defoliation by the Douglas-fir tussock moth	1975-78
Prescribed grazing by domestic livestock to manipulate vegetation along transmission line Right-of-Way	1977-79
Impacts of spruce budworm-caused damage and subsequent management activities on big game habitat in Washington and Montana.	1978-83
Classification and mapping of forest habitat types on Bureau of Indian Affairs land	1981-87
Buried viable seed in forest clearcuts	1986-87
Effects of spring prescribed burning on bitterbrush	1987- present
Application and effects of prescribed burning on rangelands of the Pacific Northwest	1988 -present
Control of common crupina with prescribed fire	1990-present
Revegetation and topsoiling of spoil sites of an abandoned uranium mine in east-central Washington.	1990-present

PUBLICATIONS (* refereed):

Tueller, P.T., J.H. Robertson and B. Zamora. 1971. The vegetation of Nevada, a bibliography. Univ. of Nev. Exp. Sta. Bull. R78, 30 p.

*Robooker, W.C. and B. Zamora. 1971. Small alternating temperature germinator. J. Range Manage. 24(6):465-466.

*Robooker, W.C., R. Schirman and B. Zamora. 1972. Carbohydrate reserves in roots of dalmation toadflax. Weed Sci. 20(3):212-214.

*Zamora, B.A. and P.T. Tueller. 1973. Artemisia arbuscula, A. longiloba and A. nova habitat types in northern Nevada. Great Basin Naturalist 33(4):225-242.

*Robooker, W.C. and B.A. Zamora. 1976. Translocation and metabolism of dicamba in Western Bracken. Weed Sci. 24(4):435-438.

*Schirman, R. and B.A. Zamora. 1978. Bud development in excised roots of rush skeletonweed (Chrondrilla juncea). Weed Sci. 26(6):582

*Zamora, B.A. 1981. An approach to plot sampling for canopy volume in shrub communities. J. Range Manage. 34(2):155-156.

*Leege, T.A., D.J. Hermand and B.A. Zamora. 1981. Effects of cattle grazing on mountain meadows in Idaho. J. Range Manage. 34(4):324-328.

Zamora, B A. 1982. Understory development in forest succession: An example from the Inland Northwest. p. 63-69. IN: Means, J.E. (ed.) 1982. Forest succession and stand development research in the Northwest. Proc. Symp. (26 Mar1981), Corvallis, OR., For. Res. Lab., Ore. St. Univ., 170 p.

Zamora, B.A. 1982. Mapping of disturbed habitats using terrain and juxtaposition models of potential vegetation. p. 153-159. IN: In-place resource inventories: principles and practices. Proc. Nat'l Wkshop (9-14 Aug1981), Orono, ME., SAF, Bethesda, MD. 1101 p.

*Pyke, D.A. and B.A. Zamora. 1982. Relationships between overstory structure and understory production in the grand fir/myrtle boxwood habitat type of north central Idaho. J. Range Manage. 35(6):769-773.

Zamora, B.Z. 1983. Forest habitat types of the Spokane Indian Reservation. Wash. St Univ., Agric. Res. Center, Research Bull. XB-0936-1983.

*Pratt, D.W., R.A. Black and B.A. Zamora. 1984. Buried viable seed in a ponderosa pine community. Can. J. Bot. 62:44-52.

Clausnitzer, R. and B.A. Zamora. 1987. Forest habitat types of the Colville Indian Reservation. Wash. St. Univ. Agric. Res. Ctr Res. Bull. No. MISC0110. 110p

Haferkamp, M. R., P. O. Currie, J. Menke, B. Zamora (editors). 1988. Range research areas in the western United States. Ore. St. Univ. Agric. Exp. Sta. Bul. 671. 40 p.

Zamora, B.A. 1989. Tiller responses of Bluebunch Wheatgrass to fall burning. IN: Prescribed Fire in the Intermountain Region - Forest Preparation and Range Improvement, Symposium Proc. p. 113-116, WSU Ext Publication

Roberts, R.F., B.A. Kelcman and B.A. Zamora. 1989. Evenage bitterbrush through prescribed fire: a management philosophy. IN: Prescribed Fire in the Intermountain Region - Forest Preparation and Range Improvement, Symp. Proc., p. 147-149, WSU Ext Publication

Baumgartner, D.M., D.W. Breuer and B.A. Zamora (editors). 1989. Prescribed Fire in the Intermountain Region. Symposium Proceedings. WSU Extension Publication.

* Schlosser, W.E., K.A. Blatner, B. Zamora. Pacific northwest forest lands potential for floral greenery production. Northwest Sci. 66(1):44-55

Zamora, B.A. and R. Connelly (eds). 1993. Challenge of Integrating Diverse Perspectives in Reclamation. Proc. Amer. Soc. Surface Mining and Reclamation. Vols. 1 and 2. Spokane,WA.

Zamora, B.A. and J. Leier. 1994. Growth and development of snow buckwheat on xeric spoils of an abandoned uranium mine in eastern Washington. In Reclamation and Revegetation: Vol. 3. Proc. Internt'l Conf. Abate. Acidic Drainage, Pittsburgh, PA. Bur. Mines Sp. Pub. SP06C-94,

Zamora, B.A. 1994. The potential for the use of *Eriogonum* in reclamation. (Northwest Hortus).

PROFESSIONAL AND HONORARY SOCIETY MEMBERSHIP

American Society for Surface Mining and Reclamation
Society for Range Management
Ecological Society of America
British Ecological Society
International Association for Vegetation Science
International Association of Wildland Fire
Northwest Scientific Association
Sigma Xi.
Xi Sigma Pi
Gamma Sigma Delta

PROFESSIONAL ORGANIZATION SERVICE

Washington State Interagency Range Reseeding Committee (1973-1976)
Washington Interagency Range Equipment Development Committee (1973-1976)
Steering Committee, NWA Northwest Alloys Magnesium Plant Pollution Assessment Project (1975-1981), Addy, WA.
Advisory Council, BLM Spokane District (1975-1980)
Society for Range Management Nat'l Student Activities Committee (1973-1975)
Society for Range Management Nat'l. Research Affairs Committee (1983-1986, Chair '86)
PNW Society for Range Management Professional Affairs Committee (Chair 1985-88)
Northwest Forest Fire Council Steering Committee (1983-present)
Nat'l NRCS Tech Committee on "Grazing Woodland Resources and Inventories"(1984-86)
Western Regional Coordinating Committee 40, Range Research in the Western United States (member - 1981 to 1989, Chairman 1985)
Chairman of technical subcommittee of Western Regional Research Coordinating Committee 40 (Range Research in the Western U.S.) on "monitoring and measurement of rangeland trend."
Western Regional Coordinating Committee 56, Overstory-Understory Relationships in Western Forests and Woodlands (1975 - 88)
Range Science Education Council (1990- present), Chairman 1993
Resource Technology and Equipment Council (1989- 91)
Western Regional Coordinating Committee 21, Reclamation of Mined and Severely Disturbed Lands (1989-present, sec'y in 1991, vice-chair 1992, chair 1993)
USDA Forestry Research Advisory Council (1994-1996)

PROFESSIONAL CONSULTING ACTIVITIES

Expert witness regarding impacts of wildfire on rangelands: litigation - 1986, Harder et. al. vs. Big Bend Electric.
Expert witness regarding impacts of wildfire on rangelands: litigation - 1988 Jaussard and Harder vs Derew
Expert witness regarding interpretation of vegetation trend data: hearing - 1988 BLM vs Glansville.
Technical consultant to Washington Water Power Company on the impacts of stream impoundment on upland vegetation and threatened and endangered plant species.
Vegetation science consultant to Centralia Mining Company on vegetation sampling of rehabilitated mine areas and determination of rehabilitation standards for pasture, upland forest, and wetland sites.

Response to Intervenor Issues

Prepared: May 4, 1995

Water Quantity Issues

1. How will KVA get the water to the plant for cooling?

The plant would be cooled by water drawn from a wellfield adjacent to Lake Roosevelt. Three to five wells would be drilled at that location. Water withdrawn from the wellfield would be pumped to the NRPF project site via a 30-inch pipeline, which would follow an alignment identified in conjunction with local landowners. This alignment runs generally south-north, following county roads where possible, for a total distance of approximately 7 miles. The pipeline would be located within a 30-foot permanent right-of-way. Construction would occur entirely within a 130-foot temporary construction easement. Access to the pipeline construction area would occur over this construction easement and over existing roads, and no new construction access or maintenance access roads would be required. After the pipeline has been installed, the pipeline right-of-way would be regraded so that agricultural crops can be replanted in areas where the pipeline passes through agricultural fields.

2. Is mechanical cooling an option that is being considered?

Mechanical draft cooling towers will be used for cooling. Air-cooled condensers (which would not require water for cooling water make-up) were considered, but rejected because of their unreasonably greater cost, the reduction in plant efficiency that they would cause, and significant problems with reliability. As stated in the SCA (section 2.6.2), an air-cooled condensing system would cost $24.8 million more than the proposed mechanical draft cooling towers (their cost would amount to 8.7 percent of total project cost). They would be much more massive in size. They would reduce the output of the plant up to 31.8 megawatts during summer months. These types of air condensing systems have had problems with icing in cold winter climates, which causes further inefficiencies, reduces output, and can even lead to shut-down during the periods when the plant's output is needed the most. For these reasons, air-cooled condensers were rejected from further consideration as unreasonable.

3. Will they be pumping out of the ground or using some other means of getting water? This is of concern to us in light of the problem that Lincoln County and agriculture are facing with the Sole Source Aquifer designation.

Although the cooling water would be pumped from wells, these wells, like the existing wells at the site, are located in alluvial terrace deposits adjacent to Lake Roosevelt and would be directly charged by the lake rather than by any groundwater aquifer. Well logs from the existing wells and water level monitoring indicate that the wellfield is in direct connection with Lake Roosevelt. Because groundwater levels directly reflect the lake level and the terrace deposits are coarse and would be well-drained in the absence of the lake, the water pumped from the wells would be lake water rather than from a groundwater aquifer.

5. **What procedures will be followed if the pipeline goes through a wetland?**

The pipeline would be sited to minimize impacts to wetlands. Where the line must pass through a wetland, the Federal Energy Regulatory Commission, which has regulatory jurisdiction over the gas pipeline, will require implementation of its standard wetland and waterbody construction and mitigation procedures that it requires to be followed (Attachment A). These requirements include:

- Limitations on the location of staging areas and other ancillary areas
- Spoil pile placement and control
- Crossing procedures (which require compliance with Corps of Engineers section 404 nationwide permit program conditions [33 CFR Part 330] at a minimum)
- Temporary erosion and sediment control
- Trench dewatering requirements
- Restoration requirements
- Right-of-way maintenance practices
- Limitations on hydrostatic testing

6. **Related to pipeline corridor:**

a. **What fish or wildlife resources exist in each corridor?**

The gas pipeline route will be surveyed for fish and wildlife resources as part of the FERC authorization process. To date, preliminary reviews of existing databases (National Wetlands Inventory [NWI] maps and Washington Department of Fish and Wildlife Priority Habitat System [PHS] maps) have been conducted. Attachment B is a matrix showing resources and characteristics of each pipeline corridor. It should be noted that while the databases used to prepare this inventory identify all known resources reasonably likely to be found, additional refinements to the pipeline alignment and field surveys may find other resources that had not been identified from the databases or ascertain that resources listed in the databases as present in the general area are not present at the specific alignment location. The following summarizes fish and wildlife resources that may be found in each corridor, according to the PHS and NWI maps. Please review Attachment B for additional information.

<u>North Corridor:</u>

- Length: 58 miles
- Feet of wetland construction: 2,300
- Number of perennial stream crossings: 5
- Number of ephemeral stream crossings: 50
- Number of sensitive fish streams crossed: 12 (listed resident fish: dolly varden/bull trout, Olympic mud minnow)

- Miles crossing sensitive biological habitat: 18

  Areas include stream and pond area with riparian vegetation, white-tailed deer fawning area, cliff habitat with pileated woodpeckers and winter/spring bald eagle use; urban natural open spaces with shrub/steppe remnants associated with western bluebirds, grasshopper sparrows, red-tailed hawks, great-horned owls, Coopers hawks, wintering goshawks, coyotes, wintering bald eagles, winter waterfowl concentrations, cavity-nesting ducks, pileated woodpeckers; wetland marsh and associated stream with heron, bittern, black-tern feeding areas, sandhill crane migration stopover, tiger salamander, beaver; wetland with shorebird use, eagle foraging habitat, and diverse plant community for waterfowl nesting and resting; area with sharp-tailed grouse lek within 1 mile; deer fawning area, riparian winter budding habitat for sharp-tailed grouse; sharp-tailed grouse habitat

Middle Corridor 1 (currently preferred route):

- Length: 69 miles
- Feet of wetland construction: 14,800
- Number of perennial stream crossings: 5
- Number of ephemeral stream crossings: 58
- Number of sensitive fish streams crossed: 15 (listed resident fish: dolly varden/bull trout, Olympic mud minnow)
- Miles crossing sensitive biological habitat: 8

  Areas include wetland marsh and associated stream with heron, bittern, black tern feeding area and sandhill crane migration stopover, tiger salamander and beaver habitat; wetland areas with shorebird use area, eagle foraging area, and waterfowl nesting and resting area; area for deer fawning; sharp-tailed grouse habitat; steppe habitat with seasonal concentrations of waterfowl, spring waterfowl nesting, and bald eagles in fall and winter; riparian area with white-tailed deer fawning; pileated woodpeckers, and bald eagle use in winter and spring.

Middle Corridor 2:

- Length: 69 miles
- Feet of wetland construction: 18,550
- Number of perennial stream crossings: 5
- Number of ephemeral stream crossings: 65
- Number of sensitive fish streams crossed: 13 (listed resident fish: dolly varden/bull trout, Olympic mud minnow)
- Miles crossing sensitive biological habitat: 7

Areas include area with sharp-tailed grouse lek within 1 mile; deer fawning area, riparian winter budding habitat for sharp-tailed grouse; sharp-tailed grouse habitat; wetland marsh and associated stream with heron, bittern, black tern feeding area and sandhill crane migration stopover, tiger salamander and beaver habitat; steppe area with seasonal concentrations of waterfowl, spring waterfowl nesting, and bald eagles in fall and winter; riparian area with white-tailed deer fawning; pileated woodpeckers, and bald eagle use in winter and spring; stream with associated ephemeral ponds for bald eagles, heron foraging, migratory waterfowl use, and staging area for waterfowl, cranes, and shorebirds.

Middle Corridor 3:

- Length: 70 miles
- Feet of wetland construction: 20,650
- Number of perennial stream crossings: 3
- Number of ephemeral stream crossings: 57
- Number of sensitive fish streams crossed: 7 (listed resident fish: dolly. varden/bull trout, Olympic mud minnow)
- Miles crossing sensitive biological habitat: 15

  Areas include shrub/steppe area with sharp-tailed grouse habitat with associated wetlands, migratory waterfowl resting and nesting area; steppe with seasonal concentrations of waterfowl, spring waterfowl nesting, and bald eagles in fall and winter; riparian area with white-tailed deer fawning area, pileated woodpeckers, and bald eagle use in winter and spring; stream with associated ephemeral ponds for bald eagles, heron foraging, migratory waterfowl use, and staging area for waterfowl, cranes, and shorebirds; shrub/steppe with migratory waterfowl resting and nesting area and sharp-tailed grouse habitat; shrub habitat with redtail hawk foraging and sagebrush vole habitat.

South Corridor:

- Length: 64 miles
- Feet of wetland construction: 12,400
- Number of perennial stream crossings: 3
- Number of ephemeral stream crossings: 38
- Number of sensitive fish streams crossed: 3 (listed resident fish: dolly varden/bull trout, Olympic mud minnow)
- Miles crossing sensitive biological habitat: 21

  Areas include shrub/steppe area with sharp-tailed grouse habitat with associated wetlands, migratory waterfowl resting and nesting areas; steppe used seasonally by waterfowl and bald eagles with spring waterfowl nesting; riparian area used for sharp-tailed grouse wintering

and deer fawning; area with winter bald eagle use, 2 Swainson's hawk nests within 1 miles, a regular concentration of sandhill cranes within 1 mile, and spotted frogs documented in Hog Canyon Creek.

b. Are there threatened and endangered species now or in the near future?

Please see the response to 6 (a).

c. Are there important recreational species?

Please see the response to 6 (a).

d. Are there priority species or critical habitats?

Please see the response to 6 (a).

e. What is the potential for existing or other resources based on current conditions, ownership?

The response to 6(a) summarizes available information about known habitats and sensitive species in the area of the alternative pipeline routes. Field surveys will be conducted as part of the environmental analysis for the FERC license for the pipeline. These surveys will allow actual existing and potential habitats to be identified and evaluated.

7. Related to construction impacts:

a. What are the likely impacts from the construction phase, including site disruption, road building, pipeline laying, etc.?

The following is a summary of environmental impacts that have been addressed by FERC in NEPA documents for recent pipeline projects similar to the planned KVA gas pipeline. Typical measures employed to avoid, minimize, or mitigate impacts are also summarized. The following is the reasonably likely range of environmental impacts and mitigation options that the FERC will examine in its analysis. It does not imply that all the impacts listed would be significant or even present for the KVA project, or that the mitigation measures will or should be employed for the KVA project. It does represent the issues that the FERC is likely to examine, and a reasonable array of mitigation measures that the FERC is likely to select from.

Geology

Impact: Active fault crossings.

Mitigation options: Geotechnical investigations, special design measures, such as extra-wide trench with granular backfill,

JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 92, NO. D4, PAGES 4191–4207, APRIL 20, 1987

Ozone Production in the Rural Troposphere and the Implications for Regional and Global Ozone Distributions

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The relationship between O_3 and NO_x ($NO + NO_2$) which was measured during summer and winter periods at Niwot Ridge, Colorado, has been analyzed and compared to model calculations. Both model calculations and observations show that the daily O_3 production per unit of NO_x is greater for lower NO_x. Model calculations without nonmethane hydrocarbons (NMHC) tend to underestimate the O_3 production rate at NO_x higher than 1.5 parts per billion by volume and show the opposite dependence on NO_x. The model calculations with NMHC are consistent with the observed data in this regime and demonstrate the importance of NMHC chemistry in the O_3 production. In addition, at eight other rural stations with concurrent O_3 and NO_x measurements in the central and eastern United States the daily O_3 increase in summer also agrees with the O_3 and NO_x relationship predicted by the model. The consistency of the observed and model-calculated daily summer O_3 increase implies that the average O_3 production in rural areas can be predicted if NO_x is known. The dependence of O_3 production rate on NO_x deduced in this study provides the basis for a crude estimate of the total O_3 production. For the United States an average summer column O_3 production of about 1×10^{12} cm^{-2} s^{-1} from anthropogenically emitted NO_x and NMHC is estimated. This photochemical production is roughly 20 times the average cross-tropopause O_3 flux. Production of O_3 from NO_x that is emitted from natural sources in the United States is estimated to range from 1.9×10^{11} to 12×10^{11} cm^{-2} s^{-1}, which is somewhat smaller than ozone production from anthropogenic NO_x sources. Extrapolation to the entire northern hemisphere shows that in the summer, 3 times as much O_3 is generated from natural precursors as those of anthropogenic origin. The winter daily O_3 production rate was found to be about 10% of the summer value at the same NO_x level. However, because of longer NO_x lifetime in the winter, the integrated O_3 production over the lifetime of NO_x may be comparable to the summer value. Moreover, because the natural NO_x sources are substantially smaller in the winter, the wintertime O_3 budget in the northern hemisphere should be dominated by ozone production from anthropogenic ozone precursors. The photochemical lifetime of O_3 in the winter in the mid-latitude is approximately 200 days. We propose that this long lifetime allows anthropogenically produced O_3 to accumulate and contribute substantially to the observed spring maximum that is usually attributed to stratospheric intrusion. Furthermore, the anthropogenic O_3 may be transported not only zonally but also to lower latitudes. Thus the long-term interannual increase in O_3, observed in the winter and spring seasons at Mauna Loa, may be due to the same anthropogenic influences as the similar winter trend observed at Hohenpeissenberg, Germany.

INTRODUCTION

Since the initial prediction of an active hydrogen radical photochemistry in the natural troposphere by *Levy* [1971], the photochemical production and loss of tropospheric ozone have been investigated extensively. By analogy to the urban ozone formation mechanism, *Crutzen* [1973] and *Chameides and Walker* [1973] argued that photochemical production of ozone in the troposphere is much greater than the flux from the stratosphere. Later advances in the knowledge of the tropospheric distribution of nitrogen oxides [e.g., *Noxon* 1978; *Kley et al.*, 1981] resulted in an improved understanding of the ozone budget [*Fishman et al.*, 1979; *Liu et al.*, 1980; *Logan et al.*, 1981; *Crutzen and Gidel*, 1983]. These studies generally confirmed the earlier calculations. The predicted production and loss rates were smaller, but the net production of ozone in the troposphere still remained a few times the cross-tropopause flux of ozone from the stratosphere.

The studies cited above are model evaluations of global production and loss of O_3 based on limited knowledge of the distribution and budget of NO_x. Direct observation of photochemical production and loss of O_3 and its dependence on NO_x is required to validate such model predictions. Some indirect evidence for photochemical production is available [*Fishman et al.*, 1979; *Fishman and Seiler*, 1983], but it is not fully quantitative and may be subject to other interpretations [*Liu et al.*, 1980; *Logan*, 1985]. On the other hand, observation of NO_x mixing ratios less than 0.01 parts per billion by volume (ppbv) in the mid-Pacific provides evidence for photochemical destruction of ozone in the remote troposphere [*Liu et al.*, 1983].

Extensive data on O_3 and its precursors have been gathered at several rural stations [*Fehsenfeld et al.*, 1983; *Kelly et al.*, 1984*a*; *Parrish et al.*, 1986*a*]. These data allow detailed analysis of the production and loss of O_3 and the relationship of these processes with NO_x and hydrocarbon precursors [*Fehsenfeld et al.*, 1983; *Kelly et al.*, 1984*a*; *Greenberg and Zimmerman*, 1984].

In order to evaluate these data, a chemical modeling approach is presented that treats the influence of the combined effect of NO_x and nonmethane hydrocarbons (NMHC), as well as CO and CH_4, on ozone production. Approximate methods to compensate for the effects of transport and dilution are developed. This treatment provides estimates of ozone

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Paper number 7D0043.
0148-0227/87/007D-0043$05.00

APPENDIX 3

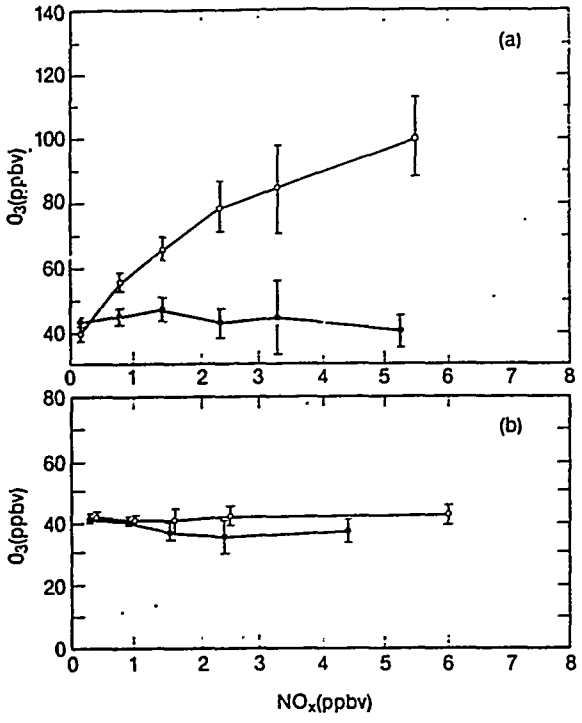

Fig. 1. (*a*) Summertime (June 1 to August 31) O_3 and NO_x relationship observed under clear sky conditions at Niwot Ridge, Colorado. Solid circles are observed values from 0700 to 1100 MST and open circles are observed values between 1400 and 1900 MST. The vertical bars give the 95% confidence limits for the average. (*b*) Same as Figure 1*a* except for winter (December 1 to February 28).

production occurring in an air mass. The model predictions are compared to the diurnal variations of ozone as a function of NO_x mixing ratio measured at Niwot Ridge, Colorado. These results, in turn, are compared with the measured summer ozone increase observed by *Kelly et al.* [1984*a*] and *Research Triangle Institute* [1975]. An algorithm is developed to approximate the relative emission of NMHC and NO_x from anthropogenic sources. The model-predicted ozone production as a function of NO_x level is then used to estimate photochemical ozone production associated with natural and anthropogenic NO_x sources as a function of season on regional and global scales.

Measurements

The measurement site, instruments, and data were described in detail previously [*Fehsenfeld et al.*, 1983; *Parrish et al.*, 1986*a*]. A brief summary is given here to facilitate later discussion.

The measurement site is located in a forest clearing in the Rocky Mountains approximately 60 km northwest of metropolitan Denver, Colorado. The site has an elevation of 3.05 km. The prevailing winds are from the west, which bring in clean air; however, there are frequent easterlies (i.e., wind direction is from the east) that transport pollutants from the metropolitan area to the site. As a result, the measurements show large variations in the concentrations of anthropogenic pollutants. Atmospheric trace species were measured concurrently at the site during several extended periods from 1981 to 1984. A large data base of simultaneous measurements of O_3, NO, NO_2, H_2O, UV radiation flux, and meteorological parameters was obtained. CO, CH_4, NMHC, SO_2, particulate NO_3^- and SO_4^{2-} were measured less frequently. Of particular interest were the NMHC which were measured at this site by *Roberts et al.* [1983, 1984, 1985] and *Greenberg and Zimmerman* [1984]. Only average values of NMHC for the summer and winter are given by the latter investigators. For the hydrocarbons measured by both groups the results were consistent with each other.

Figure 1 shows the O_3 mixing ratios measured at the site in the morning and afternoon during the summer and winter. The data shown include all measurements from June 1 through August 31 of 1981, 1983, and 1984 (Figure 1*a*) and December 1 through February 28, 1981 (Figure 1*b*). The open circles represent the observed average values of O_3 within a NO_x interval centered on the symbol for the afternoon between 1400 and 1900 MST. The solid circles give the morning measurements that were made between 0700 and 1100 MST. The vertical bars are 95% confidence levels of the average values. The confidence levels are relatively large for NO_x levels greater than 2 ppbv due to the sparseness of the data for these infrequent polluted levels.

Since the model described below includes no cloud effects, we have excluded data in Figure 1 that were obtained during periods when the photolysis rate of NO_2 was below 2×10^{-3} s^{-1}, i.e., about 20% of the noontime clear sky value [c.f. *Parrish et al.*, 1983]. This is not the best way to screen out data of cloudy days because this criterion is based on only the UV flux measured at the site, which may not always represent general sky conditions accurately. Nevertheless, this criterion is useful for excluding data from heavily overcast skies. The difference between the morning and afternoon curves represents the net daily ozone change. Except at very low NO_x, there is a net increase in O_3 during the day in summertime. It will be shown later that most of the increase is due to photochemical O_3 production (see also *Fehsenfeld et al.* [1983]). Little or no such increase is observed in wintertime.

Model Calculations

The net daily ozone change, indicated below as Q, is the result of the combined processes responsible for ozone production P, loss (including photochemical loss and surface deposition) L, and transport T,

$$Q = P - L + T \tag{1}$$

where the units are parts per billion by volume (ppbv) of O_3 per day. In order to compare the observed Q to theoretical predictions, model calculations that include the dominant production and loss processes have been made. The calculations use ambient conditions that are appropriate to Niwot Ridge. The model is an extension of the box model described by *Liu et al.* [1980]. This model in its original form neglects transport and surface deposition. The reaction rates have been updated according to the *Jet Propulsion Laboratory* [1985] recommendations. Table 1 gives a list of the reactions and rate constants included in the model. Reaction schemes for NMHC are adopted from *Atkinson et al.* [1982] and *Atkinson and Lloyd* [1984]. For natural NMHC the reactions of isoprene have been included that are based on the reaction schemes developed by *Lloyd et al.* [1984]. To study the influence of NMHC on the ozone production, the model calculations were made first excluding then including the observed NMHC mixing ratios.

The distributions of trace gases are controlled, at least in

part, by transport. Since the present model neglects the transport processes, the concentrations of long-lived species that are most sensitive to transport are fixed at their observed values at this site. These include CH_4, CO, HNO_3, and H_2O. Because there is significant photochemical production or loss, the concentrations of NO_x, NMHC, and O_3 are fixed in the morning at sunrise each day and allowed to vary during the course of the day. Other species are treated as prognostic variables in the model. The model calculations are run through a sufficient number of diurnal cycles to achieve steady state. For all species of interest, 5 days of integration are sufficient in summer; for winter conditions, 30 days of integration are needed.

The starting value of the O_3 mixing ratio in the model calculations is set at 40 ppbv, which is representative of the planetary boundary layer (PBL). The CH_4 mixing ratio is 1600 ppbv. In the PBL, CO is scaled to NO_x according to concurrent measurement of the two species at the site (P. D. Goldan, private communication, 1986). The scaling gives about 250 ppbv of CO at NO_x level less than 0.5 ppbv and about 750 ppbv of CO at 10 ppbv of NO_x. The CO level at the low NO_x level is probably 10–40% too high judged by surface level measurements made near this latitude [e.g., *Hoell et al.*, 1985; *Pratt and Falconer*, 1979; *Junge et al.*, 1971]. However, it will be shown that the difference in CO level has little influence on the conclusions drawn from this study.

Since the photochemistry of O_3 is strongly affected by the concentrations of NMHC, it is important to define accurately the abundance of natural and anthropogenic hydrocarbons. In general, anthropogenic hydrocarbons are transported to the site from the Denver metropolitan area. *Greenberg and Zimmerman* [1984] measured most of the important anthropogenic hydrocarbons and reported their average mixing ratios. In our model calculations the mixing ratios of anthropogenic hydrocarbons are determined as follows. First, we assume that the concentrations of anthropogenic hydrocarbons are linearly proportional to the concentration of NO_x and their ratios are determined from the average values of hydrocarbons measured by *Greenberg and Zimmerman* [1984]. The summertime average NO_x is about 0.8 ppbv in the day [*Williams et al.*, 1984]. The anthropogenic NMHC mixing ratios included in the model are 2.5, 1.5, 1.0, 0.5, and 0.2 ppbv for C_2H_6, C_3H_8, C_4H_{10}, C_2H_4, and C_3H_6, respectively. These values are set to be about 20% higher than the average values of these species observed at this site in the summer by *Greenberg and Zimmerman* [1984] in order to account for hydrocarbons that are measured by them but not included in the model.

The anthropogenic NMHC included in our model are probably slightly lower than the amount present at the site (P. R. Zimmerman, private communication, 1986) because NMHC with carbon number greater than 10 and oxygenated hydrocarbons were not measured. In addition, the relative abundance of anthropogenic NMHC will change with the age of air mass due to differing rates of photochemical reactivities. The mixing ratios of highly reactive species should decrease faster than less reactive species. However, the linear scaling of all anthropogenic NMHC with NO_x does not allow for the differentiation between NMHC with different lifetimes. This tends to underestimate the reactivity of NMHC at high NO_x and to overestimate it at low NO_x. However, since we are not trying to simulate a specific event and there are substantial uncertainties in the photochemistry of NMHC, we believe that this representation of the anthropogenic NMHC and their photochemistry is adequate.

The average concentrations of the natural hydrocarbons at about a height of 1 m measured at Niwot Ridge in the summer were 0.63 ppbv for isoprene and about 0.35 ppbv for the terpenes [*Greenberg and Zimmerman*, 1984]. If these values were characteristic of the total PBL, they would have a very large impact on the photochemistry of O_3 and odd hydrogen species. However, a PBL model simulation [*Hov et al.*, 1983] of the vertical distributions of terpenes shows that under normal summer atmospheric conditions the mixing ratios of terpenes decrease sharply with height in the first 20 m of the surface air. This is because the vertical turbulent mixing is inefficient near the surface where the hydrocarbons are emitted and they are rapidly destroyed photochemically before they have an opportunity to mix throughout the PBL. *Hov et al.* [1983] calculated average mixing ratios of terpenes in the PBL that are more than a factor of 5 lower than the surface values. We have made a similar calculation for isoprene and found a similar decrease of mixing ratio with height (M. Trainer et al., Impact of natural hydrocarbons on hydroxyl and peroxy radicals at a remote site, submitted to *Journal of Geophysical Research*, 1987). Therefore the average mixing ratio for isoprene and terpenes in the PBL should be about 0.1 and 0.05 ppbv, respectively. Since the photochemistry of terpenes is poorly known, we assume that all natural hydrocarbons are in the form of isoprene with a mixing ratio of 0.15 ppbv in the PBL and negligible above. At this level the natural hydrocarbons will increase the photochemical production of O_3 by about 20%, a significant amount but well within the uncertainty of our model.

The HNO_3 concentration is scaled to NO_x, $[HNO_3] \sim 0.3\,[NO_x]$. Because there is less HNO_3 than NO_x, the conversion of HNO_3 to NO_x is negligible. Thus the conversion of NO_x to HNO_3 constitutes a real sink for NO_x. Finally, NO_x and the anthropogenic hydrocarbons are assumed to be well mixed in the PBL.

Solar insolation for July 21 conditions is assumed to represent the average summer value and January 21 insolation for the average winter value. The overhead O_3 column density is fixed at 313 Dobson units in the summer and 333 Dobson units in the winter [*Dütsch et al.*, 1970]. The ground albedo is set at 10%. The H_2O level is fixed at 1% in the summer and 0.33% in the winter. The temperature changes with local time as prescribed by observed mean values. Values of photolysis rate at noontime are listed in the end of Table 1.

The surface deposition of trace gases in the PBL is included in the model by adding a sink term that is equal to the surface deposition velocity divided by the thickness of the PBL. For ozone the choice of deposition velocity is of fundamental importance, since the lifetime of tropospheric ozone can depend on the rate that ozone is destroyed at the surface, especially in the winter. During the summer an ozone surface deposition velocity of 0.5 cm s^{-1} [*Aldaz*, 1969; *Galbally and Roy*, 1980; *Wesely et al.*, 1981; *Lenschow et al.*, 1982; *Colbeck and Harrison*, 1985] is used. The data are sparse on O_3 deposition in the winter. For snow the surface resistance to O_3 uptake is large. A value of 11 s cm^{-1} was observed by *Colbeck and Harrison* [1985]. *Galbally and Roy* [1980] reported a median value of 16 s cm^{-1} with a great deal of variation, while *Wesely et al.* [1981] reported a value of about 34 s cm^{-1} with small variation. *Wesely* [1983] estimated from their experiments that

TABLE 1a. Reaction Rate Constants

Reaction	Rate Constant
$O(^1D) + H_2O \rightarrow 2OH$	2.2×10^{-10}
$O(^1D) + CH_4 \xrightarrow{O_2} CH_3O_2 + OH$	1.4×10^{-10}
$OH + CH_4 \xrightarrow{O_2} CH_3O_2 + H_2O$	$2.4 \times 10^{-12} \exp(-1710/T)$
$O(^1D) + H_2 \xrightarrow{O_2} HO_2 + OH$	1.0×10^{-10}
$OH + H_2 \xrightarrow{O_2} HO_2 + H_2O$	$6.1 \times 10^{-12} \exp(-2030/T)$
$OH + CO \rightarrow HO_2 + CO_2$	1.5×10^{-13} (1. + 0.6 p(atm))
$OH + HO_2 \rightarrow H_2O + O_2$	(7 + 4 p(atm)) 10^{-11}
$OH + O_3 \rightarrow HO_2 + O_2$	$1.6 \times 10^{-12} \exp(-940/T)$
$HO_2 + O_3 \rightarrow OH + 2O_2$	$1.4 \times 10^{-14} \exp(-580/T)$
$HO_2 + HO_2 \rightarrow H_2O_2 + O_2$	$[1.9 \times 10^{-33} M \exp(980/T) +$ $2.2 \times 10^{-13} \exp(620/T)]$ $(1 + 1.4 \times 10^{-21} \exp(2200/T)\ H_2O)$*
$OH + H_2O_2 \rightarrow HO_2 + H_2O$	$3.1 \times 10^{-12} \exp(-187/T)$
$HO_2 + NO \rightarrow NO_2 + OH$	$3.7 \times 10^{-12} \exp(240/T)$
$NO + O_3 \rightarrow NO_2 + O_2$	$1.8 \times 10^{-12} \exp(-1370/T)$
$OH + HNO_3 \rightarrow H_2O + NO_3$	$9.4 \times 10^{-15} \exp(778/T)$
$NO_3 + NO \rightarrow 2NO_2$	2×10^{-11}
$NO_2 + O_3 \rightarrow NO_3 + O_2$	$1.2 \times 10^{-13} \exp(-2450/T)$
$CH_3O_2 + HO_2 \rightarrow CH_3OOH + O_2$	$7.7 \times 10^{-14} \exp(1300/T)$
$CH_3O_2 + CH_3O_2 \rightarrow 2HO_2 + 2CH_2O$ (a)	$K = 1.6 \times 10^{-13} \exp(220/T)$
$\rightarrow CH_2O + CH_3OH$ (b)	$K_a = 0.38$ K, $K_b = 0.62$ K
$CH_3OOH + OH \rightarrow CH_3O_2 + H_2O$ (a)	$K = 1 \times 10^{-11}$
$\rightarrow CH_2O + OH + H_2O$ (b)	$K_a = 0.56$ K, $K_b = 0.44$ K
$CH_3O_2 + NO \xrightarrow{O_2} HO_2 + CH_2O + NO_2$	$4.2 \times 10^{-12} \exp(180/T)$
$CH_2O + OH \xrightarrow{O_2} HO_2 + H_2O + CO$	1×10^{-11}
$OH + NO \rightarrow HNO_2$	2×10^{-12}
$NO + NO_2 + H_2O \rightarrow 2HNO_2$	6×10^{-37}
$O(^1D) + M \rightarrow O(^3P)$	2.88×10^{-11}
$OH + HO_2NO_2 \rightarrow$ products	$1.3 \times 10^{-12} \exp(380/T)$
$OH + C_2H_6 \xrightarrow{O_2} C_2H_5O_2$	$1.86 \times 10^{-11} \exp(-1231/T)$
$C_2H_5O_2 + NO \xrightarrow{O_2} CH_3CHO + NO_2 + HO_2$	$3.7 \times 10^{-12} \exp(240/T)$
$OH + C_3H_8 \xrightarrow{O_2} C_3H_7O_2$	$1.2 \times 10^{-11} \exp(-679/T)$
$C_3H_7O_2 + NO \xrightarrow{O_2} CH_3COCH_3 + NO_2 + HO_2$	$3.7 \times 10^{-12} \exp(240/T)$
$OH + C_2H_4 \xrightarrow{O_2} C_2H_4OHO_2$	$2.18 \times 10^{-12} \exp(387/T)$
$C_2H_4OHO_2 + NO \xrightarrow{O_2} 2CH_2O + NO_2 + HO_2$	$3.7 \times 10^{-12} \exp(240/T)$
$OH + C_3H_6 \xrightarrow{O_2} C_3H_6OHO_2$	$4.1 \times 10^{-12} \exp(544/T)$
$C_3H_6OHO_2 + NO \rightarrow CH_2O + CH_3CHO + NO_2 + HO_2$	$3.7 \times 10^{-12} \exp(240/T)$
$O_3 + C_2H_4 \rightarrow CH_2O + 0.4CH_2O_2 +$ $0.4\ CO + 0.1\ HO_2$	$2.57 \times 10^{-14} \exp(-2828/T)$
$O_3 + C_3H_6 \rightarrow 0.5CH_2O + 0.5CH_3CHO +$ $0.2CH_2O_2 + 0.2CH_3CHO_2 +$ $0.3CO + 0.2HO_2 +$ $0.1OH + 0.2CH_3O_2$	$7. \times 10^{-15} \exp(-1900/T)$
$CH_2O_2 + NO \rightarrow NO_2 + CH_2O$	7×10^{-12}
$CH_2O_2 + NO_2 \rightarrow NO_3 + CH_2O$	7×10^{-13}
$CH_2O_2 + SO_2 \rightarrow SO_4^{2-} + CH_2O$	6.7×10^{-14}
$CH_2O_2 + H_2O \rightarrow$ products	3.3×10^{-18}
$CH_3CHO_2 + NO \rightarrow NO_2 + CH_3CHO$	7×10^{-12}
$CH_3CHO_2 + NO_2 \rightarrow NO_3 + CH_3CHO$	7×10^{-13}
$CH_3CHO_2 + SO_2 \rightarrow SO_4^{2-} + CH_3CHO$	6.7×10^{-14}
$CH_3CHO_2 + H_2O \rightarrow$ products	3.3×10^{-18}
$OH + CH_3CHO \xrightarrow{O_2} CH_3COO_2 + H_2O$	$6.7 \times 10^{-12} \exp(250/T)$
$CH_3COO_2 + NO_2 \rightarrow PAN$	4.77×10^{-12}
$PAN \rightarrow CH_3COO_2 + NO_2$	$2 \times 10^{-16} \exp(-13543/T)$
$CH_3COO_2 + NO \xrightarrow{O_2} CH_3O_2 + NO_2 + CO_2$	$3.7 \times 10^{-12} \exp(240/T)$
$OH + C_4H_{10} \xrightarrow{O_2} C_4H_9O_2$	$1.76 \times 10^{-11} \exp(-558/T)$
$C_4H_9O_2 + NO \rightarrow 0.9NO_2 + 0.9HO_2$ $+ 0.6CH_3CHO + 0.1C_2H_5CHO$ $+ 0.5CH_3COC_2H_5 + 0.1$ nitrate	$3.7 \times 10^{-12} \exp(240/T)$

TABLE 1a. (continued)

Reaction	Rate Constant
$OH + C_2H_5CHO \xrightarrow{O_2} C_2H_5COO_2 + H_2O$	$2. \times 10^{-11}$
$C_2H_5COO_2 + NO_2 \rightarrow PPN$	4.77×10^{-12}
$PPN \rightarrow C_2H_5COO_2 + NO_2$	$2. \times 10^{16} \exp(-13543/T)$
$C_2H_5COO_2 + NO \xrightarrow{O_2} C_2H_5O_2 + NO_2 + CO_2$	$3.7 \times 10^{-12} \exp(240/T)$
$OH + CH_3COC_2H_5 \xrightarrow{O_2} C_2H_4O_2COCH_3 + H_2O$	$1 \times 10^{-11} \exp(-330/T)$
$C_2H_4O_2COCH_3 + NO \xrightarrow{M_2} NO_2 + CH_3CHO + CH_3COO_2$	$3.7 \times 10^{-12} \exp(240/T)$
$N_2O_5 \rightarrow NO_2 + NO_3$	$6.81 \times 10^{-6} \exp(-9884/T)$ $(1 + M \times 4 \times 10^{-20} \exp(951/T))$ M
$NO_3 + NO_2 \underset{M}{\overset{M}{\rightleftarrows}} N_2O_5$	$K_{eq} = 1.2 \times 10^{-27} \exp(11180/T)$
$HO_2 + NO_2 \rightleftarrows HO_2NO_2$	$K_{eq} = 2.33 \times 10^{-27} \exp(10870/T)$

Units are $cm^6\ s^{-1}$ for termolecular reaction, $cm^3\ s^{-1}$ for bimolecular reaction, and s^{-1} for unimolecular reaction.

*Kircher and Sander [1984].

the surface resistance for agricultural land, rangeland, and nonforested wetland with snow to be about 30 s cm^{-1}, i.e., a deposition velocity of less than 0.03 cm s^{-1}. He also estimated that the surface resistance to O_3 for forested areas in cold weather is about 20 s cm^{-1} for near-neutral and nocturnal cases and about 3 s cm^{-1} for daytime conditions. Based on these measurements, we assume a daytime averaged O_3 deposition velocity over continental areas in the winter to be 0.1 cm s^{-1}. At night the deposition velocity of O_3 and other species is assumed to be negligible because the formation of a nocturnal inversion layer prevents efficient mixing to the surface.

The deposition velocity for NO_2 measured over various surfaces under summer conditions ranges from 0.3 to 0.8 cm s^{-1}, while the value for NO is much lower [*Rogers et al.*, 1977; *Judeikis and Wren*, 1978; *Bottger et al.*, 1978; *Wesely et al.*, 1982]. We assume a daytime value of 0.4 cm s^{-1} for NO_x in our model. There are few data on the deposition velocity of NO_x in winter conditions. This will be discussed in more detail later.

For other species that can be significantly removed from the atmosphere by surface deposition, no seasonal adjustments are made. A daytime deposition velocity of 1 cm s^{-1} is adopted for HNO_3 [*Huebert and Robert*, 1985]. In the absence of published results we arbitrarily assumed daytime deposition velocities for several key secondary reaction products, 0.5 cm s^{-1} for H_2O_2 and CH_3OOH and 0.1 cm s^{-1} for the aldehydes and ketones. These deposition velocities are low enough that they do not have significant impact on the outcomes of the model.

Although explicit transport is neglected in the model calculations, the dilution effect of trace gases in the PBL due to the rise of the top of the PBL (i.e., the inversion height) during daytime in summer is included as follows. The rise of the height of the top of the PBL in the day used in the calculation is identical to that described by *Kaimal et al.* [1976]. Above the PBL, the mixing ratios of trace gases are assumed to be those of clean continental air: 40 ppbv O_3, 0.01 ppbv NO_x, 200 ppbv CO, and 1600 ppbv CH_4. The mixing ratios of NMHC and their secondary products such as aldehydes and ketones, unless noted otherwise, are assumed to be negligibly small above the PBL compared to those in the PBL. Thus, when the top of the PBL rises in the day, trace gases in the PBL are diluted by the clean air above the PBL. Horizontal dilution is not included in the calculation, but its effect will be discussed later. Dilution effects are not included in the model calculations for winter conditions.

TABLE 1b. Termolecular Reactions

Reaction	Rate Constant
$OH + NO_2 + M \rightarrow HNO_3$	$K_0^{300} = 2.6 \times 10^{-30}$, $n = 3.2$ $K_\infty^{300} = 2.4 \times 10^{-11}$, $m = 1.3$
$HO_2 + NO_2 + M \rightarrow HO_2NO_2$	$K_0^{300} = 2.3 \times 10^{-31}$, $n = 4.6$ $K_\infty^{300} = 4.2 \times 10^{-12}$, $m = 0.$

$$K = \left(\frac{K_0(T)}{1 + K_0(T)[M]/K_\infty(T)}\right) 0.6^{\{1 + [\log_{10}(K_0(T)[M]/K_\infty(T))]^2\}^{-1}}$$

$$K_0(T) = K_0^{300}(T/300)^{-n}$$

$$K_\infty(T) = K_\infty^{300}(T/300)^{-m}$$

Units are $cm^6\ s^1$. [M] air density (molecules/cm^3).

COMPARISON OF CALCULATION AND MEASUREMENT

In Figure 2 the calculated and measured values of Q are shown for summer conditions. The measured values are the afternoon O_3 values from Figure 1*a* minus the morning values. The calculated values represent two cases of the model.

TABLE 1c. Photolysis Rates

	Reaction	Rate
(R1)	$O_3 + h\nu \rightarrow O(^1D) + O_2$	2.95×10^{-5}
(R2)	$NO_2 + h\nu \rightarrow NO + O$	9.30×10^{-3}
(R3)	$H_2O_2 + h\nu \rightarrow 2 \times OH$	1.07×10^{-5}
(R4)	$HNO_3 + h\nu \rightarrow OH + NO_2$	8.4×10^{-7}
(R5*a*)	$CH_2O + h\nu \rightarrow 2 \times HO_2 + CO$	2.53×10^{-5}
(R5*b*)	$CH_2O + h\nu \rightarrow H_2 + O$	5.56×10^{-5}
(R6)	$NO_3 + h\nu \rightarrow NO_2 + O$	7.32×10^{-2}
(R7)	$N_2O_5 + h\nu \rightarrow NO_2 + NO_3$	3.35×10^{-5}
(R8)	$HNO_2 + h\nu \rightarrow OH + NO$	1.86×10^{-3}
(R9)	$HO_2NO_2 + h\nu \rightarrow HO_2 + NO_2$	8.0×10^{-5}
(R10)	$CH_3CHO + h\nu \rightarrow CH_3O_2 + HO_2 + CO$	3.7×10^{-6}
(R11)	$CH_3OOH + h\nu \rightarrow CH_2O + OH + HO_2$	$j_{11} = 0.7 \times j_3$
(R12)	$RCHO + h\nu \rightarrow C_2H_5O_2 + CO + HO_2$	$j_{12} = j_{10}$
(R13)	$MEK + h\nu \rightarrow CH_3CO_3 + C_2H_5O_2$	$j_{13} = j_{5a}$

Units are s^{-1}. Calculated for clear sky conditions, zenith angle = 21°, column O_3 = 313 Dobson units, surface at 3 km, and albedo = 0.1.

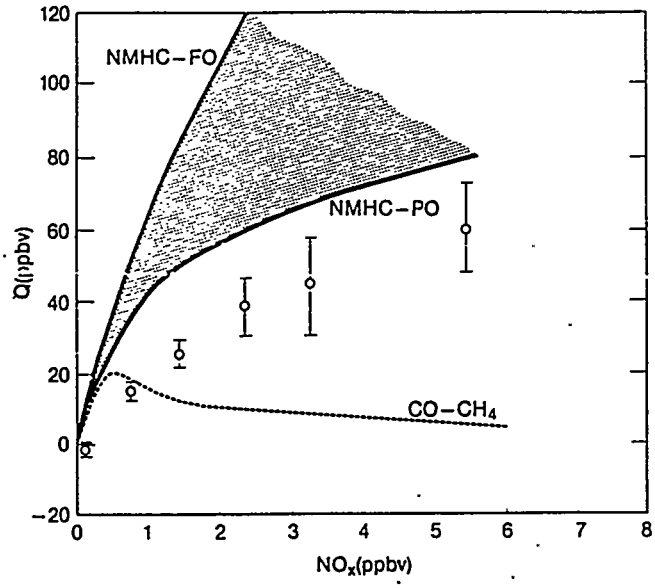

Fig. 2. Model-calculated daytime change in ozone (from sunrise to 1630 MST) for the summer clear sky conditions is compared to the observed difference between the afternoon (1400–1900 MST) and morning (0700–1100 MST) for clear sky conditions. The dashed line is calculated from a model without NMHC. The shaded area represents calculated values from a model with anthropogenic NMHC. The lower envelope of the shaded area is calculated by assuming no overnight retention of secondary hydrocarbons (NMHC-PO), while the upper envelope assumes buildup of secondary hydrocarbons to their steady state values (NMHC-FO).

The dashed line, which we will refer to as the CO-CH_4 case, is the model calculation without NMHC. The shaded area bounded by the solid lines represents the possible range of Q obtained by including the effects of NMHC in the model calculation. The lower solid line represents the model calculation where the diurnal change in the planetary boundary layer dilutes the secondary hydrocarbon products, e.g., aldehydes and ketones. Thus these compounds do not accumulate sufficiently to influence the photochemistry. This limit will be referred to as the NMHC partial oxidation (NMHC-PO) case. The upper solid line is calculated assuming that the trace gases are not diluted by the change of the height of PBL. An example for this may be found in a stagnant anticyclonic system where the trace gases in the afternoon PBL are not dispersed during the night when the nocturnal inversion layer is formed. These trace gases will be mixed down the following morning after the inversion layer breaks down. In this case the secondary hydrocarbons can accumulate over several days. Here the secondary hydrocarbon products accumulate to their steady state values in 2–3 days, thus exerting their maximum influence on O_3 production. This limit will be referred to as the NMHC full oxidation (NMHC-FO) case.

In the CO-CH_4 case, ozone production is a by-product of the catalytic oxidation of CO and CH_4 by NO_x and odd hydrogen radicals. For CO this cycle is given by

$$CO + OH + O_2 \rightarrow CO_2 + HO_2 \quad (2)$$

$$NO + HO_2 \rightarrow NO_2 + OH \quad (3)$$

$$NO_2 + h\nu + O_2 \rightarrow NO + O_3 \quad (4)$$

$$\text{Net} \qquad CO + h\nu + 2O_2 \rightarrow CO_2 + O_3 \quad (5)$$

CH_4 can play a role similar to that of CO but at a smaller rate. In addition, depending on the ambient conditions (for example, NO_x mixing ratio) and the detailed photochemical processes assumed, CH_4 can be a small source or sink for hydrogen radicals.

The estimated uncertainty in Q predicted by the model for the CO-CH_4 case is ±50%. Considering both the uncertainty in the model prediction and the variability of the measurements for elevated NO_x levels, the CO-CH_4 case underpredicts the value of Q deduced from observations at the site. This discrepency is caused by the reaction of NO_2 with OH to form nitric acid. At higher NO_x levels this process rapidly depletes the odd hydrogen radicals and strongly suppresses the photochemistry.

The inclusion of NMHC substantially alters the predicted Q at higher NO_x levels. This process can be represented by the simplified scheme

$$NMHC + OH + O_2 \rightarrow RO_2 \quad (6)$$

$$RO_2 + NO + O_2 \rightarrow NO_2 + HO_2 + CARB \quad (7)$$

$$HO_2 + NO \rightarrow NO_2 + OH \quad (3)$$

$$2(NO_2 + h\nu + O_2 \rightarrow NO + O_3) \quad (4)$$

$$\text{Net} \qquad NMHC + 4O_2 + h\nu \rightarrow 2O_3 + CARB \quad (8)$$

where R stands for hydrocarbon radical and CARB denotes carbonyl compounds. Reaction (8) shows that two O_3 molecules are produced for every NMHC oxidized. In addition, the carbonyl compounds may undergo further photochemical reactions which will result in a significant net gain of hydrogen radicals and, in turn, produce more O_3. The shaded area in Figure 2 can be interpreted as representing the uncertainty due to various levels of accumulation of carbonyl compounds in the PBL.

The sensitivity of the O_3 production P to uncertainties in the NMHC concentrations has been tested by changing these concentrations in the model. When NO_x is less than 4 ppbv, the sensitivity is relatively small; for example, a factor of 2 change in NMHC concentrations results in less than a 30% change in the O_3 production. The change increases to 50% at 6.5 ppbv of NO_x. The limitations implicit in the use of the simple relation to deduce the NMHC concentrations coupled with the lack of understanding of the photochemistry of NMHC are the two largest sources of uncertainty in this model. We estimate the uncertainty in the model-predicted Q, including the effects of NMHC, to be approximately a factor of 1.5 below 1 ppbv of NO_x, a factor of 2 for NO_x levels between 1 ppbv and 5 ppbv, and a factor of 3 for NO_x levels above 5 ppbv.

In comparing the model predictions with measurements one has to note that the measurement site at Niwot Ridge is significantly influenced by a single source of anthropogenic emissions. Since the transport time from this source to the site is less than 1 day, the secondary reaction products of hydrocarbon oxidation cannot accumulate in the sampled air masses. Consequently, the measured Q should be compared to values near the bottom of the shaded area of the model calculation, i.e., the NMHC-PO case. Although the model calculated values of Q lie above the measured values, the differences between predicted and measured Q values are well within the estimated uncertainty except for NO_x levels below 1 ppbv. Below 1 ppbv of NO_x, model calculations with or without NMHC overestimate the O_3 increase by a factor of 2. It is suspected that the model calculations are overestimating odd

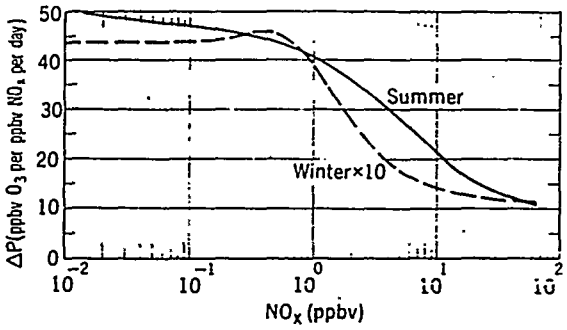

Fig. 3. The values of ozone production per unit NO_x per day, ΔP, from the NMHC-FO model are plotted as a function of NO_x mixing ratios. A constant NMHC to NO_x ratio is assumed; see text for detail. The solid line gives summer values. The dashed line gives the winter values multiplied by 10.

hydrogen radical concentrations. This has been recognized previously [*Roberts et al.*, 1984; *Parrish et al.*, 1986*b*], but the causes of this overestimation have not been established.

A clear feature that emerges from Figure 2 is the nonlinear character of Q as a function of NO_x level. This is evident in both the observed ozone mixing ratios and the calculations that include the NMHC. It is less pronounced for the calculation with the accumulation of secondary hydrocarbons. This is expected because the production of HO_2 and RO_2 radicals from secondary hydrocarbons compensates the increased loss of OH radicals due to their reaction with NO_2 at higher levels of NO_x.

Dilution due to horizontal transport will have a similar effect as vertical dilution. Namely, its major effect is to prevent the accumulation of secondary hydrocarbons.

In the winter data (Figure 1*b*) the afternoon average O_3 concentrations are slightly higher than the morning values, but the difference may not be statistically significant. This may be simply due to the rise of the inversion layer in the daytime and the mixing of upper level O_3 down into the PBL. The photochemical production and loss rates of O_3 are so small that the O_3 distribution is controlled by transport. Therefore quantitative comparison of the observed daytime O_3 change at this site with our simple model that does not incorporate realistic transport processes is not meaningful.

Comparison With Other Observations

It has been shown that the summer ozone observations at Niwot Ridge can be reasonably well matched by model-predicted diurnal ozone profiles that are chosen to simulate physical parameters and chemical species concentrations observed at Niwot Ridge. In this section the data and model calculations are compared to simultaneous O_3-NO_x observations made in the summer at other sites in the United States.

At present, there are few published reports of simultaneous measurements of NO_x and O_3 at rural sites with sufficient amounts of data to estimate the value of Q. *Kelly et al.* [1984*a*] observed NO_x and O_3 at three sites located in South Dakota, Louisiana, and Virginia. The average mixing ratio of NO_x at these sites was 2.9 ppbv, and the inferred Q was 17 ppbv O_3. At Niwot Ridge including all sky conditions, the O_3 increase corresponding to an NO_x level of 2.9 ppbv was approximately 25 ppbv, i.e., about 50% greater than the value observed by *Kelly et al.* [1984*a*]. This difference can be explained by the altitude difference of the sites. Our station is at 3 km altitude where the O_3 production efficiency is estimated to be about 40% higher than at sea level due to the larger photolysis rates of O_3 that lead to the production of $O(^1D)$ and hence to OH radicals.

Research Triangle Institute [1975] made measurements of O_3 and its precursors at five rural stations in the summer of 1974. The mean NO_2 mixing ratios at these stations are similar to each other, ranging from 3 ppbv to about 5 ppbv in the afternoon. Assuming that NO is about 1/3 of NO_2 [*Williams et al.*, 1984], NO_x mixing ratios ranging from 4 to 7 ppbv are derived. The mean diurnal O_3 distributions reported have essentially the same shape as that at our station. With the exception of one station, McHenry, the daytime O_3 increase Q is about 47 ppbv. (The McHenry station in the state of Maryland has an elevation of 884 m above sea level. Its observed daily increase in O_3 is only about 20 ppbv, while the afternoon NO_x is relatively high at about 7 ppbv. *Research Triangle Institute* [1975] did not find any obvious cause for the low O_3 buildup at McHenry but noticed that the O_3 buildup had been 50% higher in the previous summer. For this reason, the data from the McHenry site are excluded from the present discussion.) This Q value after correction for elevation and cloud cover is compatible with the Q values inferred from the *Kelly et al.* [1984*a*] measurements and the value deduced for Niwot Ridge from Figure 1.

In comparing these data the limitation of present NO_x-measuring techniques should be recognized. We presently know that NO_2 to NO surface conversion techniques used in most chemiluminescence detectors can also convert organic nitrates, e.g., peroxyacetyl nitrate (PAN), and in some cases HNO_3 to NO [*Kelly et al.*, 1984*b*; *Grosjean and Harrison*, 1985; F. C. Fehsenfeld et al., A ground-based intercomparison of NO, NO_x, and NO_y measurement techniques, submitted to *Journal of Geophysical Research*, 1987]. Accordingly, NO_x as measured by these instruments is an upper limit. Depending on the air masses sampled during the summer, the measurement can overestimate the NO_x concentration by a factor as large as 3 [*Fahey et al.*, 1986]. Thus the value of Q estimated above for the data of *Kelly et al.* [1984*a*] and *Research Triangle Institute* [1975] may actually correspond to lower NO_x levels.

Nonlinearity in Ozone Production

One of the important observations that has been made concerning the net daily ozone change Q is the nonlinear relationship between Q and $[NO_x]$. Both, calculations and measurements, indicate that Q increases with NO_x more rapidly at low concentrations of NO_x. Since loss and transport of O_3, L and T in equation (1), are almost independent of NO_x, the nonlinear dependence in Q is associated with the variation in photochemical production P with NO_x. This effect can be seen clearly in Figure 3, which shows a plot of the calculated

$$\frac{P}{[NO_x]} = \Delta P \tag{9}$$

versus $[NO_x]$. The quantity ΔP is the average daily ozone production per unit concentration of NO_x (i.e., ppbv O_3 per ppbv NO_x per day). The two curves in Figure 3 show ΔP for typical summer and winter conditions as calculated by the NMHC-FO model. The dependence of ΔP on the NO_x level is very similar for the two seasons with the summer values approximately a factor of 10 larger, reflecting the higher photo-

chemical activity in the summer. Because the shape of the seasonal curves for ΔP are similar, the following comments that are made for the summertime variation in ΔP with NO_x are also applicable to the wintertime case.

Our model calculation predicts, for NO_x levels below 500 pptv, that ΔP is independent of the NO_x level. The linear dependence of Q on NO_x at low levels of NO_x is observed in all model conditions that have been run (cf. Figure 2) and is also observed in summertime ozone measurements at Niwot Ridge. Between 0.5 and 5 ppbv of NO_x, however, ΔP decreases with increasing NO_x levels. According to the NMHC-FO calculation, ΔP decreases by a factor of 4 between 0.5 and 5 ppbv of NO_x (see Figure 3). Above 5 ppbv of NO_x, the NMHC-FO case indicates that ΔP becomes less dependent on NO_x. However, the other model cases show a sharper decline in ΔP for $[NO_x] > 1$ ppbv. The sharper decline is also observed in the measurements at Niwot Ridge (cf. Figure 2) and elsewhere [*Research Triangle Institute*, 1975]. However, at NO_x levels above 5 ppbv the continued rapid decrease in the observed ΔP may be due to the short residence time of NO_x and NMHC in the atmosphere. Under these conditions, NO_x and NMHC are not able to reach full O_3-producing potential.

The decline in ΔP for $NO_x > 1$ ppbv is consistent with the findings of photochemical smog models [e.g., *U.S. Environmental Protection Agency (EPA)*, 1977; *Hov and Derwent*, 1981; *Costanza and Seinfeld*, 1982; *Sakamaki et al.*, 1982; *Altshuller*, 1986]. Those models are usually intended for ambient NO_x and NMHC levels substantially higher than the present study. Thus the ratio of NMHC to NO_x and the mixture of NMHC in the smog models are significantly different. According to our modeling study and the smog models the degree of nonlinearity is a function of the ratio of NMHC to NO_x and the relative abundance of various NMHC.

The higher value of ΔP at lower NO_x suggests that the dilution of NO_x and NMHC by atmospheric turbulence and advection will enhance the efficiency of O_3 production. This phenomenon may have important implications for the global and regional tropospheric O_3 budgets. Previously, many one-dimensional, as well as two-dimensional, modeling studies have neglected the nonlinearity effect in evaluating the global budget of O_3 due to anthropogenic NO_x emissions [e.g., *Liu*, 1977; *Fishman et al.*, 1979; *Chameides and Tan*, 1981; *Crutzen and Gidel*, 1983]. In these earlier studies, NO_x emissions were assumed to be dispersed over domains that are much greater than the real domain of emissions. Because of the nonlinearity in ozone production this approach results in a significant overestimation in the O_3 produced by anthropogenic NO_x emissions.

Regional Ozone Production

For a given region the ozone production could be obtained by integration of P. For a particular region of interest, however, the spatial and temporal distribution of the NO_x mixing ratio is not likely to be available. However, if the region is large enough, the NO_x emission into and removal from the atmosphere will occur primarily within its boundary, and O_3 production can be approximated by

$$S = E\tau\,\Delta P \tag{10}$$

where S is the total O_3 produced due to the NO_x emission E within the region, τ denotes the NO_x lifetime, and ΔP is the daily O_3 production per ppbv of NO_x.

Equation (10) can be viewed in two ways. First, the product $E\tau$ is equal to the total number of NO_x molecules within the region. Since ΔP is the O_3 production per unit NO_x per unit time, the final product is O_3 production per unit time. Alternatively the product, $\tau\,\Delta P$ can be rewritten,

$$\tau\,\Delta P = \tau\left(\frac{P}{[NO_x]}\right) = \frac{P}{L[NO_x]} \tag{11}$$

where L is the rate of loss of NO_x. Thus $\tau\,\Delta P$ is equal to the number of O_3 molecules produced for each NO_x molecule destroyed. In steady state this equals the number of O_3 molecules produced for each NO_x molecule emitted. The total O_3 production S is obtained by multiplying $\tau\,\Delta P$ by the emission rate. In both approaches, τ and ΔP are assumed to be constant for each season in the region of interest over the lifetime of NO_x.

Even though equation (10) relates the O_3 production to NO_x lifetime, this is not intended to imply that NO_x alone is the rate limiting precusor of O_3. Because in our calculations anthropogenic NMHC are assumed to be proportional to the NO_x concentration in our calculations, equation (10) contains NMHC implicity. Profiles similar to those in Figure 3 and an equation equivalent to equation (10) could be generated for NMHC.

Equation (10) provides an important insight into evaluating the relative importance of CO and CH_4 versus NMHC in the production of O_3 from anthropogenic NO_x. Most O_3 is produced when the anthropogenic NO_x is within its first two lifetime periods after emission (in the summer 1–2 days [*Chang et al.*, 1979]). Since the median rural NO_x level in the eastern United States is about 6.6 ppbv [*Mueller and Hidy*, 1983], our model shows that NMHC are essential in producing O_3. Without NMHC the O_3 production would be reduced by a factor of 5. In the calculation with NMHC the O_3 production rate is essentially independent of the amount of CO present, implying a very small contribution for CO and CH_4. In fact, the only way that substantial O_3 can be produced from the interaction of CO and CH_4 with anthropogenic NO_x is for a substantial amount of NO_x to be transported to the remote troposphere before it is removed from the atmosphere. PAN, which is a product of NMHC reactions and serves as a temporary reservoir and carrier for NO_x [*Singh et al.*, 1985], can act as an agent to export anthropogenic NO_x to the remote troposphere. It is clear that the production of O_3 from the interaction of CO and CH_4 with anthropogenic NO_x depends critically on photochemistry and transport and is closely connected with NMHC. Previous estimates of the O_3 production that neglect the effect of NMHC are probably incorrect.

For the present approximation we assume that the NO_x lifetime τ in summer is determined during the day by the reaction of NO_2 with OH followed by rapid deposition of HNO_3:

$$OH + NO_2 \xrightarrow{M} HNO_3 \tag{12}$$

and at night by the reactions

$$NO_2 + O_3 \rightarrow NO_3 + O_2 \tag{13}$$

$$NO_3 + NO_2 \xrightarrow{M} N_2O_5 \tag{14}$$

followed by the conversion of NO_3 and N_2O_5 to HNO_3 on aerosols [*Noxon*, 1983; *Platt et al.*, 1984] or in the gas phase

TABLE 2. Comparison of O_3 Production Parameters for Winter and Summer Conditions as Calculated From the NMHC-FO Model at Sea Level at 40°N Latitude With Clear Sky Conditions*

NO_x, ppbv	Season	ΔP,* $[O_3]/[NO_x]$	$\tau(NO_x)$, days	$\Delta P \times \tau(NO_x)$, $[O_3]/[NO_x]$	[OH], cm^{-3}	$\tau(O_3)$, days
0.1	summer	47	1.2	58.3	1.0E6	12
	winter	4.6	13	59.5	0.8E5	180
0.65	summer	43	0.6	25.7	2.0E6	9
	winter	5	4.5	22.7	1.9E5	102
1.5	summer	39	0.42	16.6	2.5E6	7
	winter	4.1	3.7	15	2.0E5	68
4	summer	29	0.4	11.6	2.6E6	6
	winter	2.7	4	10.5	1.7E5	39
10	summer	20	0.45	9.1	2.2E6	4.5
	winter	1.9	4.3	8.4	1.5E5	21

Read 1.0E6 as 1.0×10^6. All values are diurnally averaged.
*O_3 molecules produced per NO_x molecule per day.

[*Morris and Niki*, 1974; *Noxon*, 1983; *Atkinson et al.*, 1984; *Platt et al.*, 1984]. The nighttime sinks for NO_2 are somewhat uncertain due to our lack of understanding of the details of the conversion mechanisms for NO_3 and N_2O_5 to HNO_3. The upper limit of these nightime sinks is the total removal of N_2O_5, which is equal to twice the rate of reaction (13), removing two NO_x molecules at a time. Because of the difficulty in the quantitative treatment of the nightime sink, in the following discussions the nightime sink will be neglected unless noted otherwise.

The calculated lifetime of NO_x in the summer is consequently determined primarily by reaction (12) and thus depends on the OH concentration. The OH concentration, in turn, is determined by the mixing ratios of NO_x, NMHC, water vapor, and CO. Table 2 gives a list of the OH concentrations and NO_x lifetimes calculated by the model for summer and winter seasons as a function of NO_x mixing ratio at sea level for clear sky conditions. It is well known that the OH concentration and τ depend directly on the solar UV intensity and thus on season and/or cloud cover. However, the dependence of ΔP on solar UV intensity is equal in magnitude but opposite in sign to that of τ. Hence the product $\Delta P\tau$ and therefore S are essentially independent of season. Likewise, S is independent of cloud cover. In the same way, S deduced from NMHC-FO model has nearly the same value as the one deduced from the NMHC-PO model. For example, the calculated ΔP at 10 ppbv NO_x in the summer is 22 ppbv O_3 per ppbv NO_x per day for the NMHC-FO case and 12.5 for the NMHC-PO case, while the value of τ is 0.45 day for the former and 0.72 day for the latter. Thus, although both ΔP and τ are each subject to uncertainties of the order of a factor of 3 depending on the atmospheric chemical composition and the uncertainies in the attendant odd hydrogen radical chemistry, because of the conjugate relationship between ΔP and τ, the uncertainty in S is no larger than a factor of 2.

As discussed above, equation (10) may also be written for NMHC if they are the rate-limiting precursor for O_3. It can be shown that the seasonal invariance of O_3 production suggested by Table 2 will not change using this approach. For simplicity of discussion, let us assume that a surrogate hydrocarbon can be used to represent all the NMHC. Then the total O_3 produced, S, would be equal to the product of the emission rate of this hydrocarbon, its lifetime, and the daily O_3 production rate per ppbv of the hydrocarbon. Since the major sink of the hydrocarbon would probably be the reaction with OH, the seasonal variation of S, assuming hydrocarbons to be the independent variable, would be the same as that shown in Table 2.

On the other hand, from the change of the product $\Delta P\tau$ with NO_x levels shown in Table 2, we note that both ΔP and τ decrease with increasing NO_x. The value of this product as a function of NO_x level is plotted in Figure 4. This enhances the nonlinear effect described previously and increases the uncertainty in our simplistic evaluation of the O_3 production. In the following discussion, regional ozone production will be derived using an approximate value of $\tau\ \Delta P$ from Figure 4 compatible with the assumed regional NO_x distribution. This provides a useful qualitative estimate for regional ozone production. Models that incorporate realistic transport and photochemical processes are needed to evaluate this production accurately.

OZONE PRODUCTION IN THE UNITED STATES IN SUMMER

In this section, equation (10) will be used to estimate ozone production for the United States in the summer season from anthropogenic and natural NO_x sources. In order to calculate S for anthropogenic and natural NO_x emission we choose an average NO_x level of the United States that is appropriate to each NO_x emission and then choose values for $\tau\ \Delta P$ corresponding to each level (cf. Figure 4). The NO_x levels in the United States can largely be attributed to anthropogenic sources. A majority of the anthropogenic NO_x is emitted in the eastern United States. In this region the median rural NO_x level is observed to be about 6.6 ppbv [*Martinez and Singh*, 1979; *Ferman et al.*, 1981; *Shaw and Paur*, 1983; *Mueller and Hidy*, 1983]. In other areas of the United States the median NO_x levels are lower. For these levels we assume that $\tau_a \Delta P_a = 10$ ozone molecules formed for each NO_x emitted.

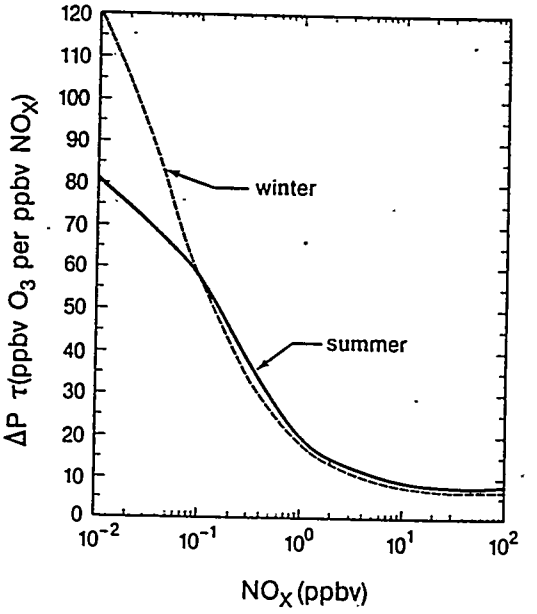

Fig. 4. The values of ozone molecules produced per NO_x molecule destroyed due to OH reaction with NO_2, $\Delta P\tau$, from the NMHC-FO model are plotted as a function of NO_x mixing ratios. The solid line gives summer values, and the dashed line gives winter values.

The anthropogenic emission rate E_a is 6×10^{12} g N yr^{-1} in 1980 (*Logan* [1983], following *U.S. EPA* [1982]) with little seasonal variability. The subscripts "a" and "n" are used to denote values derived from anthropogenic and natural NO_x emissions, respectively.

Using the values derived above for E_a, and $\tau \Delta P$, equation (10) yields

$$S_a = 5 \times 10^{13} \text{ g}$$

for O_3 produced from anthropogenic NO_x sources in the United States in the three summer months. Assuming the O_3 production to be uniform over the area of the United States for the summer months yields an average column O_3 production rate of 1×10^{12} cm^{-2} s^{-1}.

To estimate the production of ozone from natural sources, the NO_x levels attributable to natural NO_x emissions must be determined. This is equivalent to calculating S_n for the preindustrial era. Natural NO_x emissions are smaller than anthropogenic NO_x sources [*Logan*, 1983] and are more diffuse. Typical NO_x levels over the continental United States attributable to natural NO_x emissions would be 0.5 ppbv or less. The measurement of NO_x in rural and remote areas supports this limit [*McFarland et al.*, 1979; *Schiff et al.*, 1979; *Kley et al.*, 1981; *Helas and Warneck*, 1981; *Williams et al.*, 1984; *Ridley et al.*, 1987]. For $[NO_x] \leq 0.5$ ppbv we choose $\tau_n \Delta P_n = 32$ for ozone molecules produced per NO_x molecule emitted from natural sources. Thus, in the preindustrial United States natural NO_x was about 3 times as efficient in producing ozone as anthropogenic NO_x emission is at present.

NO_x has a variety of natural sources including soil emissions, lightning, and stratospheric subsidence [*Logan*, 1983]. Biogenic NO emissions from soils are estimated to range from 1×10^9 to 2×10^{10} cm^{-2} s^{-1} in the summer, with average of about 3×10^9 cm^{-2} s^{-1} [*Galbally and Roy*, 1978; *Slemr and Seiler*, 1984; *Williams et al.*, 1985]. The average O_3 produced from this NO flux is estimated to be 1×10^{11} cm^{-2} s^{-1}. A range of 0.5×10^{11} to 2×10^{11} cm^{-2} s^{-1} is obtained by adopting the uncertainty ranges of NO_x emissions given by *Logan* [1983]. NO_x production from lightning is estimated to be between 0.07×10^{12} and 0.7×10^{12} g N yr^{-1} in the United States [*Logan*, 1983; *Albritton et al.*, 1984]. Assuming that it is uniformly distributed and that roughly 50% of total emissions occur in summer [*Turman and Edgar*, 1982], a range of 7.6×10^{10} to 7.6×10^{11} cm^{-2} s^{-1} is obtained for O_3 production. NO_x emissions from biomass burning in the United States are about 0.05×10^{12} to 0.15×10^{12} g N yr^{-1}, mostly from forest fires [*Seiler and Crutzen*, 1980; *Logan*, 1983]. Assuming even distribution and no seasonal variation, this would give a range of 2.7×10^{10} to 8.2×10^{10} cm^{-2} s^{-1} of O_3 produced in the summer. When combined, the value of S_N deduced from these natural photochemical sources ranges from a low of about 1.5×10^{11} to as high as 10×10^{11} cm^{-2} s^{-1}, averaged over the United States in the summer. In addition, there is a significant addition of ozone to the troposphere from the stratosphere. The average cross-tropopause O_3 flux is estimated to be 5×10^{10} cm^{-2} s^{-1} [*Danielsen and Mohnen*, 1977; *Mahlman et al.*, 1980]. Therefore, in the summer the sum of the O_3 generated from natural NO_x and the direct O_3 flux from the stratosphere on average is substantially smaller than the anthropogenic O_3 source in the United States.

In comparing natural ozone production with anthropogenic ozone production in the United States the simplified picture presented here overlooks several factors that can potentially influence the results. First, it should be noted that the same CO mixing ratios were used to calculate S_n and S_a. However, CO mixing ratios were probably 50% lower over the United States in the preindustrial era. A 50% reduction in the CO mixing ratio would result in a 30% reduction in S_n. Second, the distribution of NO_x sources must be taken into account. For example, a substantial amount of the NO_x from lightning is generated in the upper troposphere where the effective NO_x lifetime may be significantly longer than the lifetime in the lower troposphere. This is due to reduced scavenging of HNO_3 and regeneration of NO_x from HNO_3 [*Liu et al.*, 1980, 1983] at higher elevations. As a result, O_3 production due to NO_x from lightning and the stratosphere could be substantially greater than the presented estimate indicates.

Likewise, depending on the effects of dilution by transport and inhomogenieties in emissions, the ozone production from anthropogenic NO_x sources may vary substantially from region to region in the United States. The average value presented above would suggest that S_a is approximately twice S_n. However, in the central and eastern United States, with average NO_x of about 7 ppbv as discussed above, the O_3 doubling time is less than a half day in the boundary layer. In this case, the effect of transport is relatively small, and the increase of O_3 concentration due to anthropogenic emissions is probably greater than the ratio of the O_3 sources derived above. Thus in the central and eastern United States, human activities probably contribute at least 50–80% of the O_3 in the summer. This conclusion is consistent with the elevated O_3 levels observed over large areas in the central and eastern United States [*Research Triangle Institute*, 1975; *Vukovich et al.*, 1977, 1985; *Cleveland et al.*, 1977; *Spicer et al.*, 1979; *Wolff and Lioy*, 1980; *Fehsenfeld et al.*, 1983; *Kelly et al.*, 1984*a*]. A similar situation appears to exist for western Europe [*Cox et al.*, 1975; *Guicherit and Van Dop*, 1977; *Hov*, 1984].

OZONE PRODUCTION IN THE NORTHERN HEMISPHERE

In the preceding section the summer ozone production in the United States associated with natural and anthropogenic NO_x emissions was estimated. The estimation of O_3 production on a regional level is satisfactory for the summer when the NO_x lifetime is short. In this case, ozone production in and near the region is largely associated with NO_x emitted within the region. This approach is not adequate for the United States in the winter. In winter, NO_x emitted in the United States can, during its lifetime (cf. Table 2), be transported well beyond the boundaries of the United States. In this case, equation (10) can still be used to estimate ozone formation but over a significantly larger area. In this section the ozone production associated with anthropogenic NO_x emissions will be compared to that due to natural emissions for the northern hemisphere (NH).

To do that, the model estimates for ΔP obtained from this study which are based on measurements made in rural locations in the United States are extrapolated to deduce ozone production in other areas of the world. Since the ambient conditions in such areas may have a substantially different mix of NMHC and NO_x in comparison with the rural United States, the ΔP calculated for these areas may be inaccurate. Of particular concern are estimates of ΔP for the forested regions of the tropics and subtropics where natural sources dominate the emissions of NMHC [cf. *Greenberg and Zimmerman*, 1984]

and NO_x [cf. *Turman and Edgar*, 1982; *Slemr and Seiler*, 1984; *Galbally and Roy*, 1978]. Even in the mid-latitudes, composition and/or levels may be quite different from that used to deduce ΔP above. On the other hand, the use of these results to estimate ozone production in relatively clean oceanic areas should be reasonably accurate since the observed concentrations of NMHC are small [*Rudolph and Ehhalt*, 1981; *Eichmann et al.*, 1979, 1980], as assumed in the model. The extrapolations in the following may be spectulative; however, they provide a perspective on the global ozone budget that would otherwise be unavailable.

Logan [1983] estimated the global budget of NO_x. The four largest sources are fossil fuel combustion, biomass burning, lightning, and biogenic emissions with global source strengths of 21 (14–28), 12 (4–24), 8 (2–12), and 8 (4–16) in units of 10^{12} g N yr^{-1}, respectively, with the numbers in parentheses indicating the uncertainty. These sources are essentially land sources and mostly occur near the surface. Other sources in the lower troposphere are insignificant by comparison. Biomass burning is mostly of anthropogenic origin [*Seiler and Crutzen*, 1980]. Therefore, globally, the emissions from anthropogenic sources are probably more than twice as large as the natural emissions.

Seasonal variations of natural NO_x sources are quite different from the anthropogenic sources. *Turman and Edgar* [1982] reported the seasonal variation of the lightning trigger occurrence at dawn and dusk. In the NH, about 40% of the lightning triggers occur in the summer versus only about 5% in the winter. Biogenic NO_x emission from soils also peak strongly in the summer, as observations [*Slemr and Seiler*, 1983; *Williams et al.*, 1985] show a strong dependence of the NO_x emission rate on the soil temperature. On the other hand, the principal anthropogenic NO_x source in the United States, combustion, is essentially independent of season [*U.S. EPA*, 1982]. The combustion source for the rest of the world is probably slightly higher in the winter because the need for space heating is not offset by use of air conditioning as in the United States. Most of the NO_x emissions from biomass burning take place in the tropics and mainly during the dry season [*Seiler and Crutzen*, 1980]. In the NH the dry season in the tropics usually occurs in the winter. Therefore it can be concluded that in the NH winter the anthropogenic sources by far dominate the NO_x emissions. We estimate that the ratio of the anthropogenic emissions to natural emissions is about 10 to 1 in the NH in the winter.

Assuming that the only significant anthropogenic NO_x emissions in summer are from combustion sources and that $\Delta P_a \tau_a = 10$, the resultant O_3 production S_a from anthropogenic sources would be $(1.8 \pm 0.6) \times 10^{14}$ g for the three summer months. Since essentially all emissions occur in the NH, this corresponds to a NH average column O_3 production S_a of $(1.1 \pm 0.3) \times 10^{11}$ cm^{-2} s^{-1}.

These numbers can be compared with the recent results of *Fishman et al.* [1985]. In that study a one-dimensional PBL model was used and predicted a value of S_a that is about 20% greater than our estimate. Considering the large uncertainties in these two different approaches, the agreement is surprisingly good.

In the summer the natural and anthropogenic NO_x emissions are about the same in the NH. However, as before, we take the higher O_3 production potential into account and by assuming $\Delta P_n \tau_n = 32$, S_n is computed to be 3×10^{11} cm^{-2} s^{-1}, which is about 3 times greater than the value computed for anthropogenic emissions. The additional natural O_3 source associated with the cross-tropopause flux in summer is small compared to the photochemical production.

Considering the NH as a whole, O_3 production in summer is probably dominated by the photochemical production from natural NO_x sources. However, as stated in the preceding section, since the O_3 lifetime in summer is relatively short, long-range transport of O_3 will be limited. In this context, it should be noted that the time for doubling O_3 due to photochemical production is an important characteristic time for comparison with the long-range transport time. Table 2 shows that the doubling time for O_3 is shorter than a day when the NO_x level is greater than 1 ppbv. As a result, the O_3 distribution tends to be controlled by regional sources, especially in the PBL. For example, O_3 distribution in the tropics and subtropics should be dominated by the natural photochemical O_3 sources and sinks, while the anthropogenic source controls mid- and high-latitude ozone levels.

Both model calculations and observations show a substantially lower daily O_3 increase in the winter compared to the summer. Table 2 lists the model calculated O_3 production rate ΔP averaged over a day at various NO_x levels for winter conditions compared to that of summer conditions. The O_3 production rate ΔP is about a factor of 10 lower in the winter compared to the summer (cf. Figure 3). The seasonal change of ΔP is almost entirely due to the change in the odd hydrogen radical concentrations, which is represented by the change in the OH density. The density of HO_2 changes by about the same ratio. If one considers only daytime chemistry, the photochemical lifetime of NO_x is inversely proportional to the OH density. In this case the product $\Delta P\tau$ is essentially independent of season. Figure 4 and Table 2 show that this is true for almost all levels of NO_x. *Fishman et al.* [1986] used a different approach to estimate the O_3 production in the eastern United States and arrived at a similar conclusion. The large NO_x lifetime in the winter predicted here implies that the NO_x distribution from a constant emission source, such as anthropogenic combustion, will lead to higher NO_x concentrations in the winter compared to the summer. A two-dimensional simulation of the NO_x distribution from combustion emissions [*Crutzen and Gidel*, 1983] estimated 2–20 times higher NO_x mixing ratio in most of the NH in January compared to July, supporting this conclusion.

The above statement does not apply to NO_x introduced in the upper troposphere because HNO_3 is removed relatively slowly from this region, as discussed earlier. However, recent model calculations by *Kasting and Singh* [1985] showed that in the winter the formation of PAN may reduce NO_x in the upper troposphere by a factor of 10, thus reducing the O_3 production there to an insignificant level. This leaves the stratospheric intrusion as the only significant natural O_3 source in the winter.

In the lower troposphere of the NH, the NO_x in the winter is essentially all due to anthropogenic emission. It follows that the O_3 production in the lower troposphere in the winter is dominated by the anthropogenic source. Therefore the average column O_3 production in the NH due to combustion should range from 0.8×10^{11} to 1.5×10^{11} cm^{-2} s^{-1}, i.e., the same as in the summer. Biomass burning could contribute a production rate as large as this if one assumes that half of the global NO_x emissions due to biomass burning occur in the

NH winter season. Therefore the anthropogenic source of O_3 could be 3–6 times the natural source of O_3 in the winter NH.

The seasonal invariability of the O_3 production depends critically on the seasonal variation of the lifetime of NO_x. So far we have assumed that the lifetime of NO_x is primarily determined by the daytime chemistry. We think this is justified under summer conditions because the nighttime sink and dry deposition of NO_x account for less than 50% of the NO_x sink. In the winter the nonphotochemical sinks, formation of HNO_3 at night (cf. equations (13) and (14)) and deposition of NO_2, could be substantial. If NO_3 at night is assumed to be totally removed from the atmosphere in the winter, NO_x would have a lifetime of only about 2 days in the boundary layer and the O_3 production would decrease by a factor of about 3. The factor would be doubled if N_2O_5 instead of NO_3 is totally removed because for each N_2O_5 reaction two NO_x molecules are removed. To remove NO_3 or N_2O_5 effectively, the product of the NO_3 or N_2O_5 reactions would need to be a stable species that is readily removed from the atmosphere such as HNO_3 or particulate nitrate. One mechanism that may lead to this is the interaction of N_2O_5 or NO_3 with wet aerosols in humid conditions, as suggested by *Platt et al.* [1984]. At relative humidities less than 50% there has been no observational evidence suggesting that this occurs in the atmosphere. Kinetic studies [*Morris and Niki*, 1974; *Atkinson et al.*, 1984] showed that NO_3 reaction with aldehydes probably resulted in the production of HNO_3. However, the major removal process for NO_3 or N_2O_5 is probably not due to the reaction with aldehydes [*Noxon*, 1983; *Platt et al.*, 1984]. Furthermore, the production rate of aldehydes is also strongly seasonally dependent, yielding slower removal of NO_3 in the winter.

It is clear that nighttime chemistry of NO_x may play a major role in reducing the O_3 production in the winter. However, our current knowledge on the NO_3 and N_2O_5 is not adequate for a quantitative assessment. In this context, it should be noted that even in the case of total removal of NO_3 or N_2O_5, the anthropogenic source of O_3 would still be comparable to the stratospheric O_3 flux.

The surface deposition of NO_x may also significantly shorten the NO_x lifetime in the continental boundary layer in the winter. There have been little data on the deposition velocity of NO_x in winter conditions. However, *Wesely et al.* [1982] reported a large surface resistance at night in the summer over a soybean field that resulted in a NO_2 deposition velocity as low as 0.05 cm s^{-1}. The large surface resistance observed during the summer night was attributed by them to low biogenic activity at night which will certainly be true during winter. This suggests slow surface deposition for NO_2 under winter conditions. Preliminary results from field measurements of the NO_x deposition velocity in winter conditions indicate its value to be significantly less than 0.2 cm s^{-1} (D. H. Stedman, private communication, 1986). The deposition velocity of NO and NO_2 over water surfaces is negligibly small because of their low solubility [*Lee and Schwartz*, 1981]. Assuming an average NO_x deposition velocity of 0.1 cm s^{-1} and a 500-m PBL height in the winter, the lifetime due to surface deposition would be about 6 days. Since some NO_x will be transported above the PBL, the lifetime should be longer. Therefore surface deposition probably will not affect the NO_x lifetime appreciably. This is substantiated by the calculation of *Crutzen and Gidel* [1983] that assumed constant seasonal deposition velocity and still predicted much higher NO_x in the winter than the summer.

Reduction of the winter O_3 production may also come from removal of secondary products of NMHC reactions, such as organic nitrates, aldehydes, and organic acids. The long NO_x lifetime and increased stability of the secondary products allow more time for their removal by processes such as heterogeneous scavenging or surface deposition.

In the above discussion, we have also neglected the effect of the Arctic winter which has attracted extensive attention [*Rahn and McCaffrey*, 1979; *Heintzenberg et al.*, 1981; *Barrie et al.*, 1981]. In the Arctic winter night, NO_x, hydrocarbons, and other pollutants may accumulate and give rise to enhanced photochemical production of O_3 and other pollutants in the spring [*Isaksen et al.*, 1985; *Barrie and Hoff*, 1985]. In fact, the Arctic effect can be considered to be an extreme case of the winter effect shown in Table 2 by extending the lifetime of NO_x and O_3 production over winter into spring. The net effect is that the Arctic plume will delay part of the winter O_3 production until the spring. Without a realistic model we can not accurately estimate the reduction of the winter O_3 production due to the Arctic plume.

It is clear that our evaluation of the winter anthropogenic O_3 source leads to an overestimate. The uncertainties discussed above do not allow us to quantify the overestimation. However, the anthropogenic source is so much greater than the natural source that the former would need to be reduced by a factor of more than 10 to alter our conclusions.

LIFETIME OF OZONE

The seasonal variation of the photochemical lifetime of O_3 at 40°N is given in Table 2. The calculations in Table 2 are for sea level under clear sky conditions. The cloud cover should increase O_3 lifetime in the boundary layer by about 30%. In addition, above the boundary layer the O_3 lifetime is substantially longer than the values in Table 2 because of lower H_2O mixing ratios. Our calculations show that at 500 mbar the O_3 lifetimes are about 50% larger than those shown in Table 2. In estimating the O_3 lifetimes the expression for O_3 and other odd oxygen species are grouped following the designation of *Levy et al.* [1985]. In this approach the lifetime of O_3 is equal to the sum of the concentrations of all odd oxygen species (O_x) divided by the photochemical loss of odd oxygen. This expression provides a good representation of the net O_3 photochemical production and destruction. For example, NO_2 is considered to be one of the odd oxygen species because to a large extent the photolysis of NO_2 balances the reaction of O_3 with NO and does not result in either production or loss of O_3. Reactions such as HO_2 and RO_2 with NO are counted as production terms for O_3.

The lifetime of O_3 is about a factor of 10 longer in the winter than in the summer. The long lifetime of O_3 in the winter implies that O_3 will be transported over long distances. Once anthropogenically produced O_3 is transported to the relatively clean troposphere, the photochemical lifetime at mid-latitudes in the winter will be greater than 200 days. This is certainly longer than the characteristic time of zonal transport which is of the order of 30 days [*Oort*, 1983] and probably longer than the time of transport between mid-latitudes and lower latitudes in the NH. The latter transport time is difficult to estimate but is probably less than 3 months.

The photochemical lifetime of O_3 in the winter in mid-

latitudes is so long that the O_3 lifetime is probably governed by surface deposition processes. As discussed earlier, we adopt a diurnally averaged surface deposition velocity of 0.1 cm s^{-1} for continental areas in the winter. The surface resistance of freshwater and oceans has been found to be quite large, in the range of 10–100 s cm^{-1} [*Aldaz*, 1969; *Galbally and Roy*, 1980; *Garland et al.*, 1980; *Wesely et al.*, 1981; *Lenschow et al.*, 1982; *Colbeck and Harrison*, 1985]. An estimate by *Wesely* [1983] of the surface resistance for the ocean gives 20 s cm^{-1} under various stability classifications. Taking this estimate, an averaged O_3 deposition velocity over oceanic area can be calculated to be 0.05 cm s^{-1} or less.

The large variability and uncertainty in the surface deposition velocity in the winter make it difficult to estimate the O_3 lifetime due to surface loss. If a deposition velocity of 0.1 cm s^{-1} for the land and 0.05 cm s^{-1} for the ocean is assumed, a lifetime for the whole column O_3 in the mid-latitude of about 150 days is derived. For O_3 in the continental boundary layer, assuming a typical PBL height of 500 m in the winter, the lifetime due to surface deposition is only about 6 days. As discussed above, the question can be raised as how much O_3 or its precursors can be transported out of the boundary layer before they are lost to the surface. The vertical exchange velocity between the PBL and the free troposphere in the winter is probably greater than 0.1 cm s^{-1}, the O_3 deposition velocity. If this is the case, then at least 50% of the O_3 would be transported out of the PBL and hence would be susceptible to long range transport.

Transport of mid-latitude O_3 to the tropics may be an important sink. However, we note that the photochemical O_3 lifetime at 500 mbar at 20° latitude in the winter is as long as 35 days. Therefore mid-latitude O_3 has to be transported to the boundary layer in the tropics to be effectively destroyed. The transport process itself may take substantial time. A model with realistic transport is needed to study this problem.

Implications for Ozone Distribution

The combination of long O_3 lifetime and the predominance of O_3 production from anthropogenic sources in the winter may have several important implications for the O_3 distribution in the NH in the winter. First, anthropogenic O_3 may be transported over most of the NH. Second, the winter O_3 may be mostly of anthropogenic origin, especially in the lower troposphere of mid- and high latitudes. Furthermore, the long O_3 lifetime allows anthropogenically produced O_3 to accumulate continuously during the winter and to contribute substantially to the observed spring maximum over many remote stations, even as far as Mauna Loa, Hawaii [*Oltmans*, 1981; *Logan*, 1985]. Neglect of the Arctic night effect may lead to an overestimate of the winter anthropogenic O_3 production but will have little effect on the spring maximum because it is compensated by the increased production in the spring.

The spring O_3 peak has always been considered to be due to the stratospheric O_3 intrusions [e.g., *Junge*, 1963; *Fabian and Pruchniewicz*, 1977; *Logan*, 1985]. There are several pieces of evidence supporting this theory [see *Liu et al.*, 1980]. The spring O_3 maximum correlates with tracers from the stratosphere such as ^{90}Sr and ^{7}Be. The maximum in mid-latitudes appears first in the upper troposphere and propagates to the lower troposphere [*Chatfield and Harrison*, 1977], and a three-dimensional general circulation model (GCM) that included only stratospheric O_3 intrusion and surface deposition successfully simulated the spring maximum in the remote areas [*Levy et al.*, 1985]. The model did not include tropospheric photochemistry. The spring O_3 maximum calculated in the model was the result of maximum stratospheric O_3 flux predicted by the model. The long O_3 photochemical lifetime in winter calculated here implies that the relative value of the spring maximum calculated by the GCM would have been substantially greater if the photochemical sink of O_3 was included in the model. In fact, even with constant stratospheric O_3 flux, a spring O_3 maximum would be expected because of the long O_3 lifetime in winter.

By proposing that the anthropogenic O_3 production in the winter contributes substantially to the spring maximum, we do not dispute that the stratospheric intrusion also contributes. In fact, the stratospheric intrusion probably dominates in the upper troposphere. Transport processes like this play an important role in the spatial and temporal distribution of tropospheric O_3, especially in the winter season when the O_3 lifetime is long. The simple O_3 budget analysis performed above should be regarded as a qualitative assessment. Realistic models are needed to evaluate the relative importance of various O_3 sources.

Our proposal for the O_3 spring maximum is consistent with the recent results by *Penkett and Brice* [1986]. They used PAN as a tracer of photochemical activity in the troposphere. Based on the observed correlation between PAN and O_3 and the springtime PAN maximum in background air, they suggested that tropospheric photochemistry may contribute to the spring maximum in the tropospheric O_3 concentration.

The proposed dominance of the anthropogenic O_3 source in the winter and its contribution to the spring O_3 maximum provides an interpretation for the long-term variability of O_3 that has been observed in polluted as well as remote areas. We expect that the anthropogenic impact on O_3 will spread over most of the NH in the winter. In contrast, in the summer the impact will probably be confined to the mid-latitudes and may even be confined regionally in the continental boundary layer because of the shortened O_3 lifetime due to surface deposition.

Recently, *Oltmans and Komhyr* [1986] reported O_3 measurements from 1973 to 1984 at four NOAA Geophysical Monitoring for Climatic Change (GMCC) baseline observatories. They show an increase in O_3 over this period at Mauna Loa, Hawaii (20°N, 155°W, 680 mbar). The linear growth rates in percent per year are 1.97 (±1.04), 1.85 (±1.26), 0.52 (±1.42), and 1.07 (±1.19) for winter, spring, summer, and fall seasons, respectively. The numbers in the parentheses are 95% confidence levels of the average values. Only winter and spring seasons have statistically significant growth rates. Because of reduced photochemistry in these seasons the O_3 trend was interpreted by *Oltmans and Komhyr* [1986] to be due to a change in transport induced by El Nino events. Alternatively, the present results indicate that this trend could be due to increasing O_3 production from anthropogenic emissions of NO_x and NMHC in the winter and spring. The 2% per year increase is consistent with the O_3 increase observed in the winter at 700 and 500 mbar over Hohenpeissenberg, Germany, one of the most consistently operated ozonesonde stations, in about the same period [*Logan*, 1985]. Other ozonesonde stations in the NH analyzed by *Logan* [1985] also show positive trends at 700 and 500 mbar. However, the values are significantly lower, and some of them are not statistically significant. We interpret these positive O_3 trends as the result of the increase in NO_x and NMHC emissions in the NH. Unfor-

tunately, sufficiently reliable and accurate emission trends for the NH are not available.

The long-term trend at Mauna Loa and the winter trend at Hohenpeissenberg can be considered as pieces of evidence supporting our proposal. However, the observed O_3 trend at the other GMCC observatory in the NH (i.e., Point Barrow, Alaska) does not. The trend at this site is significant in the summer and fall seasons but not in the winter and spring seasons. The summer and fall growth rate is about the same as Hohenpeissenberg and is consistent with the notion that the site is under the influence of the mid-latitude pollution. The lack of trend in the winter and spring is not consistent with our proposal. Another Arctic station, Resolute (75°N), also shows no trend at 700 and 500 mbar in the winter [*Logan*, 1985]. A possible explanation is the destruction of O_3 due to anthropogenic emissions of NO, NMHC, and other reducing pollutants in the polar night.

It would be very valuable for testing our proposal if measurements of O_3 could be made at several remote sites like Mauna Loa in the NH, preferably with altitude profiles. Interannual correlation of O_3 between polluted and remote sites at various seasons should show clear differences between summer and winter. We expect good correlation above the boundary layer in the winter and much smaller correlation in the summer, especially in the boundary layer. It would be also useful if existing ozonesonde data for each season could be evaluated for interannual correlations.

SUMMARY AND CONCLUSIONS

From the above discussion it is clear that the tropospheric O_3 budget and distribution is an extremely complex problem that involves photochemical and transport processes of various temporal and spatial scales. It will take considerable efforts in laboratory and field measurements and modeling to understand all the essential aspects of the problem. As mentioned in the introduction, there have been important advances in our understanding of the problem, yet these have almost always been followed by new contradictions and controversies. This study will not be an exception. However, we believe that we have gained some important insights into the budget and distribution of the tropospheric O_3 by analyzing the observed O_3 and NO_x relationship at Niwot Ridge. The highlights are summarized below.

Within a factor of 2, the observed daily ozone increase in the summer can be modeled by photochemical production and destruction plus surface loss. Both model calculations and observations show that the daily O_3 increase per unit of NO_x is greater for lower NO_x. The model calculations without NMHC substantially underestimate the O_3 increase at NO_x higher than about 1.5 ppbv and show the opposite dependence on NO_x. The model calculations with NMHC are reasonably consistent with the observed data, thus supporting the importance of NMHC chemistry in O_3 production.

The summer daily O_3 increases at various NO_x levels at Niwot Ridge have been compared to those from eight other rural stations with concurrent O_3 and NO_x measurements in the central and eastern United States [*Research Triangle Institute*, 1975; *Kelly et al.*, 1984*a*]. With only one exception, the daily O_3 increases for these stations agree very well with the O_3 and NO_x relationship observed at Niwot Ridge, a remarkable agreement considering the wide range of geographical locations. The consistency of the summer daily O_3 increases suggests that the average daily O_3 production at a rural station may be predicted if the NO_x concentration is known. The dependence of the O_3 production rate on NO_x also allows us to formulate an approximate method to estimate the O_3 production from NO_x and NMHC emissions. The method uses the concept that the O_3 production is proportional to the NO_x emission rate and its lifetime.

The method outlined here provides new insight into some of the important problems of the tropospheric O_3 budget and distribution. It is shown that most of the O_3 due to human activities is probably produced from the interaction of anthropogenic NO_x with NMHC. The contribution from CO and CH_4 is minor, especially in summer. In addition, photochemistry and transport of NMHC and their products such as PAN play such a critical role in the interaction of CO and CH_4 with anthropogenic NO_x that previous evaluations of O_3 production from this interaction need to be reevaluated.

For the United States we estimate an average summer column O_3 production rate due to anthropogenic NO_x and NMHC emissions of about 1×10^{12} cm^{-2} s^{-1}, about 20 times the average cross-tropopause O_3 flux. Estimates of O_3 production from natural NO_x sources range from 1.9×10^{11} to 12×10^{11} cm^{-2} s^{-1}. Therefore human activities probably contribute 50–80% of the O_3 in the central and eastern United States in the summer. The environmental effects due to the increased O_3 on crops and forest may be substantial [*Heck et al.*, 1982; *Adams et al.*, 1985; *Reich and Amundson*, 1985]. A similar situation is expected to exist in Europe.

Averaged over the NH, the anthropogenic O_3 production in the summer is about 1×10^{11} cm^{-2} s^{-1}. The production of O_3 from natural NO_x emissions is greater, roughly 3×10^{11} cm^{-2} s^{-1} in the summer. Both are greater than the cross-tropopause O_3 flux. Because the O_3 lifetime is relatively short in the summer, especially in the PBL, the O_3 distribution is probably controlled by regional sources.

The winter daily O_3 production rate is of the order of 10% of the summer value at the same NO_x level. However, because the NO_x lifetime is about 10 times longer when only daytime chemistry is considered, the O_3 production rate integrated over the lifetime of NO_x in the winter is comparable to the summer value. Since the natural NO_x sources are insignificant compared to the anthropogenic source in the winter, the O_3 budget in the NH should be dominated by the latter. In this connection it should be noted that the long lifetime of PAN and NO_x in the winter may allow a significant export of anthropogenic NO_x to remote regions. The dilution of this NO_x coupled with the nonlinear dependence of production on NO_x may significantly increase the ozone production efficiency from anthropogenic NO_x emissions during the winter season.

The photochemical lifetime of O_3 in mid-latitudes in the winter is of the order of 200 days. We propose that accumulation of anthropogenically produced O_3 may contribute substantially to the observed spring O_3 maximum in the lower troposphere of the NH, a phenomenon that has often been considered to be due to enhanced stratosphere-troposphere exchange. In addition, the long lifetime will allow transport of O_3 not only zonally but also to other latitudes. It is proposed that the observed long-term O_3 trend in winter and spring seasons at Mauna Loa, Hawaii, a clean site, and at Hohenpeissenberg, Germany, a moderately polluted site, may be due to increases in the same anthropogenic source.

The major uncertainties in the winter O_3 budget and distri-

bution is associated with the estimates of lifetimes for NO_x and O_3. These involve the nighttime NO_3 and N_2O_5 removal mechanism, surface deposition of NO_x and O_3, and removal of secondary NMHC products such as PAN and aldehydes. The photochemistry of NO_3, N_2O_5 and the organic nitrates is not well understood. Laboratory studies of the photochemistry of these species and reactions of NMHC and NO_x in general are needed. Since transport processes play an important role in the O_3 production efficiency and the fate of organic nitrates, models with realistic transport parameterization will be needed to address the complexities of coupled chemistry and dynamics. Finally, measurements of O_3 and its precursors, especially in the remote troposphere, will be most valuable to improve our knowledge of the O_3 budget and distribution.

Acknowledgments. This research has been funded as part of the National Acid Precipitation Assessment Program by the National Oceanic and Atmospheric Administration. The paper has benefited from preprints sent by J. Fishman, and by S. J. Oltmans and W. K. Komhyr. Discussions with D. L. Albritton, M. A. Carroll, J. P. Greenberg, C. J. Howard, D. H. Lenschow, B. A. Ridley, A. R. Ravishankara, S. Solomon, and P. R. Zimmerman have been helpful. Programming help from R. Tallamraju is appreciated.

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(Received May 1, 1986;
revised January 7, 1987;
accepted January 13, 1987.)

LETTER "H" RESPONSES

H-1 Material provided in the adjudicative hearing are being considered by EFSEC as part of the adjudicative hearing process not the SEPA process. For clarification changes have been made to the text on page 6-6, Section 6.5. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

H-2 See General Response #1.

H-3 Use of the Regional Oxidant Model (ROM) is unwarranted and inappropriate for assessing potential ozone impacts of the NRPF. Applications of ROM have been limited to the eastern coast of the U.S., primarily because the model performs poorly in areas of complex terrain. The usual application of this model has been to assess the effect of ozone transport from one metropolitan area to another, and the effect of this transport on attaining ambient air quality standards. ROM uses a large (approximately 20 km) grid spacing that would be totally inappropriate for this application and would require extensive inventory-building efforts that would be extremely costly. Screening assessments of ozone impact filed as testimony during the EFSEC process have indicated that the potential impacts of the NRPF on ozone formation would be extremely small, unmeasurable with existing equipment, and occur at a distance of several hundred kilometers.

The comment suggests that an estimate of economic damage due to ozone formation should be factored into the BACT determination for NOx. It is unclear as to how this would be factored into the selection of BACT. In addition, it should be noted that any economic analysis of reduced crop yields at several hundred kilometers from the project site should also address the phenomenon of "ozone scavenging" in the vicinity of the project site. Ozone scavenging is the reaction of emitted NO with ozone to form nitrogen dioxide (NO_2). Presumably, the loss of ozone locally could provide a benefit to crop yields. In addition, it should be noted that the NRPF is projected to replace generating capacity at facilities in the western U.S. with higher emissions of NOx per unit of electrical energy.

The applicant has not assumed a useful life of 10 years for the SCR system, as stated by the comment. The use of a 10 year capital recovery period is a very common assumption in estimation of annualized costs of control and cost effectiveness for BACT determinations. This capital recovery period is related to project financing rather than to the lifetime of physical structures and equipment. The capital recovery period of 10 years is also applied to cost elements such as construction and engineering. It appears that the applicant may have overestimated the costs of ammonia vaporization, by assigning a cost of $0.05/Kwh to the equivalent electrical energy required. However, this cost element is a rather small portion of the annualized costs of control, particularly when considering the overall uncertainties in the analysis. This is illustrated by the fact that two vendor estimates of the total installed equipment costs differed by nearly 50 percent. In addition, the final determination of BACT does not rely strictly on economic issues, but also on energy and environmental factors. Any environmental benefits of the reduction of NOx emissions must be weighed against the environmental hazards of ammonia emissions as well as the potential for accidental release during the storage and handling of ammonia.

H-4 The impacts of the NRPF relative to global carbon dioxide (CO_2) have been greatly overstated in the DEIS, which addresses gross rather than net emissions. An extremely detailed analysis of the future net CO_2 emissions associated with generation of electricity in the Western United States indicates that operation of the NRPF is expected to result in an overall decrease in emissions ("Northwest Regional Power Facility Dispatch and CO_2 Emission Analysis". Henwood Energy Services, Inc., Sacramento, CA, September 28, 1995). This report concludes that the NRPF will displace 7100 GWh of generation in the Western System Coordinating Council (WSCC) region, resulting in a total net CO_2 emission reduction of 2.8 million tons in 1999. The statement of nonsignificance in the DEIS is warranted and is supported by the consideration of the net CO_2 emissions. This is necessarily speculative, one cannot accurately model a system ten years from now when the NRPF might be built.

H-5 Comment noted. Start-up operations would be conducted during the day.

H-6 Please refer to Section 3.2.4.3, Mitigation Measures, NRPF Site, where it states "Pine tree plantings would act as an effective partial screen (emphasis added) for the project; native stands average about 60 to 75 feet (18 to 23 m) tall, compared to the 125-foot tall exhaust stacks and 85-foot high air cooled condensers. Painting the stacks and buildings would also help the facility blend with the surrounding landscape, particularly as viewed form a distance. Light-colored earth tones (beige, tan) and earthy greens would blend well with the existing vegetation. The facility stacks could be painted light blue or gray to blend with the sky, or a darker gray to blend with background mountains where appropriate. Deciduous and evergreen trees planted around the facility would also resemble the regional aesthetic of rural farm residences and their associated large trees. The height of the stacks preclude the use of berms as a screening method near the facility.".

H-7 Comment noted. The VISCREEN analysis is conservative and not likely to minimize predicted impacts. The results are presented in terms of the percent of hours per year when visual impairment could occur. This does not minimize the significance of the impact. The comment suggests that potentially significant impacts occur a large percent of the time in which the meteorological conditions producing significant impacts are likely to occur. This is a self-evident conclusion and it is not clear how this statement would improve the analysis or the communication of impacts.

H-8 See General Response #1.

H-9 See General Response #1.

H-10 The background annual NOx concentration of 11 ug/m^3 is based on actual measurements at the site during the years 1980 to 1981. This concentration is 11% of the ambient standard of 100 ug/m^3. It is also an eminently reasonable estimate of the background for the rural characteristics of the site. It was estimated in 1987 that rural NOx concentrations in the eastern U.S. are 6.6 ppb (12.5 ug/m^3) according to the reference supplied as Appendix 3 to the comments (Liu, et al., 1987). Given the higher population density in the eastern U.S. and the reduction in vehicle emission rates of NOx since 1987, the assumed background of 11 ug/m^3 at Creston is consistent with this published value. Use of a different NOx background estimate based on different instrumentation would not change the conclusions of the DEIS.

H-11 Comment noted. Please refer to Section 1.2.3, Applicant's Determination of Purpose and Need, for a more detailed description of the need for additional electricity in the Pacific Northwest Region.

Appendix 1 See General Response #1.

Appendix 2 See General Response #1.

LETTER "I"

December 18, 1995

Energy Facility Site Evaluation Council
State of Washington
PO Box 43172
Olympia, WA 98504-3172

Re: Northwest Regional Power Facility-Comments Spokane Tribe-Draft EIS

The Spokane Tribe of Indians submits these comments to the Draft Environmental Impact Statement ("DEIS") for the proposed Northwest Regional Power Facility ("NRPF").

The Spokane Indian Reservation is located approximately 15 miles northeast of the proposed project. The Reservation is approximately 165,000 acres and governed by the Spokane Tribe of Indians through the Business Council of the Tribe. Along with providing a homeland for the members of the Spokane Tribe, the Reservation has an abundance of natural resources and recreation facilities for the use and enjoyment of Tribal members and non-members alike. The Spokane Reservation is classified as a Class I airshed under the Clean Air Act.

At the time of intervention with the Energy Facility Site Evaluation Council ("EFSEC"), the Spokane Tribe identified issues of concern with the application for the NRPF. These issues were: effects on cultural and archeological resources of the Tribe, effects of air emissions on Tribal lands, and the water withdrawal from the Spokane River where it would affect the Spokane Reservation including the fishery in the Spokane River and Lake Roosevelt. With the change in the application from water to air cooling, the water withdrawal issues were not of primary concern to the Spokane Tribe (as long as they remained out of the application) and therefore the Tribe concentrated on cultural resources and air quality. Correspondingly, the Spokane Tribe executed two agreements with the applicant to protect its cultural and environmental interests. Those agreements have been entered as evidence in the adjudicative proceeding with EFSEC.

The NRPF will significantly affect the environmental quality of the Spokane Reservation. The lack of comprehensive baseline data in the initial studies of the applicant do not allow for an adequate evaluation of all impacts addressed in the DEIS as well as possible unknown impacts. Many examples exist in the DEIS where the lack of baseline data is crucial. The Tribe will articulate a few here. For example, the applicant states that the NRPF will have visibility impacts on the Class I airshed of the Spokane Reservation for 6 percent of the hours of the year mostly at sunrise and sunset hours. For members of the Tribe and users of the recreational facilities at the confluence of the Spokane and Columbia Rivers this is a significant impact. Again this prediction is conjecture without the benefit of an adequate baseline. Other examples can be seen in Table 3.4 and on page 3-32 where the DEIS gives information on effects on sensitive plant species. The DEIS and correspondingly the Clean Air Act permits are wrought with these assumptions The baseline data must be established before impacts on Tribal natural resources and recreational facilities can be adequately evaluated. The air quality agreement with the applicant starts this

1

evaluation process.

In the "Northwest Regional Power Facility- Air Quality Agreement with the Spokane Tribe of Indians" the Spokane Tribe has agreed that it shall participate in the ongoing process of evaluation of the environmental effects of air emissions on the Spokane Indian Reservation. The agreement provides for the establishment of detailed baseline data which is lacking in the application and the DEIS. At the time the baseline data is established the Tribe can then further evaluate the effects of air emissions on the Reservation environment. Relevant effects are, but are not necessarily limited to: visibility, NOX, SO2, CO, PM10, VOC. The Agreement also provides for the direct monitoring by the Spokane Tribe and limits certain emissions. Most importantly the Agreement provides for further dispute resolution and legal process if emission levels are found to have adverse effects after establishment of the adequate baseline data. 2

The Agreement provides the vehicle for the applicant to provide adequate information to the evaluating agencies in concert with the Spokane Tribe. However, it will be quite difficult for the agencies to fully consider, discuss and evaluate all environmental impacts and alternatives under the DEIS without the establishment of adequate baseline data. Therefore, it may be premature to set forth a Final Environmental Impact Statement until such time baseline data on the Spokane Reservation exists. 3

Proper permitting under the Clean Air Act as integrated in the EFSEC and EIS processes is a necessity. Valid baseline data to make assumptions in the permitting process is mandatory and the comments above as they address the lack of baseline data are also germane in the permitting process. In addition, it seems that certain other requirements of the Clean Air Act may not have been followed. Section 165 (d) requires that for proper permitting to take place a consultation process must occur with the Federal Land Manager of Class I areas. To date the Spokane Tribe has not seen any evidence of satisfaction of this requirement. 4

The "KVA/CSWE Stipulation and Agreement with the Spokane Tribe of Indians for the Northwest Regional Power Facility" sets forth the obligations of the applicant regarding the cultural resources of the Spokane Tribe for Reservation, ceeded, aboriginal lands and usual and accustomed places. The primary intent of the document is the Spokane Tribe is the only party which can adequately evaluate the effects of the NRPF on those lands. 5

The agreements cited above are incorporated by reference into these comments and are on record with EFSEC. Please address any questions or concerns to the Spokane Tribe of Indians, c/o Larry Goodrow, Executive Director, Box 100, Wellpinit, WA 99040. (509) 258-4581.

LETTER "I" RESPONSES

I-1 The visibility impacts discussed in the DEIS were based upon conservative estimates of background data which probably lead to an over statement of estimated impacts. The visibility analysis utilized a modeling procedure developed by the U.S. Environmental Protection Agency. The value selected for the background visual range was selected in consultation with the Washington State Department of Ecology. A background visual range of 160 km was selected. This is typical of remote wilderness areas. Use of this background value for the Spokane Indian Reservation is conservative, and will likely lead to over-estimating the anticipated impacts on visibility in that area. Collection of additional background data is not necessary to reach a reasonable estimate of the projected impacts to visibility.

The analysis of impacts to vegetation in the DEIS was based on information on chronic injury symptoms published by the U.S. Department of Agriculture. These data indicate that air quality thresholds for chronic injury to plants are more than ten times higher than the conservative estimates for air quality impacts within the Spokane Indian Reservation Class I area. Collection of background data is not reasonably necessary to evaluate impacts to sensitive vegetation.

The comment suggests that the purpose of the stipulated air quality agreement between the Spokane Tribe of Indians and the NRPF is to collect background data. The agreement provides for payments to the Spokane Tribe of Indians for funding "to establish baseline studies, air monitoring or for any other purpose at the Tribes full discretion." It is quite possible that this agreement will lead to other environmental studies unrelated to air quality. Further, funding of the agreement does not begin until three months after commencement of construction -- an event which will not occur, if at all, until after the FEIS is completed. It is thus not possible to delay the FEIS to await studies under the agreement.

I-2 The impacts upon visibility were derived from the conservative assumptions discussed above. Some impact may be visible under proper lighting situations if one were looking toward the plant site and visibility was not obstructed by land forms. If one knew where to look, a slight distortion might be detectable. Most of the recreation on or along the rivers occurs at locations where hills will obstruct this view. The impact, if it occurs, should not be noticeable to recreational visitors. The impact to visibility is only a possibility, and, if it occurs, it should not be significant.

As stated above, the DEIS summary of chronic impacts to sensitive plant species all occur at threshold values at least ten times above those conservatively estimated to occur in the Class I area. Even chronic impacts to sensitive plants should not occur.

I-3 See Response to Comment I-1.

I-4 The Environmental Protection Agency confirms that the Spokane Tribe of Indians is the federal land manager for the Class I area within the Spokane Indian Reservation. NRPF has had repeated consultations with the Spokane Tribe of Indians. The stipulated agreement concerning air quality, which was signed by the Spokane Tribe of Indians, and which resolved all air quality issues raised by the Tribe before the Energy Facility Site Evaluation Council, is evidence of this consultation.

I-5 Comment noted.

LETTER "I"

10-20-95

Jason Zeller
E.F.S.E.C.

We are writing in reponce to your letter received 10-19-95.

We are not able to attend the meetings to be held in Creston 10-24 or 11-15-95.

After our own extensive search, we have finally received information on the proposed B.P.A. plant in Creston.

We appose this plant from its conception. After speeking with a representive of the gas Co. This plant is not necessary. Getting tired of the greedyness of B.P.A. Enough domage has beendone to this state. 1

Being located on your preferred pipeline route has come as a suprise, we recently learned this fact. We oppose this route as well as the others. None suitable for a 20" gas pipe line. 2

As deadlines approach, we wish to object. Protest this plan in its entirety.

Mary L. McCaughey

John L. McCaughey

add.
S. 13615 Cheney-Sp. Rd.
Cheney Wa. 99004

LETTER "J" RESPONSES

J-1 Comment noted. Please refer to Section 1.2, Purpose and Need, of the Draft EIS for a discussion of the need for the project.

J-2 Comment noted. However, the preferred route for the natural gas pipeline has not yet been determined. Please refer to General Response No. 1 for a discussion of the natural gas pipeline and to the appendix in this document, which deals with generic impacts of natural gas pipelines.

LETTER "K"

10-20-95

Nancy Whittpenn
B.P.A. E.I.S.

We are writing in responce to your letter received 10-19-95. We will not be able to attend the planned meetings in Creston Wa.

We had received one piece of information on this plant in april. After extensive searching, we have learned that a 20" Gas line is supposed to go through our property. Maps received in early Oct. 1

We are writing to protest the BPA plant and all proposed routes for your gas line.

After speeding with a representive for the gas company, this plant is not necessary.

B.P.A has damaged this state enough in the name of power, for whom I do not know. No one has approched us about this gas line; it will be opposed. 2

Mary L. McCaughey
John L. McCaughey.

add:
S. 13615 Cheney Sp. Rd.
Cheney WA. 99004

LETTER "K" RESPONSES

K-1 Comment noted. However, the preferred route for the natural gas pipeline has not yet been determined. Please refer to General Response No. 1 for a discussion of the natural gas pipeline and to the appendix in this document, which deals with generic impacts of natural gas pipelines.

K-2 Comment noted. Please refer to Section 1.2, Purpose and Need, of the Draft EIS for a discussion of the need for the project.

LETTER "L"

November 9, 1995

Jason Zeller
EFSEC Manager
PO Box 43172
Olympia, WA 98504-3172

Re: Northwest Regional Power Facility Draft EIS

Dear Mr. Zeller,

I am writing in support of the Northwest Regional Power Facility Plant proposed in Creston, Washington.

I feel the plant will be beneficial to the area. New jobs and a growth in population will provide a stabilizing effect on our economy.

Sincerely,

Bonnie Jensen
Mayor

BJ/mjd

LETTER "L" RESPONSES

L-1 Comment noted.

LETTER "M"

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R. ALAN SWANSON
EDWARD EARL YOUNGLOVE, III

RALPH G. SWANSON
OF COUNSEL

WILLIAM LEE PARR (1976)
CLIFFORD F. CORDES, JR. (1980)

December 18, 1995

HAND DELIVERED

Jason Zeller
EFSEC Manager
Washington State Energy Facility
Site Evaluation Council
PO Box 43172
Olympia, WA 98504-3172

Re: Comments to NRPF Draft EIS

Dear Mr. Zeller:

Enclosed are two memoranda (with attachments): KVA Resources and CSW Energy Comments on the NRPF Draft EIS; and KVA Resources and CSW Energy Editorial Suggestions for the NRPF Draft EIS. This letter, together with the "Comments" memo constitute the comments of KVA Resources and CSW Energy to the Draft EIS. The second memo consists of editorial suggestions, which we do not intend be treated as comments or necessarily responded to in the Final EIS. Many of these "suggestions" reflect changes which occurred with the change in the method of cooling.

The change in method of cooling reduced the footprint of the plant so that its permanent impact covers only 75 acres, of which 70 acres are currently used to grow alfalfa. None of the construction will occur in wetlands. The Applicants believe, in view of this limited impact, it is incorrect to conclude that impacts to wildlife will be significant. During the course of the adjudicatory hearing, the Applicants committed to eliminate grazing on the remainder of the site for a period of three to five years, and then to allow more limited grazing, managed to protect habitat quality. The Applicants hope that the responsible official will reconsider the impacts on wildlife in view of these changes. 1

The Applicants contend that NRPF's long-term effect on "greenhouse" gases, the effect of these gases upon global climate, and the particular effects of climate changes, are all speculative. These uncertainties are at least mentioned in section 4.2 of the Draft EIS, although their treatment in other sections is sometimes awkward. During the adjudicatory hearings, various witnesses concluded that if the NRPF is constructed, it will displace older, "dirtier," fossil fuel plants in the Northwest and on the West Coast. (A copy of Eric V. Toolson's Dispatch Study is enclosed.) Thus, the overall impact would be to improve emissions. The potential displacement of other emissions should be discussed in the EIS. 2

Please consider these comments, along with those in the enclosed memoranda, when preparing the Final EIS. We have appreciated the extra efforts that you, and your consultants, have undertaken as this proposal has been revised during the course of the hearing process to incorporate mitigating features.

Sincerely yours,

SWANSON, PARR, CORDES,
YOUNGLOVE & PEEPLES, P.S.

Darrel L. Peeples

Charles W. Lean

DLP:jw

Enclosures

LETTER "M" RESPONSES

M-1 Comment noted.

M-2 Comment noted.

LETTER "N"

KVA Resources and CSW Energy Comments on the NRPF Draft EIS

General Comment on the Natural Gas Pipeline

As the Draft EIS states, natural gas fuel for the project will be supplied through a natural gas pipeline running approximately 60 miles from the Pacific Gas Transmission Company's (PGT's) main transmission line east of Spokane to the project site. This pipeline will be owned and operated by PGT. PGT will also secure the licenses for, and construct, the pipeline.

The gas pipeline must be licensed by the Federal Energy Regulatory Commission (FERC), and EFSEC has no jurisdiction over that pipeline. Before licensing the pipeline, FERC will conduct an environmental review of the proposal pursuant to the National Environmental Policy Act. Neither EFSEC nor the present applicants (CSWE and KVA) control the extent or nature of FERC's environmental review.

The Applicants submitted written testimony addressing the environmental impacts of the natural gas pipeline. (Prepared Testimony of Wilfred G. Thomas, and Rebuttal Testimony of John D. Cassady.) EFSEC eventually ruled that since it did not have jurisdiction over the gas pipeline, any testimony related thereto was irrelevant. The Applicants therefore withdrew the testimony which they had submitted regarding the pipeline.

The contents of an environmental impact statement prepared under the State Environmental Policy Act (SEPA) may be broader than EFSEC's jurisdiction. The SEPA Rules, in WAC197-11-060(4)(b), state that an agency shall not limit its consideration of environmental impacts only to those within its jurisdiction. Since the natural gas pipeline will not be constructed "but for" construction of the NRPF, some consideration of the impacts of that pipeline in the EIS for the NRPF may be appropriate. WAC 197-11-060-(3)(b).

The SEPA Rules also state that "the level of detail and type of environmental review may vary with the nature and timing of proposals and their component parts" WAC 197-11-060 (5) (d). EFSEC lacks jurisdiction to require mitigation of pipeline impacts because this lies within the jurisdiction of FERC. Even if mitigation were within EFSEC's jurisdiction, the SEPA Rules would require consideration of whether those impacts may be mitigated by federal requirements.

Under these circumstances, the required coverage of the natural gas pipeline in the SEPA EIS is not completely clear. The Applicants, however, believe that it is appropriate for the SEPA EIS to consider whether there is a reasonable likelihood that the natural gas pipeline will lead to significant, adverse environmental impacts which will not be mitigated or avoided. If such impacts would result from the natural gas pipeline, they should be considered by EFSEC and the Governor as part of the SEPA process. Impacts which can be mitigated, and the details of that mitigation, fall within the exclusive jurisdiction of FERC.

For the above reasons, the Applicants are submitting the Prepared Testimony of Wilfred G. Thomas and the Rebuttal Testimony (excluding exhibits) of John D. Cassady as comments to the DEIS. Mr. Thomas and Mr. Cassady are both employed by Pacific Gas Transmission Company, and are familiar with environmental mitigation measures employed on natural gas pipelines. The testimony of both supports the conclusion reached by Mr. Thomas that "even if one assumes a worst case scenario with

respect to environmental impacts from the pipeline, tried and tested measures exist to mitigate those impacts to acceptable levels" (p.7).

FERC has standard wetland and waterbody construction mitigation procedures, a requirement for an erosion control, revegetation, and maintenance plan, and guidelines for reporting on cultural resources investigations–all of which would be applied to the natural gas pipeline. Mitigating measures discussed in the attached testimony address erosion control, stream crossings, wetland crossings, protection of endangered plants and animals, noxious weed control, and historic and cultural resource protection, as well as other possible impacts. PGT has experience in constructing major natural gas pipelines without significant adverse long-term impacts; there is no reason to expect that construction of this approximately 60-mile line will be any different.

The DEIS (at pp. 1-9, 1-10, 3-25, and 3-34) mentions possible impacts from compressor stations. There will be no compressor stations required for this pipeline, so these references should be deleted. 1

Fact Sheet

Page i, second paragraph, line 4:

Currently reads: . . . of which less than 380 acres will be used. . .

Should read: . . . of which less than 140 acres will be impacted. The footprint of the facilities permanently impacts 75 acres; 70 acres of agricultural lands and 5 acres of three-tip sagebrush/Idaho fescue habitat. The remaining 65 acres will be temporarily disturbed during construction of an underground gas pipeline, an underground water pipeline, and grading for the area used for the collection of stormwater runoff into the stormwater retention pond. 2

Section 1.4.1.2 Climate

Page 1–9, Mitigation Measures–last sentence

Currently reads: However, some power plant developers have voluntarily offered offset for greenhouse gases. 3

This sentence should be deleted since this is an editorial comment.

Fourth paragraph in section, lines 2, 3, 4, and 5

Currently reads: However, carbon dioxide (CO_2) emissions from the NRPF will contribute to the cumulative impact of greenhouse gases. The incremental contribution of the NRPF is in itself not considered significant, although the cumulative impact of global warming may be significant. This is discussed in Section 4.2. 4

Should read: However, carbon dioxide (CO_2) emissions from the NRPF may contribute to greenhouse gases. The incremental contribution of the NRPF Site emissions is in itself not considered significant. The relationship of carbon dioxide emissions from the NRPF Site to global warming is discussed in Section 4.2

Section 1.4.1.5 Water Quality

Page 1–12, first paragraph

Currently reads: Wastewater from employee sanitary facilities, service sinks, etc., will be routed to a septic system and transferred to the wastewater discharge pond.

Should read: Wastewater from employee sanitary facilities, service sinks, etc., will be routed to a package sewage treatment system and transferred to the evaporation pond. 5

This revised language is consistent with the rest of the document. (See Section 2.1.5.8 Sanitary Wastewater Treatment, page 2-29 for reference to an aerobic digestion package sewage treatment system.) A package treatment plant is not considered a septic system and uses an anaerobic digestion process.

Section 3.1.2.3 Mitigating Measures (NRPF Site)

Page 3–25, line 4

Currently reads: However, CO_2 emissions from the NRPF will contribute to the cumulative impact of greenhouse gases. The incremental contribution of the NRPF is in itself not considered significant, although the cumulative impact of global warming may be significant. This is discussed in Section 4.2. 6

Should read: However, CO_2 emissions from the NRPF may contribute to greenhouse gases. The incremental contribution of the NRPF Site emissions is in itself not considered significant. The relationship of carbon dioxide emissions from the NRPF Site to global warming is discussed in Section 4.2.

Section 3.1.3.1 Existing Conditions

Page 3–28, Table 3.2

Hourly emissions of carbon monoxide should be 56 and annual emissions should be 249 tons per year. 7

This reflects the draft permit issued by EFSEC dated November 1994.

Section 3.1.3.2 Impacts (NRPF Site)

Page 3–29, last paragraph, line 1

Modeled Ambient Air Quality Concentrations

Currently reads: Two EPA-developed computer dispersion models were used to estimate the ambient air pollutant concentrations caused by the controlled emissions from the NRPF turbines: the ISCST2 model was used to evaluate close-range impacts resulting from building wake effects; and the COMPLEX1 computer model was used to calculate the long-range impacts within the elevated terrain near Creston Butte and within the Spokane Indian Reservation. 8

Should read: Two EPA-developed computer dispersion models were used to estimate the ambient air pollutant concentrations caused by the controlled emissions from the NRPF

turbines: the ISCST2 model was used to evaluate impacts in flat terrain. The COMPLEX1 model and ISCST2 were both used to evaluate impacts in intermediate terrain, which is defined as areas above stack top but below plume height. Creston Butte and areas within the Spokane and Colville Indian Reservations were identified as areas with intermediate terrain.

Section 3.1.3.2

Page 3–30

Table 3.4

The following underlined corrections are made to Table 3.4:

	Class I Impact		Class II Impact		9
	Currently reads	*Should read*	*Currently reads*	*Should read*	
NO_x (annual)	0.025	0.18	0.86	1.6	
PM_{10} (annual)	0.005	0.03	0.15	0.27	
PM_{10} (24-hour)	0.14	0.29	12.0	3.0	

This reflects the draft permit issued by EFSEC dated November 1994.

Section 3.1.3.2

Page 3–31

Table 3.5

The following underlined corrections are made to the results in Table 3.5:

	NRPF Modeled Impact		Total Concentration		10
	Currently reads:	*Should read:*	*Currently reads:*	*Should read:*	
NO_x (annual)	0.86	1.6	12	13	
CO (1-hour)	766.0	91.0	1,931	1,256	
CO (8-hour)	220.0	68.0	1,385	1,233	
PM_{10} (annual)	0.15	0.27	13	13	
PM_{10} (24-hour)	12.0	3.0	98	89	

This reflects the draft permit issued by EFSEC dated November 1994.

Section 3.1.3.2

Page 3–31

Table 3.6

The following corrections are made to Table 3.6: 11

	Maximum Impact	
	Currently reads:	*Should read:*
Benzene	1.7×10^{-4}	3.0×10^{-4}
Formaldehyde	2.0×1^{-3}	3.1×10^{-2}

This reflects the draft permit issued by EFSEC dated November 1994.

Section 3.1.3.2

Page 3–32, last paragraph, line 8

Currently Reads: In all cases, the modeled changes in the rainwater pH were small relative to the assumed baseline pH, and the overall pH values of the ephemeral and permanent water bodies was within the tolerance level that might indicate adverse effects on amphibians. Therefore, it was concluded that the NRPF would not cause adverse impacts on sensitive animal species in the Class I areas.

Should read: In all cases, the modeled changes in the rainwater pH were small relative to the assumed baseline pH, and the overall pH values of the ephemeral and permanent water bodies were within the tolerance level that might indicate adverse effects on amphibians, except for one amphibian species. In the Spokane Indian Reservation, rainwater pH was predicted to be 5.3 using conservative methodology. The Tiger Salamander was identified as having a potential impact threshold of pH 5.3. Because of the conservative methodology used in the analysis, it was concluded that the NRPF would not cause adverse impacts on sensitive animal species in the Class I areas. 12

Section 3.1.3.2

Page 3–33

Table 3.7

The following underlined corrections are made to the results in Table 3.7:

	Background Loading Rate		Incremntal Change		Predicted Impact		13
	Currently reads	Should read	Currently reads	Should read	Currently reads	Should read	
Alpine Lakes			0.004	0.021			
Glacier Peak			0.002	0.011			
Pasayten			0.017	0.011			
North Cascades			0.002	0.011			
Spokane Indian Reserv'n	2.9	0.8	0.053	0.376	3.0	1.18	

This reflects the draft permit issued by EFSEC dated November 1994.

Section 3.1.6.2 Impacts (Plants and Animals)

Page 3-58, first paragraph in Wildlife section, lines 5

14

Should add this sentence to the end of the paragraph: No critical wildlife habitat will be impacted, and all wetlands and wetland setbacks will be avoided.

Page 3–58, second paragraph in Wildlife section, lines 1 and 2

Currently reads: Impacts to wildlife are considered significant. This determination is based on the amount of habitat impacted and associated impacts on wildlife by increased light, noise, and increased human activity and increased industrial activities in the area.

Should read: Impacts to wildlife will not be significant. The permanent construction footprint at the NRPF Site is 75 acres, of which 70 acres are now agricultural fields (as noted previous 3-51). These fields are unlikely to provide resident habitat for wildlife species . Wildlife may be impacted by the construction and operation of the NRPF Site, but the mitigation measures addressed in the following sections were designed to sufficiently offset any permanent habitat losses. The loss of 5 acres of three-tip sagebrush/Idaho fescue, while adverse to wildlife, is not considered significant in view of the remaining undisturbed habitat on the site and the mitigation proposed for that acreage. 15

Page 3-59, last line

This sentence refers to a breeding season (March 1 to August 15), but it does not indicate what species the breeding season is for, nor does it explain the relevancy to this section. 16

Limitations on timing are usually reserved for the sensitive periods of Endangered and Threatened species.

Section 3.1.6.3 Mitigating Measures

Page 3-62, first paragraph in NRPF Site section, lines 1, 2, and 3

Currently reads: Vegetation- The loss of three-tip sagebrush/Idaho fescue habitat in eastern Washington should be quantified and the conversion of agricultural land back to this type of habitat should be considered. It may be advisable to have a biologist on-site during initial grading of the NRPF site to identify sensitive species of plants during construction activities. Sensitive plants could be transplanted to a neighboring area with similar characteristics. 17

Should read: Vegetation- To mitigate the loss of the 5 acres of three-tip sagebrush/Idaho fescue and 70 acres of agricultural land to be permanently affected by the project, the applicant proposes to temporarily eliminate grazing on the remaining portion of the rangeland for a period of three to five years to allow re-establishment of the native vegetation. Thereafter, grazing of those areas would be allowed on a managed basis consistent with habitat quality.

Page 3-62, third paragraph in NRPF Site section, lines 1, 2, and 3

Currently reads: Weed control will include, where appropriate, preconstruction treatment and removal, establishment of wash-down stations at the edge of infested areas, and inspection of borrow materials for evidence of weed species. At the washdown stations, high-pressure water will be used to clean construction equipment to minimize the likelihood that weed seeds could be spread from infested to non-infested areas. All borrow material areas will be inspected to ensure they do not harbor noxious weeds. 18

Paragraph should be deleted. Control measures will vary and may include backpack spraying in some areas and other methods not outlined above in other areas. Furthermore, water may be limited, especially during the initial construction phases.

Page 3-62, fifth paragraph in NRPF Site section, lines 1 and 2

Currently reads: It may be advisable to have a biologist on-site during initial grading of the NRPF site to identify sensitive species of wildlife during construction activities. If found, sensitive animal species could be moved to another location.

Should delete existing paragraph and replace with: The temporary elimination of grazing, and the management of grazing thereafter, will enhance the site for wildlife, and will offset any minimal losses of habitat functional values associated with the project. The avoidance of wetlands during project construction will also benefit habitat values. Furthermore, the stormwater retention and evaporation ponds will be designed and constructed in a manner that is as "wildlife friendly" as the design parameters for their primary purpose will allow. Such considerations will include shallow shoreline slopes, shallow water along the shoreline, and earthen berms planted with native vegetation. 19

Section 3.2.1.1 Existing Conditions

Page 3-70, first paragraph under heading Site Conditions; second sentence

20

Appendix G does not contain the latest noise technical report (attached), which was provided to EFSEC as part of the hearings testimony.

Section 3.2.2.1 Existing Conditions (Application of Existing Plans and Ordinances)

Page 3–108, paragraph 2, line 9

Currently reads: Finally, the plan proposes that the site continue to be used for agriculture.

21

Delete the sentence. This land is presently zoned agricultural and will remain so if the NRPF is not permitted. However, the plan clearly states that industrial development on land of marginal value for agricultural use is allowed and encouraged. This site is on ground that is considered to have marginal value for agricultural use.

To state that the plan "proposes" agricultural use of the site in incorrect.

Section 3.2.3.2 Impacts

Page 3–119, last paragraph, line 1 and 2:

Currently reads: Only 29 permanent jobs would be created for facility operation, and KVA expects to fill approximately half of these plant jobs with local residents. The increase in local population of 14 operation workers and their families would result in an insignificant increase in demand for recreation facilities in the project vicinity.

22

Should read: Twenty-nine permanent jobs would be created for facility operation, and KVA/CSWE expects to fill these plant jobs with local residents to the degree possible. The increase in population caused by the plant workforce should not be significant.

The Applicant has never agreed that they could provide locals with half of the operation jobs available. However, the Applicant has agreed to hire as many local people as possible.

Section 3.2.3.3 Mitigation Measures

Page 3–120

Currently reads: A good faith effort will be made to hire approximately half of the permanent workers for the project from the local communities.

23

Should read: A good faith effort will be made to hire permanent workers for the project from the local communities.

See comment for Section 3.2.3.2.

Section 3.2.7.2 Impacts, Law Enforcement

Page 3-165, paragraph 3, line 4

Currently reads: ... by adding one to three additional staff members. If in-migrant travel to work via car pools, there will be an estimated 100 cars used (3 people per car) and require the addition of three patrol officers and one jail/radio operator. If in-migrants travel to the site by bus, one additional Lincoln County police officer will be needed (Berry 1994).

Should read: . . . by adding one to three additional staff members. If in-migrants travel to work via car pools, there will be an estimated 100 cars used (three people per car), which will require the addition of three patrol officers and one jail/radio operator. If in-migrants travel to the site by bus, one additional Lincoln County police officer will be needed (Berry 1994). 24

When Dan Berry, Lincoln County Sheriff, was first contacted he said that one to three police officers may be needed. After further information was provided to him on expected worker population and number of vehicles expected to be on the Lincoln County roads, he seemed to think only one additional police officer would be needed. The rationale provided in the Draft EIS implies that when an additional 100 cars are expected in Lincoln County, three patrol officers would be necessary, or one officer per 33 cars. This seems to be high when comparing the usual ratio of patrol officers to vehicles per day in more highly populated areas.

Section 3.2.7.3 Mitigating Measures

Page 3–168, first paragraph in section, line 4

Currently reads: A population monitoring program would document the number of workers, family members, and secondary employment population that occurs in the local Lincoln County communities.

Should read: A population monitoring program would document the number of workers, number of family members, and locations of construction workers' residences in Lincoln County. 25

Secondary employment is not being monitored because it is insignificant. Primary employment (the NRPF construction workers) will be monitored.

Section 4.2 Global Warming

Page 4-2, paragraph 2, line 2

Currently reads: NRPF may contribute to global warming.

Should read: NRPF may contribute additional CO_2 emissions to the atmosphere. 26

Note: It is the applicant's position that the scientific community is undecided as to whether CO_2 and other greenhouse gases can lead to global warming. The applicant concedes that the NRPF will release CO_2 into the atmosphere. The applicant's consultants have shown and testified that the NRPF

will displace other large CO_2 emitters in the region. Therefore, the NRPF will result in a net reduction of CO_2 production in the Pacific Northwest.

LETTER "N" RESPONSES

N-1 to
N-15 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

N-16 Comment noted.

N-17 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

N-18 Comment noted. Changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

N-19 Comment noted. Changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

N-20 Comment noted. The Final Noise Technical Report will be attached to the Final EIS.

N-21 to
N-26 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

LETTER "O"

KVA Resources and CSW Energy Editorial Suggestions for the NRPF Draft EIS

Fact Sheet

Page i, second paragraph, line 1:

Currently reads: KVA Resources, Inc., and Central and Southwest Energy, Inc. (CSW) propose to construct a . . . 1

Should read: KVA Resources, Inc. (KVA) and Central and South West Energy, Inc. (CSWE) propose to construct a . . .

Both CSWE and CSW Energy, Inc. are correct; CSW, however, refers to the parent company.

Page i, fourth paragraph:

Currently reads: The proponents are KVA Resources, Inc. and CSW Energy, Inc. 2

Should read: The proponents are KVA and CSWE.

Page iv-v, Table 1:

Table 1 is misleading because it ignores ch. 80.50 RCW and lists permits and approvals which are either issued by the EFSEC or which are not required for the NRPF. 3

Page iv, fourth element of Table 1:

Why is the Department of Ecology Engineering and Technical Services broken out separately from the rest of the Department of Ecology? 4

Section 1.1 Background

Page 1-1, first paragraph, lines 5 and 6:

Currently reads: . . . independent power producers: KVA Resources, Inc. and Central and Southwest Energy, Inc. (CSW). 5

Should read: . . . independent power producers: KVA Resources, Inc. (KVA) and Central and South West Energy, Inc. (CSWE).

Section 1.3.1 Proposed Action (Preferred Alternative)

Page 1-4, first paragraph in section, line 8:

Currently reads: . . . resulting in zero surface water discharge. 6

Should read: . . . resulting in zero discharge to surface water.

Page 1-4, second paragraph in section, lines 2-4:

Currently reads: The NRPF will require approximately 55 to 70 gallons per minute (gpm) (3.5 to 4.4 liters per second) for use in boiler makeup, cooling, general process applications, and as a domestic water supply. 7

Should read: . . . approximately 55 to 75 gallons per minute . . .

The NRPF ordinarily needs only 70 gpm for plant operations. The additional 5 gpm is for the domestic water supply needs. This is consistent with the Water Supply Option Agreement approved by the Town of Creston and the Applicant.

Page 1-5:

Figure 1-1 should be replaced with a figure that conveys the most complete wetland and habitat data. Such a figure was produced by CSWE for submittal to EFSEC as part of the post-hearing material. 8

Section 1.4.1.3 Air Quality

Page 1-10, fourth full paragraph, lines 3 and 4:

Currently reads: Air quality impacts of the natural gas pipeline (e.g., compressor stations) have not been assessed for this EIS. 9

Should read: Incremental air quality impacts of the existing natural gas pipeline (e.g., compressor stations) have not been assessed for this EIS. No new compressor stations are required.

Page 1-10, fifth full paragraph, line 6:

Currently reads: . . . construction management measures, such as water spraying and washing vehicle wheels. 10

Should read: . . . construction management measures, such as water spraying, washing vehicle wheels, and reduced speed limits for construction vehicles.

Section 1.4.1.5 Water Quality

Page 1-11, first paragraph in section, line 1:

Currently reads: On-Site Retention Pond 11

Should read: On-Site Ponds

Page 1-11, first paragraph in section, lines 4 and 5:

Currently reads: . . . whether the lined ponds are leaking and whether contaminants from the unlined pond are leaching . . . 12

Should read: . . . whether the lined evaporation ponds are leaking and whether contaminants from the unlined stormwater pond are leaching . . .

Section 1.4.1.6 Plants and Animals

Page 1-13, third paragraph in section, lines 3 and 4:

Currently reads: There could be significant impacts could in tall shrub . . .

Should read: There could be significant impacts in tall shrub . . . 13

Section 1.4.2.2 Land and Shoreline Use

Page 1-17, second paragraph, line 1:

Currently reads: . . . is not considered necessary in given . . .

Should read: . . . is not considered necessary given . . . 14

Section 1.4.2.3 Recreation

Page 1-17, second paragraph in section, lines 2 and 3:

Currently reads: Although BPA is coordinating with the city on tower placement, the project could permanently lessen the park's usefulness, and would lead to a significant impact.

Should read: Although BPA is coordinating with the city on tower placement, the project could permanently lessen the park's usefulness, and depending upon the degree of intrusion could lead to a significant impact. 15

Section 1.4.2.4 Visual and Aesthetic Resources

Page 1-18, second paragraph in section, lines 3 and 4:

Currently reads: . . . facility's night-time security lighting and would directly see the anti-collision lights on the emission stacks.

Should read: . . . facility's night-time security lighting. 16

Because the stacks are less than 200 feet in height, no anti-collision lights are required, per FAA AC 70/7460-1H.

Pages 1-18 and 1-19, last paragraph that begins on 1-18 and continues on 1-19:

Currently reads: Measures designed to mitigate visual impacts of the proposed facility include planting pine tree stands to screen the facility as much as possible, painting the buildings earth-tone colors to blend with the landscape, painting the exhaust stacks a light color to blend with the sky and mountains, and planting deciduous and evergreen trees to blend with the rural aesthetic of the project area. 17

Should read: Measures designed to mitigate visual impacts of the proposed facility include planting native trees to screen the facility and painting the buildings earth-tone colors to blend with the landscape.

Pages 1-18 and 1-19, under Mitigation Measures:

No statement is made about utilizing/paralleling existing ROWs. 18

Section 1.4.2.6 Transportation

Page 1-20, last line:

Currently reads: The impacts will be concentrated on State Route 2 . . .

Should read: The impacts will be concentrated on U.S. Federal Highway 2 . . . 19

Through the entire document, State Route 2 should be changed to U.S. Federal Highway 2.

Section 1.4.2.7 Public Services and Utilities

Page 1-22, third paragraph, line 3:

Currently reads: A good faith effort will be made to hire approximately half of the permanent workers for the project from the local communities. In addition, a good faith effort will be made to hire as many construction workers from the local labor pool. 20

Should read: A good faith effort will be made to hire construction and permanent workers for the project from the local communities.

Section 2.1.2.1 General Plant Description

Page 2-2, first paragraph in section, lines 2 and 3:

Currently reads: . . . consisting of four MS7221FA combustion turbines . . .

Should read: . . . consisting of four General Electric MS7221FA combustion turbines or equivalent. . . 21

Page 2-2, first paragraph in section, lines 5 and 6:

Currently reads: Chilling capability of the inlet air will be provided.

Should read: No inlet air cooling is provided. 22

Section 2.1.2.2 Major Facilities

Page 2-5, Figure 2-2:

Figure 2-2 should be replaced with a figure that conveys the most complete wetland and habitat data. Such a figure was produced by CSWE for submittal to EFSEC as part of the post-hearing material. 23

Section 2.1.2.3 Cycle Design

Page 2-13, last paragraph (continuing on page 2-14):

Currently reads: The generating facility consists of two combined-cycle units, each containing two combustion turbine generators, one steam turbine generator, and two HRSGs. The combustion turbine section is natural-gas-fired. The combustion turbine discharges hot exhaust gases to the HRSG for the production of steam for use in the steam cycle. Steam from each pair of HRSG's is combined and routed to a separate steam turbine generator. Main steam conditions will be 1,400 pounds per square inch, gauge (psig), or 9.7 MegaPascal (Mpa-g) at 1,000°F (538°C), and reheat conditions will be 318 pounds per square inch, absolute (psia), or 2.2 MegaPascal (Mpa-a) and 1,000°F (538°C). In addition, a low-pressure (LP) evaporator will be provided to produce steam at 80 psig (0.5 Mpa-g) and 432°F (222°C) for injection into the LP turbine for additional output. Each HRSG is of triple-pressure design, which includes a separate deaerator. 24

Should read: The generating facility consists of two combined-cycle power blocks, each containing two combustion turbine generators, one steam turbine generator, and two HRSGs. The four (4) combustion turbines are natural-gas-fired. Each combustion turbine discharges hot exhaust gases to an HRSG for the production of steam. Steam from each pair of HRSGs is combined and routed to a steam turbine. Each of the four (4) combustion turbines and two (2) steam turbines rotates a direct coupled electric generator. Approximate main steam conditions to the steam turbine will be 1,485 pounds per square inch, absolute (psia), or 10.2 MegaPascal (Mpa-a) at 884°F (473°C), and reheat conditions will be 357 pounds per square inch, absolute (psia), or 2.5 MegaPascal (Mpa-a) and 838°F

(448°C). In addition, a low-pressure (LP) evaporator will be provided to produce steam at 80 psia (0.55 Mpa-a) and 487°F (253°C) for injection into the LP turbine for additional output. Each HRSG is of triple-pressure design, which includes a separate deaerator.

*These changes reflect the latest modeling results for the air cooled system, and therefore, supersede Site Certificate Application data based on the previous water cooled design.*Page

2-14, first full paragraph, lines 6 and 7:

Currently reads: Steam from the LP turbine is exhausted to the surface condenser where it is condensed. 25

Should read: Steam from the LP turbine is exhausted to the air cooled condenser where it is condensed.

Page 2-14, third full paragraph, line 2:

Currently reads: Each turbine will exhaust downward to a surface condenser. 26

Should read: Each turbine will exhaust to an air cooled condenser.

Page 2-15, fourth paragraph, lines 6 and 7:

Currently reads: The HP (about 1,400 psia/1,000°F or 9.7 Mpa-a/538°C), IP (about 320 psia/1,000°F or 2.2 Mpa-a/538°C), and LP (about 70 psia/432°F or 0.5 Mpa-a/222°C) levels are . . . 27

Should read: The HP (about 1,485 psia/884°F or 10.2 Mpa-a/473°C, IP (about 357 psia/838°F or 2.5 Mpa-a/448°C, and LP (about 80 psia/487°F or 0.55 Mpa-a/253°C levels are . . .

These changes reflect the latest modeling results for the air cooled system, and therefore, supersede Site Certificate Application data based on the previous water cooled design.

Section 2.1.2.6 Balance-of-Plant—Mechanical

Page 2-16, first bullet:

Currently reads: Single shell, two-pass, divided water box surface condenser 28

Delete this bullet.

Page 2-16, third bullet:

Currently reads: Three half-capacity circulating water pumps

Should read: One air-cooled condenser, with approximately 24 cells 29

Page 2-16, fifth bullet:

Currently reads: A full-capacity closed-cycle, air-cooled, heat exchange system

Should read: A full-capacity closed-cycle, cooling water, heat exchange system 30

Section 2.1.2.7 Balance-of-Plant—Electrical

Page 2-17, last bullet on page, lines 5-8:

Currently reads: All of the breakers in a ring bus are of sufficient capacity to carry all of the local generation capacity. If there is a fault on any part of the ring, the power may be routed in the opposite direction around the ring. Metering of net output will also be coordinated with BPA. 31

Should read: Either a ring bus or a breaker-and-a-half configuration is anticipated. All of the breakers in the switchyard are of sufficient capacity to carry all of the local generation capacity. If there is a fault on any part of the bus, the power may be routed through another path to the transmission interconnect. Metering of net output will also be coordinated with BPA.

Page 2-18, first bullet:

Currently reads: . . . medium voltage (4-kV) motors . . . 32

Should read: . . . medium voltage motors . . .

Page 2-19, second full paragraph:

Currently reads: The design and installation of the electrical system will be in compliance with the National Electric Code. 33

Should read: The design and installation of the electrical system will be in compliance with the National Electric Code and the National Electric Safety Code.

Section 2.1.2.8 Other Site Improvements

Page 2-20, third paragraph:

Currently reads: A conventional farm fence of woven wire topped with two strands of barbed wire will be constructed around the entire site boundary. 34

Should read: A conventional farm fence with five strands of barbed wire will be constructed around the entire site boundary.

Page 2-20, fourth paragraph, lines 3-5:

The last sentence correctly states: "Fencing heights will be 7 feet (2.1 meters) in all areas except around the switching station, which will be 8 feet (2.4 meters)." *This is an inconsistency carried over from the application. Please do a search for the "8" feet and replace it with a "7" feet as it applies to the enclosure fence except around the switching station. There is inconsistency with the 7 feet height as follows:* 35

Page 2-31, first bullet should read: Installation of a 7-foot-high enclosure fence.

Page 3-39, Stormwater, should read: To prevent any incidental erosion off-site, a 7-foot enclosure fence around . . .

Page 2-21, second full paragraph, line 1:

Currently reads: The stormwater retention pond will . . .

Should read: The evaporation pond will . . . 36

Page 2-22, second set of bullets, bullet 5:

Currently reads: Fuel delivery road

37

Delete bullet

Section 2.1.4 Water Supply System

Page 2-23, only paragraph in section, lines 1-4:

Currently reads: The NRPF project will require approximately 79,200 to 100,800 gallons per day (gpd) (55 to 70 gpm), or 300 cubic meters per day for use in boiler makeup, general process applications, and as a domestic water supply for the facility. The nominal water usage is expected to be in the range of 55 to 70 gpm.

38

Should read: The NRPF project will require approximately 79,200 to 100,800 gallons per day (gpd) (55 to 75 gpm), or 300 cubic meters per day for use in boiler makeup, general process applications, and as a domestic water supply for the facility. The nominal water usage is expected to be in the range of 55 to 75 gpm.

The NRPF ordinarily needs only 70 gpm for plant operations. The additional 5 gpm is for the domestic water supply needs. This is consistent with the Water Supply Option Agreement approved by the Town of Creston and the Applicant.

Section 2.1.5 Wastewater Discharge System

Page 2-23, first paragraph in section, line 3:

Currently reads: . . . resulting in zero water discharge.

39

Should read: . . . resulting in zero process wastewater discharge.

Section 2.1.5.1 Pretreatment System

Page 2-24, only paragraph in section:

Currently reads: In the pretreatment system, lime, coagulant, and coagulant air may be used in a clarifier to reduce suspended solids, silt, turbidity, color, and colloids if required. Chlorination is also added at the clarifier. The product water is then filtered for further solids removal. The filter residue is routed to the evaporation pond.

40

Delete section.

Section 2.1.5.2 Demineralizer System

Page 2-24, only paragraph in section, line 1:

Currently reads: The demineralizer is used to further treat a portion of the filtered water to use as makeup. . .

41

Should read: The demineralizer is used to treat a portion of the water supply to use as makeup. . .

Section 2.1.5.3 Steam Cycle Blowdown

Page 2-29, only paragraph in section, third line:

Currently reads: . . . bottom of the evaporator where particles collect.

42

Should read: . . . bottom of the HRSG drums where particles collect.

Section 2.1.5.5 Pretreatment System Wastewater

Page 2-29, only paragraph in section:

Currently reads: This wastewater is composed of a high concentration of the solids found in the water supply with lime, coagulant, coagulant air, and chlorine from the clarifier. 43

Delete paragraph.

Section 2.1.6 Stormwater Control System

Page 2-30, third paragraph in section, lines 1 and 2:

Currently reads: All storage tanks will have secondary containment with discharge valves kept in the closed position. 44

Should read: All oil storage containers, such as lube oil storage tanks, transformers, etc., will have secondary containment as required by federal and Washington State spill control regulations.

Section 2.1.7.1 Proposed System of Heat Dissipation

Page 2-33, first paragraph in section:

Currently reads: The cooling system that will serve the condensing and cooling needs of the facility has two major components: a steam turbine condenser, and circulating water for cooling major equipment within the facility. 45

Delete the entire paragraph.

Page 2-33, fourth paragraph in section, lines 1 and 2:

Currently reads: The condenser finned tubes or elements are arranged in an A-frame orientation so that the steam passes through the tubes in a counterflow orientation.

Should read: The condenser finned tubes or elements are arranged in the A-frame orientation. The steam passes down through the tubes counterflow to the air and condenses. 46

Section 2.1.9.2 Construction--Craft and Non-Craft Employment

Page 2-44, last sentence on page:

Currently reads: Separate contracts and independent workforces will be used to install offsite gas and water pipeline facilities. 47

Should read: Separate contracts and independent workforces will be used to install offsite gas pipelines and transmission facilities.

Section 2.2 No Action Alternative

Page 2-48, second paragraph, second bullet:

Currently reads: . . . by the Board of Commissioners of Lincoln. 48

Should read: . . . by the Board of Commissioners of Lincoln County.

Section 2.3.1.2 Heat Dissipation System

Page 2-49, last two lines on page:

Currently reads: The "wet" cooling system had three major components: a steam turbine condenser, a cooling tower, and circulating water for cooling major equipment within the facility. 49

Should read: The "wet" cooling system had five major components: a steam turbine, a shell and tube surface condenser, a cooling tower, a circulating water system for cooling major equipment within the facility, and a water makeup pipeline system.

Section 2.3.3 Alternative Energy Resources

Page 2-53, line 1:

Currently reads: An evaluating of all of the primary energy resources. . . 50

Should read: An evaluation of all the primary energy resources . . .

Section 3 Affected Environment, Impacts and Mitigating Measures

Page 3-1, second paragraph, line 1:

Currently reads: Federal and Washington state regulations . . .

Should read: Federal and Washington State regulations . . . 51

Section 3.1.1.1 Existing Conditions

Page 3-2, paragraph 2, lines 2 and 3:

Currently reads: The rocks of the Okanogan Highly are largely . . .

Should read: The rocks of the Okanogan Highlands are largely . . . 52

Page 3-8, third full paragraph:

Several thousand feet of "potentially unstable slopes" are identified. Suggest defining or qualifying "potentially unstable slopes" so that readers are not unnecessarily alarmed. The slopes may be steep, but most are probably quite stable except for surface erosion. 53

Section 3.1.2.1 Existing Conditions

Page 3-15, bottom of page, Winds

The wind rose referred to in this discussion is a wind rose for F stability and light wind speeds (2-3 m/sec). This should not be applied in the manner it is here. It is really only a partial wind rose. 54

Page 3-29, Table 3.3:

For clarification, please add the units (lb/yr) *for the Estimated Emissions and the Small Quantity Emission Rate columns.* 55

Section 3.1.3.2

Page 3-30, second paragraph

Currently reads: The "PSD increment" is the allowable increase in the ambient concentration above the background values. 56

Should read: The "PSD increment" is the allowable increase in the ambient concentration above the baseline values.

Section 3.1.5.2 Impacts

Page 3-39, first paragraph under "Groundwater," lines 3 and 4:

Currently reads: . . . is expected to provide a recharge function to the groundwater table in the Sinking Creek basin. 57

Should read: . . . is expected to provide a recharge function to the groundwater table.

Section 3.1.5.3 Mitigating Measures

Page 3-42, last paragraph, line 3:

Currently reads: . . . to detect if the lined pond is leaking and whether or not contaminants from the unlined pond are . . . 58

Should read: . . .to detect whether the lined pond (evaporation) is leaking and whether or not contaminants from the unlined pond (stormwater) are . . .

Section 3.1.6.1 Existing Conditions

Page 3-44, third paragraph, lines 1 and 2:
Currently reads: The habitats were identified during surveys of the project site on 16 and 17 June 1993, 3 and 4 June 1994, and 16 through 19 May 1995. 59

Should read: The habitats were identified during surveys of the project site on 16 and 17 June 1993, 2 and 3 June 1994, and 16 through 19 May 1995.

Page 3-45, third full paragraph, line 5:

Currently reads: . . .long-leaf fleabane (*Ergeron corymbosus*). . . 60

Should read: . . . long-leaf fleabane (*Erigeron corymbosus*) . . .

Page 3-45, third full paragraph, line 8:

Currently reads: . . .*Artemesia tridentata tridentata*. . . 61

Should read: . . . *Artemesia tripartita*. . .

Page 3-45, fourth full paragraph, line 5:

Currently reads: . . .photographs indicated 42 isolated . . .

Should read: . . . photographs indicated 43 isolated . . . 62

Page 3-45, fourth full paragraph, lines 6 and 7:

Currently reads: Most of these wetlands are in the northwest portion of the site. 63

Delete the sentence. They are dispersed through the central portion of the site.

Page 3-45, fourth full paragraph, lines 7-10:

Hardstem bulrush, Olney's bulrush, and alkali cordgrass were listed as dominates on the NRPF site. Please reference source of information. 64

Page 3-49, second full paragraph, line 10:

Currently reads: Great Basin gopher snakes (*Pituophis catenifer*) . . .

Should read: Great Basin gopher snakes (*Pituophis melanoleucus deserticola*) . . . 65

Catenifer is a subspecies of P. melanoleucus *that occurs only in western Oregon and California, and is known as the Pacific Gopher Snake.*

Page 3-49, third full paragraph, line 6:

Currently reads: . . . and mule deer have been seen at the site.

Should read: . . . and mule deer could potentially use this habitat at the site. 66

CH2M HILL biologists did not report observing great blue heron and greater yellowlegs.

Page 3-49, fourth full paragraph, lines 1 and 2:

Currently reads: Waterfowl, such as mallard (*Anas platyrhynchos*) and cinnamon teal (*Anas cyanoptera*) . . .

Should read: Waterfowl, such as mallard (*Anas platyrhynchos*) and green-winged teal (*Anas crecca*) . . . 67

Only green-winged teal are reported in CH2M HILL reports.

Page 3-50, Table 3.10:

CH2M HILL did not report seeing the following: piute sculpin, golden eagle, great blue heron, osprey, and Swainson's hawk. Reference sources for observations on NRPF Site or delete. 68

Page 3-50, last line on page:

Because the northern sagebrush lizard is listed as a sensitive species, it should not be implied that it occurs at the site, along with the long-tailed vole. 69

Page 3-51, third full paragraph:

Delete the paragraph. These two streams will not be impacted by the NRPF Site and are not discussed elsewhere in the DEIS. 70

Page 3-51, last paragraph, line 4:

Currently reads: . . . as a result of domestic livestock grazing in the 1830s and later for croplands. 71

Should read: . . . as a result of domestic livestock grazing and agricultural practices.

Page 3-54, fifth full paragraph:

Currently reads: Farming and livestock grazing have reduced or degraded the original steppe wildlife community in Washington. Any steppe, especially shrub steppe, that retains native species and supports native wildlife is highly valued. 72

Should read: Farming and livestock grazing have reduced or degraded the original steppe wildlife community in Washington.

Highly valued is a subjective determination that is usually reserved for critical habitats.

Section 3.1.6.2 Impacts

Page 3-57, first paragraph under NRPF Site, sentence 2 and 3:

Currently reads:..These acres will be lost as a result of the construction and operation of the proposed power plant and ancillary facilities. Losses will include about 70 acres (28 ha) of agricultural vegetation and 70 acres (28 ha) of tree-tip sagebrush/Idaho fescue habitat. 73

Should read: The footprint of the facilities permanently impacts 75 acres; 70 acres of agricultural lands and 5 acres of three-tip sagebrush/Idaho fescue habitat. The remaining 65 acres will be temporarily disturbed during construction of an underground gas pipeline, an underground water pipeline, and grading for the area used for the collection of stormwater runoff into the stormwater retention pond.

Page 3-58, first paragraph in Wildlife section, lines 5

Should add this sentence to the end of the paragraph: No critical wildlife habitat will be impacted, and all wetlands and wetland setbacks will be avoided. 74

Page 3-58, second paragraph under Wildlife:

Currently reads: Impacts to wildlife are considered significant. This determination is based on the amount of habitat impacted and associated impacts on wildlife by increased light, noise, and increased human activity and increased industrial activities in the area.

Should read: Impacts to wildlife will not be significant. The permanent construction footprint at the NRPF Site is 75 acres, of which 70 acres are now agricultural fields (as noted previous 3-51). These fields are unlikely to provide resident habitat for wildlife species . Wildlife may be impacted by the construction and operation of the NRPF Site, but the mitigation measures addressed in the following sections were designed to sufficiently offset any permanent habitat losses. The loss of 5 acres of three-tip sagebrush/Idaho fescue, while adverse to wildlife, is not considered significant in view of the remaining undisturbed habitat on the site and the mitigation proposed for that acreage. 75

Section 3.2.1.1 Existing Conditions

Page 3-69, second paragraph under Regulatory Overview, last three sentences

The 15, 10 , and 1.5 minute exceptions are usually not reduced to a simple 2 dBA increase in the allowable Leq. Instead, the L25, L8.3, and L2.5 can be used directly. 76

Page 3-70, second paragraph under Site Conditions, last two sentences:

Delete last two sentences and replace with: "The measured noise levels shown in Table 3.15 are given in terms of Leq, L25, L8.33, and L2.5. The measured Leqs can be compared directly with the WAC regulations. To compare the measured L25, L8.33, and L2.5 with the WAC regulations, 5 dBA, 10 dBA, and 15 dBA should be added to the WAC limit, as discussed on page 3-69." 77

Page 3-74, sixth paragraph, line 1:

Currently reads: During operation, sludge, a semi-solid, will be produced by the cooling tower.

Should read: During operation, sludge, a semi-solid, will be produced by the water treatment system. 78

Page 3-79, third paragraph, lines 3 and 4:

Currently reads: . . . CSW Energy, Inc. . . .

Should read: . . . CSWE . . . 79

Section 3.2.1.2 Impacts

Page 3-85, first full paragraph, line 7:

Currently reads: . . . 45-dBA to 54-dBA . . .(Table 3.18).

Should read: . . . 36 dBA to 38 dBA. . . receivers. 80

The reference to Table 3.18 should be deleted as shown because it is the wrong reference.

Page 3-85, first full paragraph, lines 9 and 10:

Currently reads: These modeled levels are higher than the nighttime and daytime background levels, and are therefore expected to be audible at the residential receivers.

Should read: These modeled levels are higher than the night-time background levels, and may be audible at the residential receivers if startup operations occurred at night. 81

Page 3-85, first full paragraph, lines 10 and 11:

Currently reads: However, the modeled levels are less than the regulated daytime limits for residential areas. 82

Should read: Delete the sentence.

Page 3-85, first full paragraph, last sentence:

Currently reads: Therefore, the start-up operations would comply with the state noise limits if they were conducted during the day. 83

Should read: Startup operations would comply with the WAC daytime and night-time limits.

Page 3-87, first full paragraph, line 3:

Currently reads: . . .siteand burned as it is used. . . 84

Should read: . . .site and burned as it is used. . .*[run-on words]*

Section 3.2.1.3 Mitigation Measures

Page 3-91, last paragraph on page, line 3:

Currently reads: . . . CSW Energy, Inc. . . . 85

Should read: . . . CSWE . .

Section 3.2.2.1 Existing Conditions

Page 3-94, first paragraph:

Make certain the project acreage numbers are consistent throughout the document and that they agree with actual acreage impacted. Less than 140 acres will be impacted by the NRPF project. The footprint of the facilities permanently impacts 75 acres; 70 acres of agricultural lands and 5 acres of three-tip sagebrush/Idaho fescue habitat. The remaining 65 acres will be temporarily disturbed during construction of an underground gas pipeline, an underground water pipeline, and grading for the area used for the collection of stormwater runoff into the stormwater retention pond. 86

Page 3-101, last full paragraph on page, lines 2 and 3:

Currently reads: Most agricultural land is used for growing cereal grain (wheat, oats, barley), hay, and rapeseed. 87

Should read: Most agricultural land is used for growing cereal grain (wheat, oats, barley),

Section 3.2.3.1 Existing Conditions

Page 3-115, second paragraph in section, lines 4 and 5:

Currently reads: Three new golf courses have been proposed in the northern Davenport area at Deer Meadows, Seven Bays, and Mill Canyon. 88

Should read: Two new golf courses have been proposed in the northern Davenport area at Seven Bays and Mill Canyon, and another one has recently opened to the public at Deer Meadows.

Section 3.2.3.2 Impacts

Page 3-119, last paragraph, lines 1 and 2:

Currently reads: Only 29 permanent jobs would be created for facility operation, and KVA expects to fill approximately half of these plant jobs with local residents. The increase in local population of 14 operation workers and their families would result in an insignificant increase in demand for recreation facilities in the project vicinity. 89

Should read: Twenty-nine permanent jobs would be created for facility operation, and KVA/CSWE expects to fill these plant jobs with local residents to the degree possible. The increase in population caused by the plant workforce should not be significant.

The Applicant has never agreed that it could provide locals with half of the operation jobs available. However, the Applicant has agreed to hire as many local people as possible.

Section 3.2.4.2 Impacts

Page 3-131, Figure 3-16B:

The figure has not been updated to show the new dry cooling system. The view is so distant that the changes to the project will not change the simulation to a great degree and the project impacts will not change. 90

Page 3-135, second paragraph, lines 1-3:

Currently reads: Lighting would consist of small, high-intensity lights to illuminate exterior portions of on-site buildings and anti-collision lights on the four 125-foot emission stacks.

Should read: Lighting will consist of small, high-intensity lights to illuminate exterior portions of on-site buildings. 91

Because the stacks are less than 200 feet high, they do not need to be illuminated for FAA requirements.

Page 3-135, third paragraph, lines 4 and 5:

Currently reads: . . . night-time security lighting and would directly see the anti-collision lights on the emission stacks.

Should read: . . . night-time security lighting. 92

Section 3.2.5.1 Existing Conditions

Page 3-138, first full paragraph:

Currently reads: Dr. Rob Whitlam, state archaeologist with the Office of Archaeology and Historic Preservation, notes that the 1980 study probably needs to be redone in order to meet contemporary professional standards (Whitlam 1994). 93

Should read: Dr. Rob Whitlam, state archaeologist with the Office of Archaeology and Historic Preservation, notes that the 1980 study probably needs to be redone in order to meet contemporary professional standards (Whitlam 1994). Hence, the NRPF project area, although partially surveyed by Morgan et al. (1980), was surveyed again by Larson et al. (1995).

Page 3-138, second full paragraph, lines 6 and 7:

Currently reads: A strip along the eastern margin of the New Study Area was not surveyed, hence the abrupt straight boundary for site 45LI138. 94

Should read: A strip along the eastern margin of the New Study Area was not surveyed.

Page 3-139, first full paragraph, lines 5-7:

Currently reads: None of these appears to be eligible for inclusion in the State or National Registers of Historic Places, although Requests for Determination of Eligibility have not been sought from the SHPO. 95

Should read: None of these appears to be eligible for inclusion in the State or National Registers of Historic Places.

Page 3-139, third full paragraph, lines 5-7:

Currently reads: Although no formal determination has been made, site 45LI138 is considered potentially eligible for inclusion in the NRHP. For purposes of the project, 45LI138 will be assumed eligible. 96

Should read: Site 45LI138 is considered potentially eligible for inclusion in the NRHP.

Pages 3-142 and 3-143, first paragraph under Traditional Cultural Properties:

Currently reads: Although consultation with the Spokan[e] and Colville Confederated Tribes has been initiated, the level of consultation required to identify and document traditional cultural properties has not been completed. Standards for such studies are presented in NRHP Bulletin No. 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (Parker and King 1990). 97

Should read: No traditional cultural properties potentially eligible for listing on the National Register of Historic Places were identified in the NRPF project area through consultation with the Spokane Tribe and Colville Confederated Tribes. Adeline Fredine, however, indicated that the NRPF project area was historically a plant-gathering area, as was most of the Creston vicinity. Review of traditional cultural properties for the gas pipeline corridor has not been undertaken with the Tribes.

Section 3.2.5.2 Impacts

Page 3-144, third full paragraph, lines 3 and 4:

The paragraph states that there will be a high probability of impact to the sites. It does not state what type of impact, significant and adverse, etc. 98

Page 3-145, paragraph under Traditional Cultural Properties:

Currently reads: The necessary studies to identify traditional cultural properties have not been completed. The nature of traditional cultural properties that reasonably may be anticipated in the project areas varies . . . Unless appropriately identified so that mitigative options can be determined, any such properties present will be impacted by the project.

Should read: No impacts to traditional cultural properties eligible for inclusion on the National Register of Historic Places in the NRPF project area would occur. The necessary studies to identify traditional cultural properties in the transmission and gas pipeline corridors have not been completed. The nature of traditional cultural properties that reasonably may be anticipated in the project areas varies. . . Unless appropriately identified so that mitigative options can be determined, any such properties present will be impacted by the transmission and gas pipeline corridor projects. 99

Section 3.2.5.3 Mitigation Measures

Page 3-145, last paragraph:

Add to the end of the paragraph: Other cultural resources mitigation measures that may apply to the NRPF Site are listed as stipulations required by the Colville Confederated Tribes and the Spokane Tribe. 100

Page 3-146, first paragraph, line 6:

Currently reads: . . . and the President's Advisory . . .

Should read: . . . and the Advisory . . . 101

Page 3-146, second paragraph, line 10:

Currently reads: . . . and the President's Advisory . . .

Should read: . . . and the Advisory . . . 102

Page 3-146, third paragraph, lines 2-4:

Currently reads: However consultation with affected tribes has been initiated, and the Colville Confederated Tribes and the Spokane Tribe have identified cultural resources decisions that require their participation. 103

Should read: Consultation with the Spokane and Colville Confederated Tribes has resulted in a set of stipulations that is agreeable to both Tribes.

Section 3.2.6.1 Existing Conditions

Page 3-148, second paragraph, lines 4 and 5:

Currently reads: The posted speed limit is 55 mph (86 kmh), reducing to 35 mph (56 kmh) in Davenport and Reardon.

Should read: The posted speed limit is 55 mph (86 kmh), reducing to 30 mph (56 kmh) in Davenport and Reardon. 104

Page 3-148, third paragraph, lines 1 and 2:

Currently reads: . . . which connects the town of Lincoln,. . .

Should read: . . . which connects the community of Lincoln, . . . 105

Lincoln is not incorporated.

Section 3.2.6.2 Impacts

Page 3-153, fourth paragraph, lines 1 and 2:

Currently reads: Materials would be delivered to, and workers would arrive at, the site using State Route 2 and either Lincoln Road or Creston Butte Road, depending on which site is selected. 106

Should read: Materials would be delivered to, and workers would arrive at, the site using U.S. Federal Highway 2 and Lincoln Road.

Page 3-154, last paragraph, lines 1 and 2:

Currently reads: These shipments will include the combustion turbines, condensers, steam turbines, and generators.

Should read: These shipments will include the combustion turbines, condensers, steam turbines, generators, and HRSGs. 107

Section 3.2.6.3 Mitigating Measures

Page 3-158, first bullet:

Currently reads: The applicant will fund the upgrading of Lincoln Road or Creston Butte Road (depending on alternative chosen) from its intersection with State Route 2 to the main facility entrance in order to support construction vehicle weights. 108

Should read: The applicant will fund the upgrading of Lincoln Road from its intersection with U.S. Federal Highway 2 to the main facility entrance in order to support construction vehicle weights.

Section 3.2.8.2 Impacts

Page 3-176, first (partial) and third paragraphs:

Again, there is reference to one-half of the plant jobs (50 percent of the workers) being filled by locals. See comment for page 3-119. 109

Section 3.2.8.3 Mitigation Measures

Page 3-187, Population and Housing paragraphs:

Again, there is reference to one-half of the plant jobs being filled by locals. See comment for page 3-119. 110

Section 4.2 Global Warming

Page 4-2, first full paragraph, lines 2-4:

Currently reads: Its contribution would be noticeable, but not significant, in comparison to emissions of greenhouse gases from other sources in Washington State and the rest of the world.. 111

Should read: Its contribution would not be significant, in comparison to the emissions of greenhouse gases from other sources in Washington State as well as globally.

Section 6.2.1 Notice of Intent and Mailings

Page 6-2, last paragraph, line 5:

Currently reads: . . . due to the agency by May 27, and provided contacts for further information. 112

Should read: . . . due to the Agency by May 27, 1994, and provided contacts for further information.

Section 6.2.2 Scoping Meetings

Page 6-3, three bullets:

Please include the year for the dates listed for the open houses. 113

Section 6.4 EFSEC Adjudicative Hearings

Page 6-6, second paragraph, line 5:

Currently reads: . . . granted intervenor states. 114

Should read: . . . granted intervenor status.

Section 9 Glossary and Acronyms

Page 9-2, definition of CSW *(should be CSWE)*:

Currently reads: Central & Southwest Energy, Inc. 115

Should read: Central and South West Energy, Inc.

Section 10 Distribution List

Page 10-1, Applicant:

CSWE is not listed as an applicant; is this an omission? 116

Page 10-2, lines 1 and 4:

There are question marks after USDI Bureau of Indian Affairs and USDA Forest Service. *They should be deleted.* 117

Appendix C Facility Site Alternatives

Page 9.2-3, fourth paragraph:

References to the water pipeline route should be deleted. Neither the Sinking Creek nor the NRPF site would require the water pipeline linking the site with a wellfield adjacent to the Columbia River, although Sinking Creek would require a transmission corridor linking that site with the BPA transmission line to the north; that transmission corridor could also be used to extend the proposed water pipeline from the City of Creston south from the NRPF site to the Sinking Creek site. 118

Page 9.2-10, last paragraph:

This section needs to be revised to delete references to a wellfield adjacent to the Columbia River and water pipeline from there to either the NRPF site or the Sinking Creek site. Both sites would use water from the City of Creston; the Sinking Creek site would require an extension of the pipeline that will run from the City of Creston to the NRPF site south from there to the Sinking Creek site. 119

Page 9.2-11, first and second paragraphs:

References to losses of 380 acres should be deleted and replaced with 140 acres, which is the total area that will be disturbed temporarily; only 75 acres will be disturbed permanently. 120

Page 9.2-19, fifth and sixth paragraphs:

Should reference 140 acres, not 380; a total of 70 nonirrigated agricultural acres and 5 acres of three-tip sagebrush/Idaho fescue would be permanently converted. 121

Page 9.2-29, last paragraph, first sentence:

Again, delete references to the water supply wellfield. 122

Page 9.2-30, second bullet:

Delete the second bullet, which references the wellfield and water pipeline. 123

Page 9.2-31, Figure 9.2-8:

In the row "Impacts on Land Use," *in the NRPF column:*

Currently reads: Conversion of 192 acres of nonirrigated agricultural land and 188 acres of grazed land to a nonagricultural, industrial land use. 124

Should read: Conversion of 70 acres of nonirrigated agricultural land and 5 acres of grazed three-tip sagebrush/Idaho fescue to industrial land use.

LETTER "O" RESPONSES

O-1 Comment noted. Both CSWE and CSW Energy, Inc. are correct; CSW however, refers to the parent company. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-2 Comment noted. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-3 This is a joint State Environmental Policy Act/National Environmental Policy Act document that identifies the permits and approvals for all phases of the project, i.e, the facility, gas pipeline, electric transmission lines.

O-4 Comment noted. The reference to "Engineering and Technical Services" in Table 1 has been deleted.

O-5 and
O-6 Comment noted. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-7 Comment noted. The applicant states that the NRPF ordinarily needs only 7- gpm for plant operations. The additional 5 pgn is for the domestic water supply needs. This is consistent with the Water Supply Option Agreement approved by the Town of Creston and the applicant.

O-8 Comment noted.

O-9 to
O-17 Comment noted. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-18 Comment noted. Please refer to section 1.3.1 Proposed Action (Preferred Alternative).

O-19 to
O-22 Comment noted. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-23 Comment noted.

O-24 to
O-34 Comment noted. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-35 Comment noted. The inconsistency relating to the height of the fencing will be corrected to ensure that reference to the height of the fencing, excluding that around the switching station, will be 7 feet. Reference to the height of the fencing around the switching station will be 8 feet. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-36 to
O-52 Comment noted. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-53 Comment noted. See General Response No. 1.

O-54 Comment noted. The wind rose used does not show annual average wind speed and direction characteristics. However, this did not affect the impact analysis.

O-55 Comment noted. The units "lb/yr" have been added to the Estimated Emissions and Small Quantity Emission Rate columns in Table 3.3.

O-56 to
O-63 Comment noted. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-64 Comment noted.

O-65 to
O-67 Comment noted. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-68 Comment noted. Reference to piute sculpin, golden eagle, great blue heron, osprey, and Swainson's hawk has been deleted. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-69 Comment noted. Reference to listed species has been deleted from the last sentence on p. 3-50 and the first sentence on p. 3-51. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-70 to
O-75 Comment noted. Changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-76 Comment noted. See response to O-77

O-77 Comment noted. The last two sentences have been deleted and replaced with the text shown in Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-78 to
O-85 Comment noted. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-86 Comment noted. The acreages throughout the document should be consistent. The following explanation of acreages will be used a reference to the acreages throughout the document. "Less than 140 acres will be impacted by the NRPF project. The footprint of the facilities permanently impacts 75 acres: 75 acres of agricultural lands and 5 acres of three-tip sagebrush/Idaho fescue habitat. The remaining 65 acres will be temporarily disturbed during construction of an underground gas pipeline, an underground water pipeline, and grading for the area used for collection of stormwater runoff into the stormwater retention pond.

O-87 Comment noted. However, suggested changes were not made to the text.

O-88 to
O-89 Comment noted. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-90 Comment noted.

O-91 to
O-97 Comment noted. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-98 Comment noted. Changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-99 to
O-115 Comment noted. Suggested changes have been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-116 Comment noted. CSWE should be listed as an applicant. This change has been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-117 Comment noted. The question marks should be deleted. This change has been made to the text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

O-118 to
O-124 Comment noted. However, this appendix was written prior to the decision to change the design of the power plant from water-cooled to air-cooled, and was included to demonstrate the facility site alternatives process.

LETTER "P"

Mr. and Mrs. Blake Angstrom
P.O. Box 67
Creston, Wa, 99117
November 14, 1995

EFSEC

Re: KVA Siting Stipulations

Ladies and Gentlemen,

There are several issues related to the proposed plant site, which I currently lease from Washington Water Power, that I have considered for sometime. I am concerned that these issues are not being addressed with common sense and good judgment with the true benefits to mankind as the ultimate goal, that they are in fact the decisions based on nonproductive idealistic views of a few.

Carol and I have supported the energy project at Creston from the time of its inception.

KVA has proposed a project that will benefit themselves, as a private industry should. However, the benefits to our fellowman are also of great value. Power will be produced for millions of people and business. The economy of Lincoln County and the Creston area will be greatly enhanced. The benefits of this project fall within the parameters set forth by society.

It is a shame some groups such as the Department of Fish and Game and the Indian Tribal Council have the power to cost such a project untold dollars in added nonsence such as removal of cattle, building bat houses, planting non-native species of plants and the fencing of a shale rock grave site 500' in all directions. Costs such as these would be brought to bare by the future rate payers, or possibly stop the project. 1

There are also other costs that have not been addressed which are related to cattle removal, bat houses, and shale rock grave protection.. These are personal. You see, my wife and I make a living off of the ground where the proposed energy plant is to be built. We produce a product which returns dollars to us and our community. We produce beef.

On the acres of the property, we produce over 37,536 pounds of beef annually. With the per capita consumption of over 62 pounds, we feed 605 people annually. The value of the products to us alone from those acres is over $50,000.00 annually. In 20 years, we feed 12,100 people, and produce an income of $1,000,000.00.

We personally will loose our livelihood as the loss of this acreage will not allow us to maintain the integrity of our farm.

Allowing the siting without these stipulations allows for a win win situation. KVA produces power and much needed revenue; we maintain the ground and the livelihood that has been there for the past 100 years.

Thank you for your consideration in these matters.

Sincerely,

Blake D. Angstrom

Blake Angstrom

LETTER "P" RESPONSES

P-1 Comment noted. According to the Washington State Environmental Policy Act, the environmental impact statement must identify impacts and mitigation measures and these are discussed under several headings relevant to the commenter's concerns. Please refer to Section 3.2.2, Land and Shoreline Use, 3.2.5 Historic and Cultural Resources, and Section 3.2.8, Socioeconomics, for a detailed discussion of these issues.

Nov. 15/95

LETTER "Q"

pg 1 To the Energy Facility Site Evaluation Council:

I am sure there will be dissatisfied people in this area you can count me in: should the gas-generating plant (KVA) be located as close to the town of Creston, esp; when the plant is in full operation 24 hours a day, year after year of continuous "humming" noises and emitting toxic particles in to the air, over our agricultural areas the food source which does benefits everyone in human-energy on a daily basis.

By toxic particulates the plant could emit, includes formaldehyde and benzene along with sulfur dioxide, carbon monoxide, ammonia and nitrogen oxides. 1 2

As for the Site Characteristics (Pg. 6 phenagraph 8, on line 21-22-23, in the Matter of Application No 93-2) it was listed quote: "that the site is not near any populated areas with major air pollution problems" — does this mean just because you and many other people who does NOT live here, and [redacted] probably never will, entitles you (KVA & affiliates) the right to create a pollution problem for those of us who have to live here and raise our families?

Creston has always been proud of its clean environment, air quality and open-spaces for the last 5 generations, and have worked hard to maintain a safe environment for future generations.

2/2 Thus, insuring a stable production in our Agriculture industry and its lands (this Earths garden).

As a reminder: Human-energy should come first, above all else, in accomplishing any other tasks and progresses, in making our country (U.S.) strong in its resources, with a healthy society.

If the United States would quit admitting people by the thousands each year, into this country to use-up our resources faster than Nature can replenish it, we wouldn't need so much more power, industries, schools, roads transmission lines, housing, etc; and jeopardizing those non-renewable resources that are here, today.

We feel its Time Federal Gov. puts tighter restrictions on the population growth within our boundries, as seen in Canada & other nations before the U.S. could be in same situation as Tibet (where 99% of their food resources depend on imports from other countries)

A "weak" country can never be a free-country very long.

In conclusion: We request that E.P.S.C. gives a wise and thoughtful consideration towards Agriculture Lands and its uses and the Free Enterprise system who "backs" a Conservative America and its people.

Sincerely

Mr. and Mrs. M.F. Bean + Son
(Marvin + Leon)

LETTER "Q" RESPONSES

Q-1 Comments noted. Please refer to the Air Quality section (3.1.3 on page 3-25) of the draft environmental impact statement for a discussion of air quality impacts and regulations. The project is required to comply with the air quality regulations established by the federal government (U.S. Environmental Protection Agency, the state of Washington, and by local air pollution authorities.

LETTER "R"

Pangaea International

Wilbur, Washington 99185-~~0168~~ U.S.A.

Tel: 509 647 2152 Fax: 509 647 2511 Internet: PangaeaInt@aol.com

RECEIVED

NOV 21 1995

ENERGY FACILITY SITE EVALUATION COUNCIL

Energy Facility Site Evaluation Council
PO Box 43172
Olympia, Washington 98504-3172

November 16, 1995

Attn. Mr. Jason Zeller, EFSEC Manager

re: KVA/CSW Draft EIS Comments

Dear Jason,

After reviewing the Draft Environmental Impact Statement for the KVA/CSW project in Creston, Washington, I would like to bring to light some areas which need to be addressed in the Final EIS.

Section 1.4.2.1 Environmental Health and Public Safety

During construction phases, road closures and traffic can become troublesome, especially during harvest times when local traffic can be heavy. Prior notice and minimal detours can alleviate most difficulties. 1

Heavy equipment to be installed in the facility may be railed as close to the site as possible. A rail head located directly south of the site (as opposed to one located in the town of Creston) would be beneficial in that Highway 2 would only have to be crossed and not traveled along. The roads from the rail head to the site would naturally need to be re-enforced by KVA/CSW. 2

Section 2.1.8.1 Transmission Facilities

A proposed compensation station would be built on BPA's existing Grand Coulee-Hanford 500kV line. A small building would be included with this station. It would be preferable to have a permanent building instead of prefab. trailer type. The trailers tend to look bad and weather worse after a while. 3

Section 3.1.1.1 Earth Existing Conditions

Flow thickness of the basalt layers and loess soil need to be better defined for the site as well as the rest of the Columbia Plateau. The local hydrology would also be of importance to include in the FEIS. 4

The earthquake of Dec. 14, 1872 represents a seismicity concern for the facility which were not properly addressed in the DEIS. With intensities of VI for Walla Walla, VII-VIII for Wenatchee, and VI for Whitestone, this can present operating and construction concerns for the facility which need to be addressed. Even with "moderate earthquake damage likely", this can represent significant concerns for the facility as well as the pipeline. 5

Section 3.2.1.1 Noise

A deep buffer of trees surrounding the building on site would help alleviate some of the noise concerns people may have. Type of tree and depth of buffer around the building as well as the NRPF site could be addressed. 6

Section 3.2.2.1 Land and Shoreline Use - Existing Conditions

Figure 3-8 is a poor one. The different colors for different counties is confusing. This map is based on very dated County Conservation District Maps. It would be better to have a map derived from a Landsat Satellite Image Land Use Classification analysis. This would not only give an up to date map, but also one which is more usable and understandable in the FEIS. 7

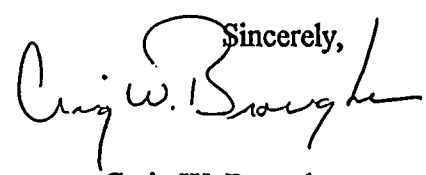
Figure 3-9 is also very lacking. There is no distinguishing colors between BLM, Private, State, or Tribal lands. Also, please note that the NPS boundary for Coulee Dam National Recreation Area is incorrect. They do not own any land, except at Fort Spokane and the St. Paul Mission at Kettle Falls. They manage the land for the US Bureau of Reclamation, Grand Coulee Dam. They do not manage land on the Colville or the Spokane Reservation, nor in the town of Coulee Dam or Grand Coulee. There are also parts of the recreation area managed by NPS which are missing. 8

A concern brought up during the public hearing is BPA's decision not to upgrade the power transmission line from Grand Coulee to the Bell substation. The implications of this decision, not only for the power transmission line but the project as a whole, should be addressed in the FEIS also. 9

Finally, a suggestion for the technical writers of any EIS. For those of us who are used to reading and writing technical and professional publications, it is very important to see references in the body of the report as opposed to being listed just at the end of the report. It raises the question of who said what, and where is that information being used in the report. References should be noted after their statement or study is mentioned in the body of the report **and** at the end of the report in alphabetical order. 10

I thank you for the opportunity to comment on the DEIS for the KVA/CSW project at Creston, Washington. I believe this is a worthwhile project not only for Creston, but for all of Washington. It has the potential to provide inexpensive power to its customers as well as important jobs to a small community. If you would like any more information regarding my comments such as supporting documentation, please do not hesitate to contact me. Thanks again.

Sincerely,



Craig W. Brougher
President

c: Files c:\documents\pengwellow deis comments.pub

LETTER "R" RESPONSES

R-1 Comment noted. The mitigation measures outlined in the EIS have been carefully considered to compensate for increased traffic problems during construction. Please see Section 3.2.6.3 in the document.

R-2 Comment noted. A railhead is not part of this project and is therefore outside the scope of this EIS.

R-3 After comparing the economics of a permanent structure vs. a pre-fab structure and the fact that the structure would be unmanned in a rural area, bpa decided to build a pre-fab structure.

R-4 Comment noted. The geology has been defined to an adequate level for the purposes of this EIS. Please see Section 3.1.1.1, Existing Conditions, 3.1.1.2, Impacts, and 3.1.1.3, Mitigation Measures.

R-5 Comment noted. The seismicity has been defined to an adequate level for the purposes of this EIS. As noted in the mitigation section (Section 3.1.1.3), further studies would be completed on the NRPF site once the application has been approved. Please refer to Section 3.1.1.1, Existing Conditions, and 3.1.1.3, Mitigating Measures, first paragraph.

R-6 Comment noted. Pine tree plantings would be incorporated into the site design to act as an effective partial screen for the project.

R-7 Comment noted. However, Figure 3-8 is only intended to show that the primary landuses in the project area are agriculture and rangeland. No changes to Figure 3-8 were made.

R-8 Comment noted. Figure 3-9 has been revised. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

R-9 BPA not building the line to Bell Substation in Spokane has little implication for this project. There is no need to build a line to Bell Substation. The new plant needs to be integrated into the transmission system. Since the load centers that may be served by the plant are to the west and south, the power will not need to flow east toward Spokane. A line to Grand Coulee allows the power to flow in the direction of greatest need.

R-10 Comment noted. The form of referencing material within an EIS is not described by SEPA or NEPA. The EIS contains references where appropriate and these are provided in Section 8, References, in a usual and acceptable manner.

LETTER "S"

Dec 1st 1995

Jack Tenter
R 1 Box 716
Davenport, Wa.
99122

RECEIVED
DEC 4 1995
ENERGY FACILITY SITE
EVALUATION COUNCIL

Mr. Jason Zeller
EFSEC Manager
PO Box 43172
Olympia, Wa. 98504-3172

RE: Written testimony concerning NREP/ DIES Creston Site
Lincoln Co. Wa.

Dear Mr. Zeller

To begin with, it has been very difficult for me as a layman to thoroughly digest the DIES and (I suspect with purpose). Please take that into consideration while reviewing this testimony.

I would begin by talking about environmental impact to people rather than plants and animals.

I live approximately 8 mi. directly down wind from the Creston Site at 7 Bays on Roosevelt Lake. The Areas of 7 Bays, Deer Meadows, Lincoln, Ft. Spokane, and Miles are without a doubt the fastest growing areas not only on the lake, but within Lincoln County. With 5 Major housing developments (100 to 500 Lots each), 3 boat launch ramps, 3 golf courses (2 proposed and 1 completed), a National Park Campground and a Casino all within less than 12 mi. of the Creston Site. 1

We of eastern Washington are all aware of the air pollution problems caused by the inversions in Spokane. Living here I can tell you that this river valley has the same problems.

Because this area is obviously a fast growing, high use area and suffers from air pollution inversions, I find it amazing that the DIES has failed to take it into consideration.

Exhaustive testimony was given by the permit applicant concerning possible air pollution impact to National Parks and Wilderness Areas 125 Mi. upwind of Creston But no mention was made of a densely populated , low lying area within 6 Mi. directly down wind of the site.

I do not believe that data from 13, 16, and 18 year old air monitoring is sufficient to draw the DIES assumed conclusions concerning baseline ambient air quality.

The TSP monitoring in Davenport ending during 1977 did not meet Washington State standards. From my personal experience I can testify that (at least visually) the air quality has deteriorated within this area during the last 18 years.

I would suggest that due to the conditions outlined above, a current and comprehensive baseline study should be completed in site downwind areas as a condition of permit approval.

Thank You

Jack Tenter

LETTER "S" RESPONSES

S-1 Comments noted. The air quality analysis showed that ambient air quality standards will be met at all locations, including areas six to eight miles downwind of the project site. The ambient air quality standards have been set at levels which are health-protective. The air quality assessment identified the peak impacts at any location and determined that they would fall within the health-protective standards. Therefore, all locations not at the point of peak impact would also meet the standards, even though these specific areas were not mentioned in the text.

LETTER "T"

To: EFSEC
From: Patti Lowe, Executive Director, Greenhouse Action
Re: Northwest Regional Power Facility DEIS
Date: December 11,1995

The DEIS states that the NRPF's contribution of greenhouse gases "would be noticeable, but not significant, in comparison to emissions of greenhouse gases from other sources in Washington State and the rest of the world."

While the facility 's 3 million tons would make up about 1.7% of total Washington Carbon dioxide emissions in 2010, the plant's proportion of the projected increase in Washington state emissions would be about 8%. This is very significant in view of the Framework Convention on Climate Change signed by over 160 nations which calls on industrialized countries to reduce emissions of greenhouse gases to 1990 levels by the year 2000. U.S. emissions are currantly increasing, and WSEO projects Washington state emissions to increase about 40%. The U. S. is the leading emitter of greenhouse gases and our commitment to averting rapid climate change, or lack of it, will have a powerful influence on the actions of other countries. 1

The International Panel on Climate Change which consists of over 2500 scientists from around the world, has just reported that they are now confident human activity is contributing to global warming. Therefore, the phrase in section 4 -2 "If this hypothesis is correct..." should be removed.

KVA has not started a plan to offset those 3 million tons of greenhouse gas emissions. Without such a plan, this facility should not be approved.

LETTER "T" RESPONSES

T-1 The impacts of the NRPF relative to global carbon dioxide (CO_2) have been greatly overstated in the DEIS, which addresses gross rather than net emissions. An extremely detailed analysis of the future net CO_2 emissions associated with generation of electricity in the Western United States indicates that the operation of the NRPF is expected to result in an overall decrease in emissions ("Northwest Regional Power Facility Dispatch and CO_2 Emission Analysis." Henwood Energy Services, Inc., Sacramento, CA, September 28, 1995). This report concludes that the NRPF will displace 7100 GWh of generation in the Western System Coordinating Council (WSCC) region, resulting in a total net CO_2 emission *reduction* of 2.8 million tons in 1999.

LETTER "U"

CENTER FOR ENVIRONMENTAL LAW & POLICY

1100 N.E. Campus Parkway
Seattle, WA 98105

Ralph W. Johnson, Chair *Rachael Paschal, Director*

18 December 1995

Allen Fiksdal
EFSEC Project Manager
P.O. Box 43172
Olympia, WA 98504-3172

BY FAX to: 360/956-2158
3 pages total

Re: Northwest Regional Power Facility
Draft Environmental Impact Statement

Dear Mr. Fiksdal:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement, DOE/EIS-0214, dated October 1995 (DEIS) discussing the Northwest Regional Power Facility project (NRPF) proposed for construction near Creston, Washington. This letter is directed toward the subject of water supply for the project and the impacts of predicted water use on resources in the Columbia Basin.

Water Quantity

Water supply for the NRPF project is proposed to be delivered from the Town of Creston, pursuant to its municipal water rights, including its Water Right Certificate No. G3-26677, with a priority date of September 25, 1980. At the time this water right issued, the Department of Ecology determined that the application was exempt from the provisions of the State Environmental Policy Act, RCW 43.21C, and no environmental assessment or analysis of the impacts of the water right was conducted at that time.

The Creston municipal water rights, on paper, are for quantities significantly in excess of the amounts actually used by the town. It is clear that the water to be supplied to the NRPF project by Creston represents "new water," that is, water that is going to be pumped and delivered in addition to the amounts currently in use.

At the time that the application for Water Right No. G3-26677 was under consideration, Creston obtained a hydrogeologic investigation of the proposed well. That report did not conclusively identify the discharge point or area for the aquifer proposed as a source of supply for this water right. The report noted that "it is possible that either aquifer may

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e-mail: celp@u.washington.edu

'pinch-out' in the Creston area . . . or that groundwater is depleted by discharge into the Columbia River gorge." (Converse Ward Davis Dixon, Inc., Seattle, WA, Report No. 80-5223-01, dated 10/27/80).

The DEIS does not specifically discuss the subject of natural discharge of the ground water intended to supply the project. In the section on water supply it is assumed that, because the Town of Creston possesses water rights adequate to supply the NRPF, no further impacts need be considered (DEIS, p. 3-36). Given that the supply for the NRPF represents water that has not heretofore been pumped or applied to use, there will be impacts associated with the use of this source of supply. Those impacts should be discussed as a part of the EIS process. 1 2

Analysis of these impacts is important. Washington recently imposed and extended a moratorium on the issuance of new water rights within the Columbia Basin out of concern for the relationship between surface water flows in the Columbia River and the health of various fish stocks, especially salmonid species that have been listed or proposed for listing pursuant to the Endangered Species Act. This moratorium applies both to surface water diversions and to groundwater pumping that is in "direct hydraulic continuity" with the main stem of the Columbia River. WAC 173-563-015 (as amended 1/3/95). The DEIS discussion of impacts to fish and wildlife does not address this issue. 3

The Columbia Basin moratorium was not in effect at the time the Creston water rights were issued, but does illustrate the drastic problems associated with water supply in Creston's region. The moratorium may apply to water right applications that involve changes to or enlargement of existing water rights. This topic is not discussed in the DEIS. 4

Place of Use

The DEIS asserts that municipalities may provide water service outside their city boundaries for a distance of 10 miles (DEIS, p. 3-36). This assertion is in conflict with the rule that water rights are appurtenant to the place of use as defined in the water right certificate. In this case the place of use is the area served by the Town of Creston in 1980. The Report of Examination for Water Right Certificate G3-26677 discusses future increase in population within the Town of Creston associated with construction and operation of a previous proposal for the "Creston Generating Station," but does not discuss the possibility of supplying water to the power facility. Extension of water supply outside the Creston service area may involve a change in place of use that would require a change in the municipal water right. This topic is not addressed in the DEIS. 5

Conclusion

The DEIS relies upon the prior issuance of a water right as a basis for not assessing the impacts of increased water withdrawals on the resources of the Columbia River basin. Because of the potential effect of water use by the NRPF on critical fishery resources, it is both appropriate and necessary to give full consideration to water supply as a potential adverse impact of the project.

Thank you for the opportunity to comment. If I can provide additional information, please feel free to contact me at the numbers shown above. Please add my name to the mailing list and keep me informed of any decisions you make regarding this project.

Yours very truly,

Rachael Paschal

LETTER "U" RESPONSES

U-1 The entirety of the ground water aquifer supplying the Town of Creston's water supply has not been mapped recently to our knowledge. Consequently, the natural discharge of the aquifer is not known.

U-2 It is not clear what is meant by "new water" and the phrase "...heretofore been pumped or applied to use.." The amount of water pumped and used by the Town of Creston varies annually and by season depending on the population and such factors as rainfall and temperature. In the past, the amount of water pumped has been substantially more than is currently being used. In 1979 the Town of Creston pumped an average of 120,000 gallons per day (gpd) to supply water service to 320 residences. Creston now supplies only about 240 residences. In 1993 Creston pumped 26,400,000 gallons (approximately 72,300 gallons per day). The NRPF's normal operating water requirements of 79,200 gpd to 100,800 gpd will increase the pumping amounts only slightly over the historically indicated amounts. These amounts are still substantially less than the amount of water rights certificates and claims held by the Town of Creston.

The Town of Creston is currently preparing a Capital Facilities Plan. Part of this plan will contain a study by Varela & Associates (Spokane, WA), addressing the potential impact of Creston supplying water to the NRPF. This study is not yet available, but is reported to confirm the aquifers and the ability of Creston to supply the NRPF with water.

As in the past, the Town of Creston is currently pumping water with both wells. Therefore, to our knowledge no new wells or improvements to the existing well system is planned.

U-3 The NRPF's use of water supplied by the Town of Creston does not require the issuance of new water rights for the pumping of groundwater. Further, the groundwater in the Creston area is derived from aquifer systems within the Columbia River Basalts. Records indicate that the area contains more than one aquifer system. While these aquifers tend to flow north westerly, there are no clear indications of "direct hydraulic continuity" with the main stem of the Columbia River. Because there is no new water right involved, no direct hydraulic connection to the Columbia River is indicated and the amounts of water used is insignificant in terms of average flows in the Columbia River. There is no impact to assess.

U-4 There is no plan or need to change or enlarge the existing water rights for the Town of Creston to provide water to the NRPF.

U-5 It is well known that under Washington laws and regulations that municipalities can provide water service outside the town boundaries upon approval or resolution of their governing body. The Town of Creston has made such a determination in Resolution No. 95-008. Further, the Town of Creston currently provides service to two residences located outside the town boundaries. The use of the Town of Creston water rights are described as the "area served by the Town of Creston," however, exemptions for other service are provided for under RCW 90.03.300; 90.03.390; and 90.44.020.

LETTER "V"

YOUR COMMENTS PLEASE!

We want to be sure to get your comments. You may use this comment sheet to provide comments regarding the Northwest Regional Power Facility Draft Environmental Impact Statement..

Page 2-14 Electric Generators

"...a 30 psig (0.2 MPa-g) hydrogen, ..." and "Each generator is hydrogen-cooled..."

I was unable to find any reference to the amount of hydrogen used and/or stored, precautions to avoid explosive ignition, leak detection ....

In short, was the explosive nature of hydrogen adequately considered? 1

RECEIVED

DEC 04 1995

ENERGY FACILITY SITE EVALUATION COUNCIL

If yes please clearly write your name and address:

Jerry W. Robinson
Route 1, Box 47
Creston, WA 99117

Please leave at meeting, mail, or fax to:

Jason Zeller
EFSEC
PO Box 43172
Olympia, WA 98504-3172
Fax: (360) 956-2158

LETTER "V" RESPONSES

V-1 Comment noted. The explosive nature of hydrogen has been addressed in the Draft EIS. As stated on pages 3-85 and 3-87 of the Draft EIS "***Risk of Fire or Explosion***- There would be a risk of a fire or explosion at the NRPF during both construction and operation, as well as during standby or nonuse, dismantling and site restoration. The risk is produced by the on-site use and storage of flammable liquids and gases. The risk of explosion or fire during construction will be very low. Only small amounts of flammable liquids, such as fuel or solvents, will be stored and used on-site. Compressed gases required for welding, such as acetylene and oxygen, will also be used and stored on-site. The risk of fire and explosion should be minimal because applicable federal and state safety regulations and WAC 296-155 procedures are required and will be adhered to during construction.

Operation of the NRPF facility will require the use of two materials which can be explosive under certain conditions: natural gas and hydrogen gas. Natural gas will be piped to the site and burned as it is used; none will be stored on-site. Hydrogen gas will be stored on site in standard bottles or larger capacity tank. The hydrogen is then used on site as part of the combustion turbine generator cooling system.

For many years, industry has stored and used natural gas and hydrogen in large quantities; when there were explosions, they resulted from equipment malfunctions or operator errors. During these incidents, flammable gases were released in an unsafe manner, either inside equipment or to the work area. The combination of flammable gases, ignition sources, and oxygen resulted in explosions. As a result of these incidents, codes, regulations, and industry standards have been upgraded to reduce the likelihood of recurrences. These codes, regulations, and consensus standards will be implemented during operation of the facility to mitigate this potential hazard. Therefore, the risk of fire or explosion associated with the NRPF is not considered a significant impact."

LETTER "W"

PACIFIC GAS
TRANSMISSION
COMPANY

2100
SOUTHWEST
RIVER
PARKWAY
PORTLAND
OREGON
97201

February 21, 1996

Nancy Wittpen
Bonneville Power Administration
905 NE 11th Avenue
Portland, OR 97232

Subject: Draft EIS, Northwest Regional Power Facility

Dear Ms. Wittpen:

Attached for your consideration are Pacific Gas Transmission Company's comments on the subject Draft EIS. If you have any questions about our comments, please call me at 503-833-4703.

Sincerely,

John Cassady
Director, Environmental and Regulatory Planning

Enclosure

cc: Allen Fiksdal, Washington Energy Facility Site Evaluation Council
Mike Boyle, Federal Energy Regulatory Commission
Jane Christmas, Resource Management International
Hunter Horvath, KVA Resources, Inc.

TEL
503 833 4000

FAX
503 833 4900

Pacific Gas Transmission Company

Comments on the Draft EIS for the Northwest Regional Power Facility

General Comments

In this Draft EIS for the Northwest Regional Power Facility, BPA and EFSEC have appropriately deferred detailed environmental analysis of the natural gas pipeline until an application is filed with the Federal Energy Regulatory Commission (FERC). It is possible, however, to include in the EIS for the Power Facility more information of a general nature regarding natural gas pipeline impacts and mitigation. For example, the FERC has developed standard mitigation plans and procedures for erosion control/restoration and wetland/waterbody construction, which are routinely made a part of the certificate conditions for interstate gas pipelines (copies sent under separate cover to RMI). 1

In addition, the FERC has recently prepared numerous NEPA analyses for natural gas pipeline projects in the West, and has refined its analytical methods and mitigation requirements with each succeeding project. It is possible to more accurately characterize the general range of impacts associated with gas pipeline projects by drawing on this extensive body of information regarding similar projects. A brief summary prepared by PGT is attached. The summary does not imply that all of the impacts would be significant or even present for the NRPF pipeline, nor that the mitigation measures will or should be employed for this project. It does, in our opinion, fairly represent the types of impacts that the FERC is likely to examine, and identifies a reasonable array of mitigation measures that the FERC is likely to select from, according to recent practices. 2

Specific Comments

Page 1-24, Section 1.6.1. The last sentence of the first paragraph should be revised to read "The pipeline project will be constructed and permitted independently of the NRPF." The second sentence of the second paragraph should be revised to read "When an application for the gas pipeline is submitted, FERC will conduct a NEPA review of its potential impacts." The third paragraph inaccurately states that PGT's routing study was "based on" an earlier corridor study. While PGT reviewed the earlier corridor study, the PGT study was not confined to the corridors identified therein, nor did PGT rely upon the earlier study's data or its conclusions. 3

Page 2-23, Section 2.1.3. The first sentence of the first paragraph should be revised to read "An underground gas pipeline to the facility would be built." In the second paragraph, refer to the previous comment regarding the earlier corridor study. 4

Figure 2-12 shows Northwest Pipeline Company's existing transmission line north of Spokane. Because the North Route would involve building another line adjacent to Northwest's existing line, the blue line representing the North Route should be extended to parallel Northwest, to the intersection with PGT's existing line. PGT wishes to reiterate that it does not consider the North Route a feasible alternative deserving of further attention. 5

Page 3-8. The first sentence under *Natural Gas Pipeline* should be revised to read "Five routes for the natural gas pipeline to provide fuel to the NRPF were examined by PGT in its routing study" (i.e.. they have not yet been proposed). See also Page 3-38, first sentence under *Natural Gas Pipeline*. 6

Page 3-13 and 14. PGT suggests that the EIS reference the FERC's "Upland Erosion Control, Revegetation, and Maintenance Plan", which would be a stipulated requirement for any FERC jurisdictional pipeline. Typically, no other erosion control plan would be required unless the detailed analysis identifies a special situation requiring it. Also the reference to automatic emergency shutoff valves should be deleted; these would not be installed. 7

Page 3-42. PGT disagrees that open cutting of streams "will degrade the natural banks and bottoms of streams". As numerous recent pipeline projects have demonstrated, utilizing standard construction and mitigation techniques typically ensures that impacts to stream morphology, water quality or aquatic resources are temporary. This is particularly true for the small, low-velocity streams that would be crossed by the pipeline route. 8

Page 3-43. PGT suggests that the EIS reference the FERC's "Wetland and Waterbody Construction and Mitigation Procedures", which would be a stipulated requirement for any FERC jurisdictional pipeline. Typically, site-specific crossing plans are required only for streams greater than 100 feet in width (none of which occur along the feasible pipeline routes identified by PGT). 9

Page 3-61, first paragraph under *Natural Gas Pipeline*. Only a strip within about 10 feet on either side of the pipeline is kept clear of trees or deep-rooted shrubs. The rest of the right-of-way is not typically cleared as part of normal pipeline maintenance. 10

In the second paragraph, PGT believes that the broad statements regarding habitat loss, displacement and ultimate perishing of wildlife, and reduction in wildlife populations are unwarranted. PGT acknowledges that more information is necessary to fully assess wildlife impacts, but a more accurate general characterization of likely impacts to wildlife is also possible at this stage (see General Comments). 11

Page 3-64, *Natural Gas Pipeline*. See General Comments. 12

Page 3-146, Traditional Cultural Properties. PGT has not consulted with the Spokane or Colville Tribes regarding the natural gas pipeline. PGT would engage in such consultation in conjunction with pre-construction cultural resources investigations for the pipeline. 13

Appendix B. Table 1 in PGT's routing study contains a numerical error in Line Item No. 10 (Number of Sensitive Fish Streams Crossed). A corrected Table 1 is attached. 14

Table 1 - KVA Pipeline Route Comparisons

TOPIC	ROUTE				
	NORTH	MIDDLE 1	MIDDLE 2	MIDDLE 3	SOUTH
1 Miles of Pipe	58.32	68.73	68.73	70.28	63.85
2 Construction Cost ($ million)	46.16	47.00	47.00	47.63	50.53
3 Number of Quaternary Surface Faults within 5 miles	0	0	0	0	0
4 Feet of Potentially Unstable Slopes	12,500	4,400	4,200	2,200	600
5 Feet of Sidehill Construction	6,500	2,400	2,200	2,200	400
6 Miles with Bedrock at or Near the Surface	15.5	13.6	13.6	18.0	41.0
7 Feet of Wetlands Construction	2,300	14,800	18,550	20 650	12,400
8 Number of Perennial Stream Crossings	5	5	5	3	3
9 Number of Ephemeral Stream Crossings	50	58	65	57	38
10 Number of Sensitive Fish Streams Crossed	12	15	13	7	3
11 Miles Above Spokane Acquifer	9.75	0	0	0	0
12 Miles Crossing Sensitive Biological Habitats	18	8	7	15	21
13 Number of Visually Sensitive Locations	6	3	3	3	3
14 Miles of Merchantable Timber	17.70	6.71	6.71	4.46	11.50
15 Miles of Land Use: Residential	14.40	0	0	0	0
16 Miles of Land Use: Agriculture	41.72	68.73	68.73	70.28	63.85
17 Miles of Land Use: Commercial	2.20	0	0	0	0
18 Miles of Public Lands	2.5	0	0	1.0	1.5
19 Number of Property Owners	133	175	174	164	84
20 Number of Residences within 500 feet	193	35	35	41	13
21 Miles Parallel to Existing Linear Facilities	35.30	39.24	34.20	39.90	10.02
22 Number of City or County Road Crossings	60	64	58	63	57
23 Number of State or Federal Highway Crossings	5	6	6	6	5
24 Number of Railroad Crossings	1	7	7	8	5

LETTER "W" RESPONSES

W-1 Comment noted. See General Response #1.

W-2 Comment noted. See General Response #1.

W-3 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

W-4 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

W-5 Comment noted. However, the natural gas pipeline routing study (see Appendix B) shows the north route starting at Creston. Other alternative routes would likely be considered by FERC during the focused environmental review of the potential environmental impacts of the natural gas pipeline.

W-6 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

W-7 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

W-8 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

W-9 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

W-10 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

W-11 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

W-12 Comment noted. See General Response #1.

W-13 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

W-14 Comment noted. Suggested changes made to text. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

LETTER "X"

Public Comments on the DEIS
Taken at public meeting in Creston, Washington
November 15, 1995

Mr. Purvis

1) Expressed concern about the independence of the EFSEC process because it is paid for by the developer. 1

Pete Bean

2) Mr.Bean asked if there is a danger of lightning strike on the powerline igniting the gas pipeline? What about fire risks on the pipelines? There are no access roads in many areas. 2

3) Will the pipeline affect puddles and springs needed by livestock? It would be preferable to do construction in the late winter/fall and early spring. 3

Pete Crow Plumbers & Steamfitters Union - Spokane

4) The union has a lot of experience constructing gas pipelines. The pipelines are safe, and are buried underground. There are a lot of regulations governing construction and operations of pipelines. Livestock grazing can continue over the pipelines. When another pipeline was under construction environmental requirements forced construction to stop, to allow birds to nest. Mr. Crow was pleased to see socioeconomics covered in the DEIS. 4

He asked if construction will have an adverse effect on the town? When a papermill was under construction in Usk, Washington, buses were used to help 800 workers from Spokane to commute to the site. There are plenty of workers in the local area to do the work. Career opportunities will exist in maintenance and possibly construction of the pipelines and the power plants. Tax revenues from this project will be of substantial benefit to Lincoln County. The DEIS handled air and water impacts appropriately. Mr. Crow stated that he wished the siting process could have been more rapid. He believes that the Council has had an open siting process. 5

Joe Bean

5) Expressed concern about possible leaks along the pipeline route. Transmission lines are a possible ignition source. He believes it would be better to route pipelines along Hwy 2 - this would provide better access for fire trucks. Mr. Bean expressed concern about the location of the water line from Creston to the plant. He would prefer to have the water line along a fence line - not in the middle of cultivated ground. Mr. Bean asked about lining storm water ponds - he believes should be lined. Pollutants in the storm water will spread out widely - The applicant responded the ponds won't be year round. The applicant also stated the ponds are not designed to be lined. The storm water returns back into the ground - additional water from the plant is not being added to the 6

stormwater. Mr. Bean noted it is hard to farm an area that has had additional water added to it from a standing water pond.

Jim Hall

6) Expressed concern about Washington Public Power Supply System - Northwest ratepayers are still paying for WPPSS. BC Hydro is a possible source of power for Washington. What is the area the plant is designed to serve? Should Eastern Washington suffer the negative environmental consequences of the plant when there is no need for power here? He asked the Councils DEIS to examine the implications NAFTA on BC-Power. What is the potential amount of electricity available from BC Hydro? Low and high had hydro may be an alternative. This part of DEIS should be expanded (alternative analysis). The gas pipeline will be near the school. Mead School District's new 1800 student high school. It should be rerouted away from the school. The basic question that should be addressed in the EIS is this project really needed? 7

Craig Brougher

7) Pg. I-16: Mr. Brougher requested that the Council require that there are no road closures during harvest season. If there must be road closures, farmers must be notified. He asked if road upgrades will be paid for by KVA? He urged KVA to build a rail head as close to site as possible to transport large equipment for the project. 8

Pg. 2-34: If a new trailer building is needed near Coulee - it should be a permanent building if it will be a permanent structure. Temporary structures should not serve as permanent buildings. 9

Pg. 3-7: He noted that a pre-1900 earthquake in North Cascades did significant damage in this area, and was not discussed in the DEIS. He urged the Council to require a tree buffer around plant 20-50' wide. A deep buffer would be very helpful to mitigate sound from the plant. 10

Fig. 3-8: In the maps on this nearby pages, the DEIS should use consistent colors for designating land use to describe the same land use. Consistency would make the maps easier to follow. 11

In the DEIS in Fig. 3-9: The delineation of National Park Service (NPS) land is somewhat lacking - The NPS does not manage any land on Colville Reservation or Spokane Reservation. 12

Fig. 3-15/16A: He was impressed with visual simulation of the plant and would like more of these visual simulations including other views of the site. 13

Mrs. Bean

8) Expressed concern about noise effects on wildlife and livestock. This should be considered by Council, also the effects of noise from the plant on domestic animals (horses). 14

Mr. Purvis

9) Appendix B - Pg. 9: Summary and conclusions should be written for the lay reader - It is hard for the average person to understand. Shouldn't use word transmission when referring to gas line between segments F & E. The DEIS is not specific enough about where pipeline will go. Would prefer to have a single review process, not a separate process for the pipeline. There should be one EIS for the entire project including the pipeline. 15

Mayor Haydon

10) Distributed a copy of Resolution #94013, supporting this project. He took issue with the testimony of Ecology's witness regarding Creston's water rights. The Mayor believes Ecology's witness improperly characterized town's water rights and the existence of an artesian well in area. There is no artesian well near Creston. This project will be clean and will benefit the county. Something needs to be done to keep young people in Lincoln County. 16

Mr. Purvis

11) Appendix E - PSD Pg. 1 Applicability Form
Benzene is a dangerous waste and known carcinogen - Can it be cleaned up? What will be the effect of benzene down wind from the plant? The DEIS should discuss benzene in more detail. 17

Joe Bean

12) Pg. 124
How did BPA end up working with FERC on pipeline issues? 18

13) Expressed concern about noxious weeds - another right-of-way will add more noxious weeds - farmers shouldn't have to pay to control weeds. 19

Jim Hall

14) Should be a clear road map of the entire review process for the public, so they can participate in all of the review processes. The name of preparers should be on the DEIS. 20

Mr. Purvis

15) DEIS - The intent of SEPA is to precede all governmental action and acts, including hearings (adjudicative). Hearings should have been held after the DEIS was issued. The current process violated intent and letter of law specifically SEPA and NEPA. The process is out of sequence! 21

PUBLIC MEETING RESPONSES

PUBLIC MEETING "X" RESPONSES

X-1 Comment noted.

X-2 The powerline and the natural gas pipeline would not be located in the same corridor. With regard to the natural gas pipeline, please refer to General Response #1.

X-3 See General Response #1.

X-4 Comment noted.

X-5 As stated on page 1-23 (Socioeconomics) of the Draft EIS "Potential socioeconomic impacts include short- and long-term effects on population, housing, employment, and income. In general, socioeconomic impacts are expected to be beneficial because of job creation and increased tax revenue for the affected counties. Potential negative effects are limited to the short-term and are associated with population, employment, and housing from potential in-migration of construction workers. Such negative impacts, however, are expected to be insignificant for a construction project of this size and will be partially offset by planned mitigation measures.".

X-6 See General Response #1.

X-7 Comment noted. Please refer to Section 1.2.3, Applicant's Determination of Purpose and Need, for a more detailed description of the need for additional electricity in the Pacific Northwest Region. With regard to the natural gas pipeline, please refer to General Response #1.

X-8 Comment noted.

X-9 Comment noted.

X-10 Seismicity near the NRPF site is addressed in the Draft EIS, please refer to page 3-7, Local Seismicity. Pine tree plantings would be incorporated into the site design to act as an effective partial screen for the project.

X-11 Comment noted. Suggested changes made to figure. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document.

X-12 Comment noted. Suggested changes made to figure. Please refer to Chapter 2 (Corrections and Modifications to the DEIS) of this document. The location of the Coulee Dam National Recreation Area is shown in more detail on Figure 3-13, page 3-117.

X-13 Comment noted.

X-14 As stated on page 1-15 (Environmental Health and Public Safety) of the Draft EIS "Because of the distance separating the site from existing residences, construction noise would be attenuated and noise impacts are expected to be negligible. Based on the information provided in the application and supporting technical documents, the

proposed facility will not have significant operational noise impacts. The proposed facility would comply with the state noise limits at all of the representative receivers, and is expected to be audible during the night and during some daylight hours depending on the activity at the time. The facility would not exceed existing ambient noise standards at any residences.".

X-15 Comment noted. With regard to the natural gas pipeline, please refer to General Response #1.

X-16 Comment noted.

X-17 Comment noted. The annual average peak project impact of benzene is 400 times smaller than the acceptable source impact level.

X-18 Please refer to General Response #1.

X-19 Mitigation measures have been identified that would control noxious weeds in the transmission line corridor. Please refer to Section 3.1.6.3 (Mitigating Measures) of the Draft EIS (pages 3-62 and 3-63). In addition, Appendix A identifies mitigation options that would control noxious weeds in the natural gas pipeline corridor.

X-20 Comment noted. Section 7 of the Draft EIS provides a list of the Draft EIS preparers.

X-21 Comment noted. However, it is the policy of SEPA to "Integrate the requirements of SEPA with existing agency planning and licensing procedures and practices, so that such procedures run concurrently rather than consecutively." (WAC 197-11-030 (2) (e)).