BUREAU OF INDIAN AFFAIRS

Wind River Agency

Fort Washakie, Wyoming

FINAL ENVIRONMENTAL IMPACT STATEMENT

Wind River Gas Field Development Project, Fremont County, Wyoming

December 2004

FINAL ENVIRONMENTAL IMPACT STATEMENT

WIND RIVER

NATURAL GAS FIELD DEVELOPMENT PROJECT

Prepared for

Bureau of Indian Affairs
Wind River Agency,
Fort Washakie, WY

Prepared by

This Environmental Impact Statement was prepared by *Buys and Associates, Inc.*, an environmental consulting firm, with the guidance, participation, and independent evaluation of the Bureau of Indian Affairs (BIA). The BIA, in accordance with Federal Regulation 40 CFR 1506.5(a) and (b) is in agreement with the findings of the analysis and approves and takes responsibility for the scope and content of this document.

December 2004

MISSION STATEMENT

The Bureau of Indian Affairs' mission is to enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of American Indians, Indian Tribes, and Alaska Natives. We will accomplish this through the delivery of quality services, maintaining government-to-government relationships within the spirit of Indian self-determination.

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United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Wind River Agency
P. O. Box 158
Fort Washakie, Wyoming 82514-015

December 1, 2004

Dear Reader:

This Final Environmental Impact Statement (FEIS) on the proposed Wind River Natural Gas Field Development Project is submitted for your review and comment. This FEIS has been prepared by the Bureau of Indian Affairs (BIA) to analyze the potential impacts of drilling and production operations of natural gas wells and associated access roads, pipelines, and production facilities proposed by Tom Brown, Inc., Samson Resources, and Saba Energy of Texas ("Operators") within the proposed project area located in Fremont County, Wyoming.

This FEIS consists of one volume. Section 1 consists of the Executive Summary. Section 2 contains Addenda and Errata to the Draft EIS (DEIS). Section 3 describes Consultation and Coordination associated with this EIS. Section 4 contains all of the comment letters and verbal testimony received regarding the DEIS. Section 5 contains responses to the comment letters. The FEIS contains seven appendices: Appendix A - Standard "Conditions of Approval" for APDs, Wyoming BLM; Appendix B - Mitigation Measures; Appendix C - Agency Mitigation/Minimization Guidelines; Appendix D - Reclamation Plan; Appendix E - Hazardous Materials Management Plan; Appendix F - Wildlife Monitoring and Protection Plan; Appendix G - Raptor Mitigation and Monitoring Plan; and Appendix G - Biological Assessment and Informal Consultation letters.

The Wind River Project Area (WRPA) encompasses approximately 91,520 acres. The surface ownership of the lands is as follows: 51.4 percent (47,066 acres) is privately owned, 32.2 percent (29,489 acres) consists of the Bureau of Reclamation Withdrawal Area, 15.7 percent (14,409 acres) is owned by members of the Shoshone and Arapaho Tribes, and less than 1 percent (546 acres) is State of Wyoming land. The mineral ownership in the WRPA is 88.4 percent (80,869 acres) tribal and 11.6 percent (10,651 acres) private.

Three action alternatives have been analyzed. Under the Proposed Action, an analysis was conducted of the effects of developing the natural gas resource by drilling 325 new wells at up to 325 locations over the next 20 years and additional infrastructure needed to link the wells with existing roads and pipelines. Alternative A analyzes the effects of developing 485 new wells at up to 485 locations and the necessary infrastructure to link the wells with existing roads and pipelines over the next 20 years. Alternative B analyzes the effects of developing 233 new wells at up to 233 locations and additional infrastructure needed to link the wells with existing roads and pipelines over the next 20 years.

In addition, a No Action Alternative was analyzed. The National Environmental Policy Act (NEPA) requires that a No Action Alternative be evaluated for comparison with the other alternatives analyzed. The No Action Alternative is denial of the drilling and development proposal, as submitted by the Operators. However, drilling of wells would be granted on a case-by-case basis

on private minerals by the Wyoming Oil and Gas Conservation Commission (WOGCC) and on tribal minerals by the BIA, to prevent the drainage of adjacent tribal minerals. A total of 100 wells at up to 100 locations may be drilled under this alternative.

Public comments on this FEIS will be accepted for 30 days following the date the U.S. Environmental Protection Agency publishes the Notice of Availability of this FEIS in the *Federal Register.* The BIA will publish a notification in the Riverton Ranger, Wind River News, and Wyoming State Journal of the availability of the FEIS to all parties wishing to comment on this FEIS and the dates during which comments will be accepted. During this time period, you are welcome to submit written comments. If you wish to submit comments on the FEIS, we request that you make them as specific as possible. Comments will be more helpful if they include suggested changes, sources, or methodologies. Comments that contain only opinions or preferences, will not receive a formal response. However, they will be considered and included as part of the BIA decision-making process.

This FEIS was prepared pursuant to the National Environmental Policy Act and other statutes and regulations, to address possible environmental and socioeconomic impacts which could result from this project. The FEIS is not a decision document. Its purpose is to inform the public of the impacts associated with implementing the Operators' drilling proposal, to evaluate the alternatives to the proposal, and to solicit public comments. The FEIS also provides information for other regulatory agencies to use in making decisions on permits required for implementation of this project.

Freedom of Information Act Considerations: Public comments submitted for this FEIS, including the names and addresses of respondents, will be made available for review at the BIA office in Fort Washakie during regular business hours (8:00 a.m. to 4:30 p.m.), Monday through Friday, except holidays, after the comment period closes. Public comments will be published as part of the Record of Decision subsequent to the comment period for the FEIS. Individual respondents may request confidentiality. If you wish to withhold you name or address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comments. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

Please send written comments to Bureau of Indian Affairs, Wind River Agency, Attn: Mr. Ramon Nation, Deputy Superintendent, Trust Services; PO Box 158; Fort Washakie, Wyoming. Written comments may also be faxed to 307-332-7317. If you have any questions or would like to obtain additional copies of this Final EIS, please contact Ramon Nation at (307) 332-3718 or at the above address.

A copy of the FEIS has been sent to the affected tribal, federal, state, and local government agencies and to those persons who submitted written or oral comments on the scoping notice and DEIS, attended either of the public scoping or DEIS meetings, or who specifically requested to receive a copy of the FEIS.

Hard copies of the FEIS and CDs are available for review by the public at the following locations:

Bureau of Indian Affairs
Wind River Agency
1st and Washakie
Fort Washakie, WY 82514
307-332-3718

Bureau of Land Management
Lander Field Office
1335 Main Street
Lander, WY 82520
307-332-8400

Midvale Irrigation District
305 3rd Street
Pavillion WY, 82523
307-856-6359

Sincerely,

[original signed]

George E. Gover
Superintendent

Wind River
Natural Gas Field Development Project

Fremont County, Wyoming

FINAL ENVIRONMENTAL IMPACT STATEMENT

Lead Agency:
U.S. Department of the Interior, Bureau of Indian Affairs

Cooperating Agencies:
Eastern Shoshone and Northern Arapaho Tribes Joint Business Council, Bureau of Land Management, Board of Fremont County Commissioners

Counties That Could Be Directly Affected:
Fremont County

Abstract:
This Final Environmental Impact Statement (FEIS) analyzes a proposal by Tom Brown, Inc., Saba Energy of Texas, and Samson Resources ("Operators") to drill additional exploratory and development wells within their leased acreage in the Wind River Gas Field Development Area (approximately 91,520 acres) in north-central Wyoming.

The Wind River Project Area (WRPA) is located in Townships 3 and 4 North and Ranges 2 through 5 East in Fremont County, Wyoming approximately 20 miles northwest of Riverton, Wyoming. The WRPA contains five development areas: Pavillion, Muddy Ridge, Sand Mesa, Sand Mesa South, and Coastal Extension. The surface ownership of the project area includes the Eastern Shoshone and Northern Arapaho Tribes (14,409 acres), private non-Indian landowners (47,066 acres), Bureau of Reclamation (29,489 acres), and State of Wyoming (546 acres). The mineral ownership includes the Eastern Shoshone and Northern Arapaho Tribes (80,869 acres) and non-Indian private owners of mineral rights (10,651 acres). Access to the WRPA is by a network of federal and state highways and county roads. Federal and state highways providing access to the WRPA include US 26/789 and Wyoming Highway 133 and 134.

The Proposed Action involves drilling approximately 325 natural gas wells at up to 325 well locations, with a forecasted success rate of 81 percent (263 producing wells) over the next 20-year planning period. These estimates were based on drilling projections and spacing orders within the WRPA, where exploration and development activities would occur. The proposed development is in addition to 178 producing wells within the WRPA. The proposed well sites, access roads, pipelines and ancillary facilities would be permitted by the BIA and BLM for tribal minerals and the Wyoming Oil and Gas Conservation Commission (WOGCC) for private minerals. Facilities located on private surface would be permitted with the surface landowner. The exact number of wells and timing of drilling associated with the proposed natural gas development project would be directed by the success of exploration and development drilling and technical and economic feasibility.

This EIS analyzes the impacts of the Proposed Action (325 new wells), Alternative A (485 new wells), Alternative B (233 new wells), and Alternative C (No Action). The EIS describes the resource elements that may be affected by the Proposed Action and alternatives, which includes geological, mineral, and paleontological resources; soil resources; climate and air quality; surface water and groundwater resources; vegetation and wetland resources; land use; wildlife resources; threatened, endangered, and state-sensitive species; recreational resources; cultural resources; and visual resources. It also discusses socioeconomics, environmental justice, transportation, health and safety, and noise and addresses issues and concerns raised during public scoping and by comments on the Draft EIS.

The direct and indirect impacts from the Proposed Action vary with the resource element analyzed. "Moderate, short-term" direct and indirect impacts that may occur from the Proposed Action include reduction in visibility, increased runoff and erosion and other water quality effects, reduction in night sky quality, and increased noise from construction and drilling operations.

Direct and indirect impacts to vegetation and wildlife from the Proposed Action that range from minor to moderate and short- to long term (depending on the species), include loss of vegetation, displacement of wildlife, loss of wildlife habitats, noise from human activities and equipment, and changes in wildlife behavior. The potential impacts of the Proposed Action to threatened and endangered species that may be present within the WRPA are "*not likely to adversely affect*" the listed species.

Direct and indirect impacts from the Proposed Action that may be "moderate and long term" include impacts to agricultural lands and residential properties, visual impacts (alternation of landscape character, reduction in scenic quality), split-estate conflicts, change in rural character, noise from additional compressor stations, and increased traffic and maintenance demand on county roads. "Moderate to major" long-term beneficial impacts from the Proposed Action include increased regional economic output, employment, personal income, revenues to the Eastern Shoshone and Northern Arapaho Tribes, and revenues to Fremont County taxing entities.

Cumulative adverse impacts from the proposed development, when combined with past, present, and reasonably foreseeable future activities, are anticipated to range from negligible to moderate, depending on the resource element analyzed. Cumulative beneficial economic effects are expected to be "major."

Other Environmental Review or Consultation Requirements

In compliance with Section 7 (c) of the Endangered Species Act (as amended), this EIS includes a Biological Assessment prepared for the purpose of identifying any endangered or threatened species which are likely to be affected by the Proposed Action. An informal consultation with the USFWS was requested by the BIA. The US FWS responded with a letter the concurred with the determination that the proposed gas field development project is "*not likely to adversely affect*" the listed bald eagle, black-footed ferret, grizzly bear, and gray wolf, and has "*no effect*" on the Canada lynx.

Lead Agency Contact:

For further information, contact Mr. Ramon Nation, Deputy Superintendent, Trust Services, BIA, Wind River Agency, Fort Washakie, Wyoming at 307-332-3718.

Comments on this Final EIS should be submitted in writing to:

Mr. Ramon A. Nation
Bureau of Indian Affairs
Wind River Agency
P.O. Box 158
Fort Washakie, WY 82514

Comments must be received at the above address within 30 days following publication of the EPA Notice of Availability of the FEIS in the *Federal Register*. Notice of the 30-day comment period will also be published in the local newspapers.

PREFACE

The purpose of this Final Environmental Impact Statement (EIS) for the Wind River Gas Field Development Project is to supplement the Draft EIS, which was published in July 2004. Reviewed together, the Draft and Final EIS documents incorporate the description of the Proposed Action, other alternatives including the "No Action" alternative, the affected environment, as well as the analyses of potential environmental consequences resulting from construction, operation, and abandonment of the proposed project. This Final EIS should not be considered as a decision document. This FEIS is organized into five sections:

- Section 1, *Executive Summary* - Information presented in this section describes the NEPA process utilized in the analysis, briefly describes the Proposed Action and alternatives, provides a summary of the resource elements analyzed and a summary of direct, indirect, and cumulative effects, and describes the agency-preferred alternative.

- Section 2, *Addenda and Errata* - Provides revisions to the Draft EIS that address comments received from the public on the draft EIS during the public comment period, and comments from internal BIA and Cooperating Agency review.

- Section 3, *Consultation and Coordination* - Summarizes the consultation and coordination that occurred during the preparation of the Wind River Gas Field Development EIS and background information regarding the consultation and coordination process.

- Section 4, *Comment Letters Received on the Draft EIS* - Provides a copy of the comment letters and transcript of oral comments received during the public comment period on the draft EIS.

- Section 5, *Response to Comments* - Provides BIA's responses to those comments provided in Section 4.

- Appendices provided in the FEIS include Conditions of Approval for APDs; Mitigation Measures; Agency Mitigation Guidelines; Reclamation Plan; Hazardous Materials Management Plan; Wildlife Monitoring and Protection Plan; Raptor Mitigation and Monitoring Plan; and the Biological Assessment and Informal Consultation Letters.

In response to comments received concerning air quality impacts with implementation of the Wind River Natural Gas Field Development Project and other projects, the BIA revised the air quality sections of the draft EIS. Changes to the air quality sections are provided in Section 2, Addenda and Errata of this FEIS. Revised environmental consequences sections for vegetation (4.6), wildlife (4.8) and threatened and endangered species (4.9) are also included in Section 2 of this FEIS.

The draft and final EIS documents have been prepared in accordance with the requirements of the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality's regulations for implementing NEPA, effective July 30, 1979.

The analyses were based on a proposed schedule and maximum assumed level of development contained in the draft EIS. As the project is implemented, the actual impacts will be evaluated to determine if they fall within the parameters discussed in the draft and final EIS documents. Any major change in project design would require additional environmental analyses.

SECTION 1: EXECUTIVE SUMMARY

1.0 INTRODUCTION

This Final Environmental Impact Statement (FEIS) analyzes the impacts of construction, drilling and production operations from the Wind River Natural Gas Field Development Project in north-central Wyoming. The Wind River Project Area (WRPA) is located in Townships 3 through 4 North and Ranges 2 through 5 East in Fremont County, Wyoming, approximately 20 miles northwest of Riverton, Wyoming (see Figure 1-1). The WRPA contains five development areas: Pavillion, Muddy Ridge, Sand Mesa, Sand Mesa South, and Coastal Extension, and encompasses approximately 91,520 acres of federal, tribal, private, and state lands. Of this total approximately 47,066 surface acres are privately owned, 29,489 surface acres are Bureau of Reclamation lands, 14,409 surface acres are owned by the United States in trust for the Eastern Shoshone and Northern Arapaho Tribes, 546 surface acres are owned by the State of Wyoming, and 10 acres of water bodies belonging to tribal, federal or state governments. The mineral ownership is divided into tribal and private ownership, with approximately 80,869 acres belonging to the United States in trust for the Eastern Shoshone and Northern Arapaho Tribes and 10,651 acres belonging to private owners. Since many of the surface landowners do not have mineral rights to their property (referred to as “split estate”), this issue is also addressed in the FEIS.

This FEIS has been prepared pursuant to the National Environmental Policy Act (NEPA) and addresses three action alternatives, the Proposed Action, Alternative A, and Alternative B, and a “No Action” alternative, as required by NEPA. Details on the Proposed Action and alternatives are described in the Draft Environmental Impact Statement (DEIS) in the following six chapters:

Chapter 1, **Purpose and Need** of the proposed Wind River Gas Field Development Project, discusses the purpose and need for the proposed project, the environmental analysis process, the relationship of the project to existing policies, plans and programs, actions that authorize the proposed project, and identifies the issues raised during the scoping process.

Chapter 2 discusses the **Proposed Action and Alternatives**. It describes the alternative selection process, the three action alternatives and the No Action alternative, alternatives that were considered but eliminated from detailed study, the plan of operations, mitigation measures, and summarizes the environmental impacts of the Proposed Action and alternatives.

Chapter 3, **Affected Environment**, discusses the resource elements that would be affected by the Proposed Action and alternatives. The resources described include geological and mineral resources, paleontological resources, soil resources, climate and air quality, surface water and groundwater resources, vegetation and wetlands, wildlife, threatened and endangered species, recreational resources, cultural resources, and visual resources. This chapter also discusses land use, socioeconomics, environmental justice, transportation, health and safety, and noise.

Chapter 4 examines the potential **Environmental Consequences** (i.e., direct and indirect impacts) of the Proposed Action and alternatives on each of the resources mentioned above. This chapter discusses the direct and indirect impacts to the resources present within the WRPA resulting from the Proposed Action, Alternative A, Alternative B, and the No Action Alternative. It also discusses mitigation measures that may be considered in addition to those listed in Chapter 2 and residual (long-term) impacts from the proposed gas development project.

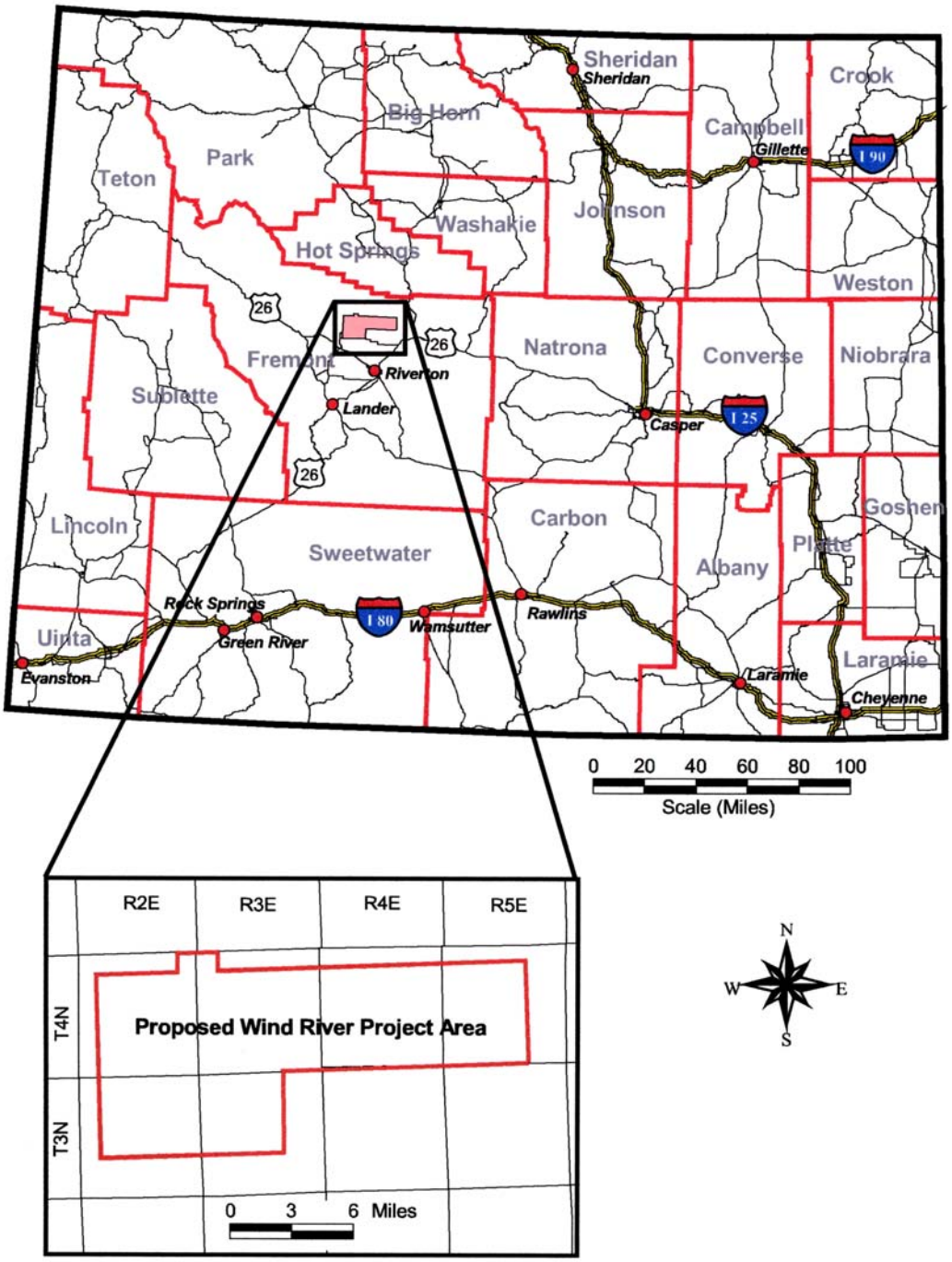

Figure 1-1. Location of Wind River Gas Development Project Area in Central Wyoming.

Chapter 5 discusses the **Cumulative Impacts** of the Proposed Action and alternatives on the human environment, which result from the incremental impact of current development, other past, present, and reasonably foreseeable future actions (RFFA) in the WRPA and the cumulative impact analysis area. The area evaluated for cumulative impacts varies with each resource, as discussed in Chapter 5.

Chapter 6 summarizes **Consultation and Coordination** with the public, including private landowners, Eastern Shoshone and Northern Arapaho Tribes, Bureau of Indian Affairs, and other federal, state, county, and local agencies potentially affected by the Proposed Action and alternatives. It also provides a listing of the parties that participated in the scoping process.

2.0 MANAGEMENT OF THE WRPA

Approximately 51 percent of the surface area of the WRPA is private, 32 percent is managed by the Bureau of Reclamation, 16 percent is tribal, and less than one percent is managed by the State of Wyoming. The land use plan applicable to the WRPA is the BIA Environmental Assessment on land management activities within the Wind River Indian Reservation (WRIR) "Environmental Assessment of the Land Management Activities Proposed by Land Operations, and Wind River Agency" (BIA 1984). The Eastern Shoshone and Northern Arapaho Tribes have prepared a zoning code, which covers the entire WRIR. The existing Fremont County Land Use Plan (1978) and draft Fremont County Land Use Plan (Fremont County 2001) were also reviewed for this EIS. The Tribes are in the process of completing a comprehensive land use plan, which is expected to be available within the next few months.

3.0 EXISTING DEVELOPMENT

Oil and natural gas exploration and production activities have been conducted within the WRPA since 1960. The WRPA currently contains 178 producing wells, with accompanying production related facilities, roads, and pipelines. Within the WRPA, total gas compression and treatment capacity is approximately 14,600 horsepower (hp). The residual disturbance from the existing wells is approximately 410.5 acres. This disturbance is approximately 0.45 percent of the WPRA and 0.79 percent of the three existing fields, Pavillion, Muddy Ridge, and Sand Mesa.

4.0 SCOPE OF ANALYSIS

The purpose of the scoping process, as stipulated (40 CFR, Parts 1500-1508), is to identify important issues, concerns, and potential impacts that require analysis in the EIS and to eliminate insignificant issues and alternatives from detailed analysis. Public participation, consultation, and coordination have occurred throughout the planning process for this EIS through *Federal Register* notices, press releases, scoping meetings, individual contacts, and informal consultation. Contact dates and actions taken by BIA are summarized in Chapter 6 - Consultation and Coordination of the DEIS. All information received during the scoping process is available for review at the BIA's office in Ft. Washakie.

Also, during preparation of the DEIS, the BIA, Cooperating Agencies (Bureau of Land Management, Fremont County, and Shoshone and Arapaho Tribes), and consultant Interdisciplinary Team (IDT) have communicated with, and received input from various federal, state, county, and local agencies, elected representatives, environmental and citizen groups, industries, and individuals concerned with issues associated with the proposed drilling program.

5.0 PROPOSED ACTION AND ALTERNATIVES

This FEIS addresses the Proposed Action and two additional action alternatives, and a No Action Alternative. These alternatives are summarized below and addressed in greater detail in the Draft EIS.

5.1 PROPOSED ACTION – 325 NEW GAS WELLS

The Operators (Tom Brown, Inc., Samson Resources Company, and Saba Energy of Texas, as Operator of Record) have indicated that approximately 325 wells at up to 325 well locations, with a forecasted success rate of 81 percent (263 producing wells), may be drilled in the WRPA. This is in addition to 178 producing wells in the WRPA. The total number of wells and the timing of drilling operations are difficult to predict, due to the limited amount of natural gas exploration in the Sand Mesa, Sand Mesa South, and Coastal Extension development areas, and the geological complexities in the WRPA. Development in the WRPA is estimated to begin in early 2005 [subsequent to the publication of the Record of Decision (ROD)] and continue for approximately 20 years, with a life-of-project (LOP) of 20-40 years. Various associated facilities (e.g., roads, pipelines, water wells, disposal wells, evaporation ponds, and compressor stations) would also be constructed throughout the WRPA.

The total new short-term surface disturbance resulting from the Proposed Action would be approximately 1,982 acres (2.15 percent of the WRPA). A maximum of 1,164.1 acres of new surface disturbance would be from well pads and facilities, including on-site gathering, measurement, and dehydration facilities; 49 miles (183.8 acres) of surface disturbance from new roads or upgrades of existing roads; 140 miles (597.2 acres) of surface disturbance from new pipelines; and approximately 36.9 acres of new surface disturbance from ancillary facilities including disposal wells, treatment/separation facilities and five new compressor stations with a total capacity of 32,800 hp. New pipelines and processing facilities would be placed, where possible, adjacent to existing roads and outside of irrigated fields. While the short-term disturbance is a small percent of the total WRPA, these changes would be concentrated within the five development areas, increasing the percent of disturbed lands in those areas to 5.23 percent.

Although a total of 1,982 acres of short-term disturbance would result from the Proposed Action, a smaller area would be disturbed at any one time, since development will be phased (i.e., development would occur over a number of years). Directional drilling may be used under the following circumstances: 1) presence of topographic features where vertical drilling would not be technically feasible, 2) areas of high cultural/archaeological concern, 3) areas where drilling would result in a high potential for impact (e.g., “take”) to threatened, endangered and state-sensitive species and relocation of the well would not be feasible, and 4) considerations of health, safety, and environment associated with occupied residences.

Reclamation of the disturbed land would begin as soon as drilling and construction have been completed for a single well and associated facilities Pipeline ROWs would be reclaimed as soon as practicable after the completion of the pipeline construction, and well pads of dry holes would be plugged and abandoned and reclaimed. Pipeline ROWs in irrigated fields would be completely reclaimed for agricultural use. Wells reaching ultimate recovery would be plugged and abandoned when production ceases. During the LOP total surface disturbance would be reduced to 422.7 acres, assuming an 81 percent success rate. This disturbance is approximately 0.46 percent of the WRPA or 1.11 percent of the five development areas (acreage of the five development areas is 37,936). Voluntary mitigation has been implemented

by the Operators in the existing development areas and would be implemented under the Proposed Action to further reduce impacts.

The Proposed Action would have major beneficial effects on revenues received by the Eastern Shoshone and Northern Arapaho Tribes, major beneficial effects on personal income and moderate beneficial effects on regional economic output and employment. The Proposed Action would also have moderate beneficial effects on revenues for certain Fremont County taxing entities. With respect to environmental impacts, the Proposed Action would have negligible to moderate and short-to long-term adverse impacts on the natural resources in the area of the proposed gas development. The affected resources include air; soil; surface and groundwater; vegetation and wetlands; fish and wildlife; threatened, endangered and state-sensitive species; land use; and recreation. The impacts would vary by the resource analyzed.

5.2 ALTERNATIVE A - 485 NEW GAS WELLS

The demand for natural gas is projected to increase during the life of the proposed development project. If increases in gas prices occur, those areas in the WRPA that are currently considered marginal for exploration and development, from an economic standpoint, may become economically feasible to develop in the future. Implementation of this alternative would increase revenues to the tribes and private mineral owners, and to the tribal, federal, and state taxing entities in both magnitude and duration.

In order to accomplish this objective, the Operators have indicated that approximately 485 wells at up to 485 well locations, with a forecasted success rate of 76 percent (369 producing wells), may be drilled in the WRPA. This is in addition to 178 producing wells in the WRPA.

Development would begin within the WRPA in early 2005 [subsequent to the publication of the Record of Decision (ROD)] and continue for approximately 20 years, with a life-of-project (LOP) greater than 40 years. Various associated facilities (e.g., roads, pipelines, water wells, disposal wells, evaporation ponds, compressor stations, and gas processing facilities) would also be constructed throughout the WRPA.

The total new short-term surface disturbance resulting from Alternative A would be 2,818.7 acres (approximately 3.06 percent of the WRPA or 7.43 percent of the five development areas). A maximum of 1,813.3 acres of new surface disturbance would be from well locations (including on-site gathering, measurement, and dehydration facilities); 73 miles (278.3 acres) of new surface disturbance would be from new roads or upgrades of existing roads; 171 miles (673.6 acres) of surface disturbance would be from new pipelines; and approximately 53.5 acres of new surface disturbance would be from ancillary facilities, including disposal wells, treatment/separation plants, and five new compressor stations with a total capacity of 46,000hp. New pipelines and processing facilities would be placed, where possible, adjacent to existing roads and outside of the irrigated fields. Although, a total of 2,818.7 acres of short-term surface disturbance would result from Alternative A, a smaller area would be disturbed at any one time, since development would occur over a number of years. Directional drilling may be utilized in the WRPA under certain circumstances, as described for the Proposed Action.

Reclamation of the disturbed land would begin as soon as drilling and construction have been completed at a well. Pipeline ROWs would be reclaimed as soon as practicable after the completion of the pipeline construction, and well pads of dry holes would be plugged and abandoned and reclaimed. Pipeline ROWs in irrigated fields would be completely reclaimed for agricultural use. Wells reaching ultimate recovery would be plugged and abandoned when

production ceased. Thus, as new wells are drilled, other areas are being reclaimed. Total residual disturbance for Alternative A would be 611.6 acres. This is approximately 0.67 percent of the WRPA or 1.61 percent of the five development areas. Voluntary mitigation has been implemented by the Operators in the existing development areas, and will be implemented under Alternative A to further reduce impacts.

Alternative A would have major beneficial effects on revenues received by the Eastern Shoshone and Northern Arapaho Tribes, major beneficial effects on personal income and moderate beneficial effects on regional economic output and employment. Alternative A would also have moderate beneficial effects on revenues for certain Fremont County taxing entities.

With respect to environmental impacts, Alternative A would have greater adverse impacts on the natural resources in the area of the proposed gas development than the Proposed Action. The affected resources include air; soil; surface and groundwater; vegetation and wetlands; fish and wildlife; threatened, endangered and state-sensitive species; land use; and recreation. The impacts would vary by the resource analyzed.

5.3 ALTERNATIVE B – 233 NEW GAS WELLS AT 233 LOCATIONS

Several respondents to the scoping notice expressed concern about potential environmental impacts resulting from the Proposed Action. Alternative B was developed in part to address those environmental concerns, including impacts on air quality, water quality, wildlife, threatened and endangered species, wetlands, and the Sand Mesa Wildlife Habitat Management Area. The implementation of Alternative B would decrease the amount of proposed development and potential environmental impacts; however, royalty revenues to the Tribes, tribal members and private mineral owners, surface use payments, and taxes revenues would also be reduced. In addition, mineral resource conservation would be jeopardized and may prevent ultimate development of recoverable reserves.

In order to accomplish this objective, the Operators have indicated that approximately 233 wells at up to 233 well locations, with a forecasted success rate of 78 percent (182 producing wells), may be drilled in the WRPA. This is in addition to 178 producing wells in the WRPA. Development would begin in late 2004 [subsequent to the publication of the Record of Decision (ROD)] within the WRPA and continue for approximately 20 years, with a life-of-project (LOP) of 20-40 years. Various associated facilities (e.g., roads, pipelines, power lines, water wells, disposal wells, evaporation ponds, compressor station) would also be constructed throughout the WRPA.

The total new short-term surface disturbance resulting from Alternative B would be 1,609.6 acres (approximately 1.75 percent of the WRPA or 4.24 percent of the five development areas). A maximum of 880 acres of new surface disturbance would result from 233 well locations (including on-site gathering, measurement, and dehydration facilities); 35 miles (137.9 acres) of surface disturbance would result from new roads or upgrades of existing roads, 123 miles (568.7 acres) of new surface disturbance would result from pipelines; and approximately 23 acres of new surface disturbance would be from ancillary facilities, including disposal wells, treatment/separation plants, and five new compressor stations with a total capacity of 22,700hp. Although, a total of 1,609.6 acres of short-term disturbance would result from Alternative B, a smaller area would be disturbed at any one time, since development would occur over a number of years. Directional drilling may be used in the WRPA under certain circumstances, as described under the Proposed Action.

Reclamation of the disturbed land would begin as soon as drilling and construction have been completed for a well and associated facilities. Pipeline ROWs would be reclaimed as soon as practicable after the completion of the pipeline construction, and well pads of dry holes would be plugged and abandoned and reclaimed. Pipeline ROWs in irrigated fields would be completely reclaimed for agricultural use. Wells reaching ultimate recovery would also be plugged and abandoned when production ceased. Thus, as new wells are drilled, other areas are being reclaimed. Total surface disturbance would be reduced to 325.1 acres (assuming a 78 percent drilling success rate). This is approximately 0.35 percent of the WRPA or 0.86 percent of the five development areas. Voluntary mitigation has been implemented by the Operators in the existing development areas, and would be implemented under Alternative B to further reduce impacts.

Alternative B would have moderate beneficial effects on revenues received by the Eastern Shoshone and Northern Arapaho Tribes, major beneficial effects on personal income and moderate beneficial effects on regional economic output and employment, Alternative B would also have minor beneficial effects on revenues for certain Fremont County taxing entities. With respect to environmental impacts, Alternative B would have smaller adverse impacts on the natural resources in the area of the proposed gas development than the Proposed Action. The affected resources include air; soil; surface and groundwater; vegetation and wetlands; fish and wildlife; threatened, endangered and state-sensitive species; land use; and recreation. The impacts would vary by the resource analyzed.

5.4 ALTERNATIVE C - NO ACTION

NEPA and its implementing regulations (43 CFR 1502.14(d)) require that the alternatives analysis in the EIS "include the alternative of no action." For this analysis, the No Action Alternative is denial of the drilling and development proposal, as submitted by the Operators. However, the Department of the Interior's (DOI's) authority to implement a No Action Alternative that denies a Tribe the right to develop its minerals or a tribal oil and gas lessee the right to drill is limited. The United States has trust obligations regarding development of the Tribes' mineral resources. A typical tribal oil and gas lease "grants, leases, and lets exclusively unto Lessee for the purposes of investigating, exploring, prospecting, drilling, mining for, and producing Oil and Gas, including all associated hydrocarbons produced in liquid or gaseous form, laying pipe lines, building roads, tanks, power stations, telephone lines, and other structures thereon to produce, save, take care of, treat, transport, market, and own such products, and performing any required Reclamation Activities" subject to the terms of the lease (Tribal Standard Form Lease). Because the Secretary of the Interior has the authority and responsibility to protect the environment with tribal oil and gas leases, restrictions (e.g., No Surface Occupancy) may be imposed on the lessee. However, the DOI is not empowered to deny all drilling based on environmental concerns. Approval of an individual Application for Permit to Drill (APD) could be denied only when the activity would constitute a violation of laws or regulations (e.g. the Endangered Species Act). Otherwise, denial of all drilling could only result from congressional action authorizing exchange, condemnation, or buy-back of the subject lease.

The No-Action Alternative would allow wells to be developed on fee minerals [through individual Application for Permit to Drill (APDs) on a case-by-case basis], and on tribal minerals to offset potential drainage of adjacent tribal minerals. The Operators estimate that under a No Action Alternative 64 wells would be drilled in Pavillion on fee minerals and 36 wells in Pavillion on tribal minerals to offset drainage of tribal minerals, for a total of 100 new wells. Some sections within the Pavillion field are under "Communitization Agreements," in which the tribes and private mineral owners share in the royalties, based on the percent of mineral holdings within

that section. No development would occur in the Muddy Ridge, Sand Mesa, Sand Mesa South, or Coastal Extension fields under this alternative. Road and pipeline construction disturbance per well site associated with the No Action Alternative would be similar to the Proposed Action.

The No Action Alternative would result in approximately 316.6 acres of total new short-term surface disturbance in the Pavillion field from well locations, new roads or upgrades of existing roads, production facilities, new pipelines, and one additional compressor station with a capacity of 3,200 hp. A smaller area of disturbance would occur at any one time, since development would occur over a number of years.

Reclamation of the disturbed land would begin as soon as drilling and construction have been completed for a well and associated facilities. Pipeline ROWs would be reclaimed as soon as practicable after the completion of the pipeline construction, and well pads of dry holes would be plugged and abandoned and reclaimed. Wells reaching the ultimate recovery would also be plugged and abandoned. Thus, as new wells are drilled, other areas are being reclaimed. The total surface disturbance would be reduced to 79.3 acres following reclamation. The disturbance would be approximately 0.09 percent of the WRPA or 0.67 percent of the Pavillion field. Voluntary mitigation has been implemented by the Operators under the existing development, and will be undertaken in the No-Action Alternative to further reduce short-term and residual impacts.

This Alternative would have minor beneficial effects on revenues received by the Eastern Shoshone and Northern Arapaho Tribes, minor beneficial effects on personal income and minor beneficial effects on regional economic output and employment, Alternative C would also have minor beneficial effects on revenues for certain Fremont County taxing entities. With respect to environmental impacts, Alternative C would have the lowest level of adverse impacts on the natural resources in the area of the proposed gas development. The affected resources include air; soil; surface and groundwater; vegetation and wetlands; fish and wildlife; threatened, endangered and state-sensitive species; land use; and recreation. The impacts would vary by the resource analyzed.

6.0 SUMMARY OF DIRECT AND INDIRECT IMPACTS

A total of 15 resource elements are analyzed in this EIS. They include geological, mineral, and paleontological resources; soil resources; air quality; surface water and groundwater resources; vegetation and wetlands, land use; wildlife, threatened and endangered species; recreation; visual resources; cultural resources; socioeconomics; transportation; health and safety; and noise. The potential direct and indirect impacts from the Proposed Action and alternatives are summarized in Table 1-1 and discussed below for each resource element.

6.1 GEOLOGY/MINERAL RESOURCES/PALEONTOLOGY

Impacts to geological resources would include increased surface runoff; increased surface erosion; collapse, piping and gullying; and initiation of mass movements. These impacts would generally be minor and short term for the Proposed Action, Alternative B, and Alternative C, and moderate and short term for Alternative A.

Impacts to mineral resources could range from negligible to major. Depletion of petroleum reserves would result in major and permanent impacts from all alternatives. However, the impacts of the Proposed Action, Alternative A, Alternative B, and Alternative C on development of non-petroleum resources (e.g., gravel mining) would be negligible.

Impacts to paleontological resources would be both beneficial and adverse. Adverse impacts would include damage to fossils, increased vandalism, and increased illegal collection. The impacts for Alternatives A, B, and C would be minor and short or long term. On the other hand, disturbance from construction activities could result in the discovery of new fossils. The benefits of fossil discoveries would be minor and long term for the Proposed Action, Alternative B, and Alternative C; they would be moderate and long term for Alternative A (see Table 1-1).

6.2 SOILS

Construction and drilling operations under the Proposed Action would disturb approximately 1,982 acres of soil, which would comprise 2.15 percent of the WRPA. Combined with the existing disturbance of 410.5 acres the total disturbance would be approximately 2,392.5 acres or 2.60 percent of the WRPA. Over the life of the project the disturbance from the Proposed Action would be reduced to 422.7 acres or 0.46 percent of the WRPA. This residual disturbance, when combined with the 410.5 acres of disturbance from existing development, would be 833.2 acres or 0.91 percent of the WRPA.

Under Alternative A, a total of 2,818.7 acres or 3.06 percent of soil in the WRPA would be disturbed. When combined with the existing disturbance the total disturbance to the soil would be 3,229.2 acres of 3.51 percent of the WRPA. Over the life of Alternative A, impacts to soil would be reduced to 611.9 acres or 0.67 percent. When combined with the existing disturbance the total residual disturbance would be 1,022.4 acres or 1.11 percent of the WRPA.

Under Alternative B, a total of 1,609.6 acres or 1.75 percent of soil in the WRPA would be disturbed. When combined with the existing disturbance, the total disturbance would be 2,020.1 acres or 2.20 percent. After reclamation, the residual disturbance would be 325.1 acres or 0.35 percent. When combined with the existing disturbance, the total residual impact would be 735.6 acres or 0.80 percent of the WRPA.

Alternative C, the No Action Alternative, would result in soil disturbance of 316.6 acres or 0.34 percent. When combined with the existing soil disturbance the total impact would be 727.1 acres or 0.79 percent. Residual disturbance from Alternative C to soil would be 79.3 acres. The total residual disturbance, when combined with the existing disturbance, would increase to 489.8 acres or 0.53 percent of the WRPA.

The impacts to soil resulting from construction of access roads, facilities, pipeline ROWs, and well pads and drilling and completion operations, could include soil exposure from vegetation removal; compaction and decreased permeability; collapse, piping and gullying; and increased susceptibility of soil to wind and water erosion. Under the Proposed Action, Alternative B, and Alternative C, these impacts would be minor and short term. Under Alternative A, impacts from exposure of soil from vegetation removal and increased susceptibility of soil to wind and water erosion would be moderate and short term.

6.3 AIR QUALITY

Comprehensive air quality monitoring has not been conducted within the WRPA, however air quality in the surrounding area is relatively good. Background pollutant concentrations recorded in the region are less than the National and Wyoming ambient air quality standards.

As an unavoidable result of various project-related activities, additional pollutants would be emitted to the atmosphere. Potential sources of emissions would include fugitive dust and

vehicle exhaust from construction activities, exhaust from drill rig engines, and exhaust emissions related to well operations and gas compression. These project-related emissions have the potential to affect air quality on both a local and a regional scale. The magnitude of the potential impacts would vary proportionally with the number of wells ultimately developed under each alternative and the rate of development. The greatest impacts would occur with the implementation of Alternative A. Proportionally lower impacts would occur with the implementation of the Proposed Action or Alternative B. Air quality impacts would be minimized with the implementation of Alternative C. Increases in pollutant concentrations are not predicted to exceed the ambient air quality standards or PSD increments.

With the implementation of the Proposed Action or Alternatives A or B, minor long-term increases in terrestrial nitrogen deposition are predicted to occur. The nitrogen impacts would exceed the incremental Depositional Analysis Thresholds (DAT) in two areas of special concern; Wind River Canyon and the Owl Creek Range. However, total nitrogen deposition rates would remain within acceptable ranges. Nitrogen deposition impacts that may occur upon implementation of Alternative C would be negligible, as predicted impacts are substantially less than the DAT. No substantial sulfur deposition impacts are predicted to occur as a result of the implementation of the Proposed Action or Alternatives. The atmospheric deposition of nitrogen and sulfur compounds upon aquatic water bodies is not predicted to impact the acid neutralizing (ANC) capacity of special concern lakes. Predicted ANC impacts are substantially less than the levels of concern.

Implementation of the Proposed Action or Alternatives would cause incremental increases in hazardous air pollutant concentrations. The increased concentrations would be long term, lasting the life of the project. For all project alternatives, the acute and chronic non-cancerous health effects would be negligible. With the implementation of the Proposed Action or Alternative A, minor increases in cancer risk are predicted to occur. The predicted incremental cancer risks would range from 1 to 2 incidents per million exposures. However, the predicted incremental cancer risks would occur only within relatively small areas. Should Alternatives B or C be implemented, the incremental cancer risk would be negligible.

Moderate visibility impacts are predicted to occur at the Wind River Canyon and the Owl Creek Range with the implementation of the Proposed Action or Alternative A. These impacts would be short term, existing for the duration of the project construction activities. Upon the completion of the construction phase of the project, visibility impacts at Wind River Canyon and Owl Creek Range would be reduced to minor levels. Minor short-term visibility impacts are predicted to occur at Wind River Canyon and the Owl Creek range upon implementation of Alternative B. No discernable visibility impacts would occur with the implementation of Alternative C.

6.4 WATER RESOURCES

The major surface water drainages within the WRPA include Fivemile Creek, Muddy Creek, Cottonwood Drain, and Cottonwood Creek. These waterways discharge into Boysen Reservoir, which is located on the Wind River. A large portion of the WRPA lies within the Riverton Reclamation Withdrawal Area, which consists of numerous irrigation canals, laterals, and drains. Other surface water bodies within the WRPA include Middle Depression Reservoir, Upper Depression Reservoir, and a small portion of Boysen Reservoir.

Impacts to surface water resulting from the Proposed Action and alternatives could include disruption of surface drainage systems, increased runoff and erosion, change in surface water

networks, increase in suspended solids (turbidity), reduction in peak flows, increased sedimentation in lakes and reservoirs, and change in water quality. Disruption of surface drainage systems, increased runoff and erosion, change in surface water networks, and increased turbidity under the Proposed Action and Alternative A would result in moderate, short-term impacts. Reduction in peak flows would result in minor long-term impacts to water quality. Under Alternatives B or C the impacts to surface water would be negligible.

Groundwater beneath the WRPA is contained primarily within unconsolidated Quaternary deposits of sand and gravel. Groundwater also occurs within the deeper Mesozoic, Paleozoic, and Precambrian rocks. Impacts to groundwater from implementation of either the Proposed Action or alternatives could result in decrease in water levels, change in water quality and change in hydraulic properties. These impacts would be negligible under all alternatives.

6.5 VEGETATION AND WETLANDS

Native mixed-grass prairie, greasewood and saltbush fans and flats, and riparian shrub, interspersed with larger expanses of big Wyoming sagebrush and desert-shrub vegetation occur throughout the WRPA. Fragmentation of this native vegetation has occurred from conversion to crops, roads, and overgrazing by livestock. Irrigation diversions, storage, structures, and drains within the WRPA have affected upland habitats. These past vegetative disturbances have encouraged the spread of invasive grasses and noxious weeds throughout the area.

Impacts to upland vegetation from the Proposed Action and Alternatives A, B, and C would include vegetation removal resulting from construction and drilling activity, reduction in species diversity, and increase in noxious weeds and nuisance species. With the implementation of Operator-committed and agency-required mitigation measures, loss of vegetation would be minor and short- to long term (depending on the species) under the Proposed Action, Alternative B and Alternative C; Alternative A would result in minor to moderate, short- to-long term impacts. Reduction in species diversity, and increase in noxious weeds and nuisance species would be minor and long term under the Proposed Action and Alternative B and C, while Alternative A would result in moderate, long-term impacts.

The Proposed Action and Alternatives A, B, and C would result in minor, long-term loss of wetlands and reduction in wetland species diversity. The loss of riparian areas would be negligible and long term with the implementation of Operator-committed mitigation measures. Exposure to contaminants from accidental spills would result in negligible to minor, short-term impacts.

6.6 LAND USE

Land use plans that cover the WRPA include the "*Environmental Assessment of Land Management Activities Proposed by Land Operations*" (BIA 1984). The Shoshone and Arapaho Tribes have prepared a zoning code, which covers the entire Reservation. The Tribes are in the process of completing a comprehensive land use plan. Fremont County has an existing Land Use Plan (Fremont County 1978) and recently prepared a new draft land use plan (Fremont County 2001). These plans were reviewed as a part of the EIS process.

The land uses in the WRPA include agriculture, grazing, residential development, recreation, and oil and gas development. The impacts to agricultural lands and residential areas would be moderate and long term under the Proposed Action and Alternative A, and minor and long term under Alternative B. Impacts to agricultural lands under Alternative C would be considered minor and short term, since the disturbance from well-pad construction is reduced to 8x8 feet after well completion (Pavillion irrigated crop land only). Impacts to range resources would be minor and short term under the Proposed Action and Alternatives A and B, and negligible under Alternative C. Under all alternatives impacts from the proposed development on other resource extraction (e.g., gravel mining) would be negligible. Impacts to recreational areas from the Proposed Action, Alternative A, and Alternative B would be minor and long term, whereas, they would be negligible under Alternative C.

6.7 WILDLIFE

The WRPA provides wildlife habitat for big game, birds, fish, reptiles, and amphibians. A total of 365 species of wildlife are known to be present or have the potential to occur within the WRPA. Important wildlife resources that occur within the WRPA include large game, such as the pronghorn antelope, mule deer, and elk; raptors (e.g., ferruginous hawk and golden eagle); small game birds, such as greater sage-grouse, gray partridge, mourning dove and numerous species of waterfowl; and sport fish.

Wildlife habitats that could be affected by the proposed development include areas that would be physically disturbed by the drilling and construction of well pads, access roads, pipelines, and production facilities, as well as zones of influence around activity areas. Zones of potential influence are areas surrounding, or adjacent to, project activities where impacts to a given species could occur. The shape and extent of such zones vary considerably with the species.

Impacts to wildlife include loss of wildlife habitat, wildlife displacement, increased mortality, habitat fragmentation, exposure to contaminants, increased predation, and reduction of prey species. Impacts to fish and wildlife populations and loss of wildlife habitat would result in minor and short- to long-term impacts (depending on the species) under the Proposed Action, Alternative B and Alternative C; and moderate impacts under Alternative A. Displacement of wildlife and impacts on wildlife behavior from the Proposed Action would result in minor to moderate and short-to long-term impacts (depending on the species); moderate short- to long-term impacts under Alternative A; and minor, short- to long-term impacts under Alternatives B and C. Noise from human activities and equipment, would result in minor to moderate, short-term impacts (depending on the species) under the Proposed Action; moderate, short-term impacts under Alternative A; and minor, short-term impacts under Alternatives B and C. Habitat fragmentation would result in minor, long-term impacts under the Proposed Action, Alternatives A, B, and C; and moderate, long-term impacts under Alternative A. These and other wildlife impacts are presented in Table 1-1.

6.8 THREATENED, ENDANGERED AND STATE-SENSITIVE SPECIES

The threatened and endangered species that may be present in the WRPA include the bald eagle (threatened), black-footed ferret (endangered), Canada lynx (threatened), grizzly bear (threatened), and gray wolf (threatened/ experimental population). The mountain plover was proposed as a threatened species in 1999, but was removed from the list of proposed species in September 2003. However, it remains a species of special concern to the US Fish and Wildlife Service and the State of Wyoming. The greater sage-grouse, also discussed in this chapter, is characterized as a sensitive species by the State of Wyoming, and has been petitioned for

listing under the Endangered Species Act.

The potential loss of bald eagle nesting, roosting and foraging habitat from all the alternatives is determined to be minor and short term. The potential loss of black-footed ferret habitat, gray wolf habitat, and grizzly bear habitat is considered to be negligible. Increased mortality to threatened and endangered species resulting from the Proposed Action and Alternatives A and B is considered to be minor and short term, but negligible from Alternative C. Since the WRPA does not contain habitat or the primary prey species (i.e., snowshoe hare) of the Canada lynx, no impacts are attributed to this species from the Proposed Action or alternatives.

Based on the information obtained on threatened and endangered species, it was determined that the Proposed Action and Alternatives A, B, and C "are not likely to adversely affect" the bald eagle, black-footed ferret, gray wolf, and grizzly bear. The Proposed Action and alternatives would have "no effect" on the Canada lynx.

The potential loss of mountain plover habitat is minor and short term from the proposed Action and Alternatives A and B and negligible from Alternative C. The increase in bare ground may benefit the mountain plover, which has a preference for bare ground. Loss of greater sage-grouse habitat is considered to be minor to moderate and long term, since the sage grouse often does not return to nesting areas or leks that have been disturbed.

6.9 RECREATION

Recreational activities within and adjacent to the WRPA include hunting of large game, upland game birds and waterfowl, fishing in Middle or Upper Depression Reservoirs, ORV use, wildlife viewing, and picnicking and camping (mainly Boysen State Park and Ocean Lake Wildlife Habitat Management Area). In general, impacts to recreation would be higher during the construction and drilling phase and decrease after reclamation has been completed. The impacts to recreational activities from the Proposed Action and alternatives would include loss of federal and trust lands available for recreation, reduction in hunting and fishing opportunities, reduction in other recreational opportunities.

Impacts to recreation resources in the WRPA (other than large game species) would be minor and short term regardless of whether the project is developed as proposed or under one of the alternatives. Impacts to big game hunting and wildlife viewing would be short to long term for the Proposed Action and Alternatives B and C and would be moderate and short to long term for Alternative A. At most, moderate impact is likely to occur to the most important resources, namely hunting, in terms of usage, sensitivity of the resources and their users, and the relationship of recreation to resource development planning in and near the WRPA. Although the level of development varies from alternative to alternative, the development and production of more or fewer wells at different well locations, despite its effect on the duration of development, would lead to perceptions of the intensity of impact that, with the exception of impacts to big game hunting and wildlife viewing, are neither large enough nor clear enough to distinguish among potential impact levels from alternative to alternative. The exception to the general perception of similarity of impacts is Alternative A, where the additional habitat disturbance and potential for further decrease in big game populations would cause a moderate level of impact to big game hunting and wildlife viewing.

The analysis also finds the potential for conflict to be minor between recreational ORV use, other recreation traffic and project traffic near Boysen State Park with the Proposed Action or the alternatives. Impacts to wildlife observation in the Sand Mesa and Ocean Lake WHMAs also

would be minor regardless of alternative, despite the high sensitivity to disturbance of the resource and its users.

On Tribal land, impacts to fishing would be minor under the Proposed Action and Alternatives A and B and avoided under Alternative C; impacts to hunting on tribal land would be minor under the Proposed Action and Alternative B, avoided under Alternative C, and moderate under Alternative A.

6.10 VISUAL RESOURCES

Visual impacts are caused by contrasts in the line, form, color, and texture between the characteristic landscape and the proposed facilities. Since the BIA, as managing agency for the proposed development project, has not developed a system of identifying and measuring visual quality, the BLM Visual Resource Management System (VRM) was used to evaluate potential impacts on visual resources. The BLM VRM classes were determined by evaluating scenic quality, viewer sensitivity level, and the viewing distance of an area. Using the BLM VRM system, more than 99 percent of the WRPA was determined to be equivalent to Visual Resource Inventory (VRI) Class IV, which permits major modifications of the existing character of the landscape. The areas classified as VRI Class III include Middle Depression Reservoir and the Sand Mesa Wildlife Habitat Management Area.

Impacts to visual resources identified, using the BLM VRM system, include alteration of landscape character, reduction in scenic quality, reduction in night sky quality, and impact to VRI Class III areas. The impacts from alteration of landscape character and reduction in scenic quality from the Proposed Action and Alternative A would be moderate and long term; impacts from Alternative B and Alternative C would be minor and long term. Reduction in night sky quality from lighting during construction and drilling under the Proposed Action, Alternative A and Alternative B would be categorized as moderate and short term; the impacts from Alternative C would be minor and short term. Impacts to VRI Class III areas would be minor under the Proposed Action, and moderate under Alternative A (see Table 1-1).

6.11 CULTURAL RESOURCES

Approximately 20 percent of the WRPA has been inventoried for cultural resources, and a total of 150 cultural resource properties have been recorded within the WRPA. The majority of the recorded properties are small prehistoric lithic scatters, but other prehistoric sites include camps, lithic procurement sources, stone alignments, a rock shelter, and rock art. Five cultural resource properties have been determined to be eligible for nomination to the National Register of Historic Places, and include three rock art sites, a prehistoric campsite, and the Wyoming Canal.

Impacts to cultural and spiritual resources from the Proposed Action and alternatives could include increased vandalism, increased unauthorized collection of cultural artifacts, construction damage to cultural and spiritual sites, and disturbance to Native American traditional uses. The disturbances to Native American traditional uses, from the Proposed Action and alternatives, would be minor and short term. Increased vandalism, unauthorized collection, and construction damage to cultural sites would be minor and long term.

6.12 SOCIOECONOMICS

Economic impacts from the proposed development would be both beneficial and adverse. The beneficial impacts would include increased personal income and increased royalty income for the Tribes, Tribal members, fee mineral owners, and some area business owners. Tribal, federal, state and local governments in Fremont County would benefit from increased tax revenues. These benefits would range from minor under Alternative C to major under the Proposed Action and Alternative A. The adverse impacts from the proposed development would include split estate conflicts, reductions in net income from agricultural activities and change in the rural character in the five gas development areas. These impacts could be moderate and long term. It is likely that reductions in net income could be avoided and compensated by surface use agreement payments from the Operators.

Increases in local population and housing demand and decreases in Midvale Irrigation District revenues would result in negligible long-term impacts. Potential increases in demand for law enforcement and emergency response services would be characterized as minor and long-term impacts.

Effects of the Proposed Action and alternatives would encompass not only the direct activity in the WRPA, but also the indirect impacts to the region's finance, retail trade, services and other industries that would potentially capture a range of expenditures spun off by direct activity in the gas industry. Total economic effects over the 28-year analysis period would total an estimated 22,205 job-years (the equivalent of that number of full time jobs), $1.1 billion in total personal income and $5 billion in total regional economic output for the Proposed Action, and would range from a high of 34,872 job-years, $1.7 billion in total personal income and $7.9 billion in total regional economic output, for Alternative A, to a low of 4,071 in total job-years, $225 million in total personal income and $1 billion in total regional economic output for Alternative C - No Action. The fiscal impacts of gas development would also be positive. Severance taxes, royalties and *ad valorem* taxes all would generate substantial revenues to a number of local and state government entities and those representing tribal interests.

Under all alternatives, the private owners of lands that overlay minerals held in trust for the Eastern Shoshone and Northern Arapaho Tribes or owned by other private interests (split estate lands) could experience economic loss associated with the removal of land from agricultural production, disruption of agricultural activity, damage to fields and crops and interference with farming practices, such as cultivation patterns and the operation of mechanized irrigation systems. In recent years the Operators have instituted practices and measures to avoid and mitigate such losses. The Operators also make initial and annual surface damage payments to private owners and make additional payments when they must re-enter previously reclaimed fields. The mitigation measures and damage payments are intended to reduce and compensate private surface owners for economic loss associated with decreases in agricultural revenue.

The additional gas development associated with each alternative would further change the character of lands within the WRPA, from rural agricultural toward mixed agriculture and natural resource extraction, the latter being a type of low density industrial land use. The potential change in rural character varies from field to field for each alternative, but, in general, could be expected to increase with the amount of development expected from each alternative.

Population effects of all alternatives are anticipated to be minor. The well-developed regional oil and gas service industry and the local labor pool would provide most of the contractors and employees needed for gas development activities. Indirect jobs stimulated secondarily by gas

development within the WRPA would also be filled from the local labor pool or by local employees who remain employed instead of losing their jobs, as economic activity from the Proposed Action or the alternatives offsets anticipated declines in existing production in the WRPA or other oil and gas fields.

Housing demand associated with all alternatives would be minor. Most housing demand would be for temporary housing accommodations to serve non-local contract employees during their work week. The duration of development under some alternatives may encourage non-local contract employees to seek longer term housing in Fremont County, but existing resources would likely accommodate this demand.

Law enforcement and emergency response (emergency medical/ambulance and fire suppression) are two of a limited range of local government facilities and services that would be subject to impact. Potential effects also would occur to county road and bridge services, discussed in the Transportation section. Increased demand could result in the need for increased training and specialized equipment in the case of emergency response services and for an equipped law enforcement officer to be located within or near the WRPA during the development phase. The substantial production-related taxes that would accrue to local governments under all alternatives would offset the cost of potential increases in these services.

Environmental Justice

Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. The area of analysis for Environmental Justice concerns for the Wind River Natural Gas Development project is the Wind River Indian Reservation; the WRPA does not contain a high concentration of either minority or low-income populations. Human health effects are identified by executive order as a specific concern for environmental justice. Health and safety effects of the Proposed Action and alternatives, as a whole, would be negligible to minor, except for a moderate impact to the risk of worker-related accidents.

Health and safety impacts generally relate to the proximity of persons to drilling, field development and production activities that would occur within the WRPA. Since concentrations of minority and low-income persons on the WRIR are located in the areas of Ethete, Arapaho and Ft. Washakie, communities that are some distance from the WRPA, persons in these areas would not experience any greater impacts to health and safety (impacts that would be negligible to minor, in any case) than the population as a whole.

In terms of risk of worker-related accidents, Tribal Employment Rights Ordinances (TERO) require at least 50 percent of gas development and operations employees to be members of the Eastern Shoshone and Northern Arapaho Tribes. Impacts to the risk of worker-related accidents (which would be moderate) would therefore disproportionately affect tribal members, most of whom would likely be residents of the WRIR. However, the increased risk could be offset by several factors. First, the tribal preference law was enacted to address the major unemployment among tribal members and the desire to have tribal members benefit from economic activity on the WRIR. Second, taking a job created by the Proposed Action or alternatives would be a matter of individual choice, with individuals presumably considering whether the higher risk disclosed here is adequately compensated for by other terms of employment. Finally, the workplace for natural gas drilling, development and operations is governed by a variety of federal and state regulations that promote worker health and safety.

Air and water quality are also areas of potential environmental impact that could affect populations on the WRIR. The analyses conducted for this assessment indicate that potential impacts to air and water quality would be negligible to minor for all alternatives, with the exception of increased surface water runoff and erosion which would be moderate under Alternative A. Because surface water within the WRPA does not drain toward the areas of the WRIR mentioned above, where concentrations of minority and low-income persons reside, minority and low-income groups would not be disproportionately, or even directly, affected by moderate impacts from water runoff and erosion.

6.13 TRANSPORTATION

Access to the WRPA is by a network of federal and state highways and county roads. Within the WRPA, county roads, Midvale Irrigation District canal roads, and operator-maintained roads provide access to leases, wells and ancillary facilities. Federal and state highways providing access to the WRPA include US 26/789, WYO 133, WYO 134. Transportation issues related to the proposed project include use of roads by trucks and heavy equipment and higher levels of traffic resulting in increased road and bridge wear and maintenance costs, traffic safety, and traffic related dust, emissions, and noise.

The Proposed Action and alternatives would result in increased traffic and maintenance demands on state and federal highways, county roads, and private and operator-maintained roads. Increased traffic and maintenance demands on state and federal highways would be minor and long term, under the Proposed Action and Alternatives A and B, except for WYO 134, where impacts would be moderate.

The largest concentrations of project-related traffic would occur on Fremont County roads providing access to and within the five gas development areas within the WRPA. Peak periods of traffic would occur during drilling and field development, resulting in localized increases in traffic and demand for maintenance on roads near and within development areas. Certain paved roads and a number of bridges maintained by the Fremont County Transportation Department are in poor condition; concentrated use of these roads and bridges by trucks and heavy equipment would accelerate deterioration and increase road and bridge maintenance costs.

Project-related traffic levels would be lower during field operations. During these periods ongoing maintenance demands would result primarily from trucks hauling water and oil, and from trucks and heavy equipment associated with infrequent well workovers and downhole maintenance activities.

Although periodic road maintenance impacts could be substantial on certain county roads, they would range from minor to moderate (as those terms have been defined for this assessment) and long term, under the Proposed Action and Alternatives A and B, varying over time and across the WRPA. Formation of a transportation planning committee would allow annual identification of intended transportation routes, proactive maintenance of affected roads and bridges and identification of alternative routes to avoid roads and bridges in poor condition.

Impacts of traffic on private and Operator-maintained roads would be minor and long term under all alternatives, whereas impacts under Alternative A would be moderate.

6.14 HEALTH AND SAFETY

Health and safety concerns associated with natural gas exploration and production in the WRPA include occupational hazards associated with construction, drilling, and maintenance activities at natural gas well pads and associated facilities. Other health and safety issues include traffic-related accidents, potential natural gas and hydrogen sulfide leaks, accidental spills or releases of hazardous substances, and man-made wildfires.

Federal regulations related to health and safety requirements for oil and gas operations are specified under 43 CFR Ch. II, subpart 3162.5 (environmental obligations). These regulations require the prior approval of a drilling and operations plan by the BLM that addresses the procedures to be employed for protection of environmental quality, including safety precautions, control and removal of waste, spill prevention, and fire prevention and fighting procedures.

Health and safety impacts from the Proposed Action and alternatives would include increased work-related accidents, increased vehicle traffic and accidents, increased pipeline fire and explosion hazards, and increased likelihood of wildfires. The impacts associated with increased work-related accidents, increased vehicle traffic and accidents, increased pipeline fire and explosion hazard would be minor and long term for the Proposed Action, and Alternatives A and B, and negligible for Alternative C.

6.15 NOISE

Ambient noise levels can be defined as the cumulative effect from all noise-generating sources in an area and constitutes the normal or existing level of environmental noise at a given location. The decibel (dB) is the unit of measure commonly used to describe sound levels. The US EPA has established an average 55 dB noise level as a guideline for acceptable environmental noise. This noise level is directed at sensitive receptors (residences, schools, medical facilities, and certain recreational areas) where people would be exposed to a specified noise level over a period of time (e.g., 24hrs.). For example, the noise level for construction equipment at 50 feet is 80 dB. Since the Tribes have not established regulatory noise standards, the 55 dB noise level is used as a reasonable level of noise that would not result in adverse effects.

Noise would result from well pad and access road construction, drilling operations, venting operations, traffic on access roads, increased vehicle-related noise, and compressor stations. The impacts from construction, drilling, and venting operations would be moderate and short term. The noise from increased number of vehicles and road maintenance operations would result in minor impacts (see Table 1-1).

7.0 SUMMARY OF CUMULATIVE EFFECTS

"Cumulative impacts" is defined in Section 1508.7 of the Council of Environmental Quality (CEQ) regulations (40 CFR 1508.7) 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."* Cumulative impacts may result from the Proposed Action and alternatives, when combined with past, present, and reasonably foreseeable future activities.

The cumulative impacts of the Wind River gas development project within the WRPA and adjacent areas are assessed for geological, mineral, and paleontological resources; soil resources; air quality; surface- and groundwater; vegetation and wetlands; land use; wildlife; threatened and endangered species; recreation; visual resources; and cultural resources. The socioeconomic and human health and safety are assessed, and the impacts from noise and transportation increases are also evaluated.

The Boysen Reservoir watershed is used as the basis for determining cumulative impacts to soil, vegetation and wetlands, wildlife, threatened and endangered species, and water. Cumulative socioeconomic impacts of the proposed development are assessed in Fremont County. The northwestern portion of the State of Wyoming is modeled for potential far-field air quality impacts. Past, present, and reasonably foreseeable future activities within and near the WRPA include oil and gas development, sand and gravel mining, agriculture, timber harvesting, residential development, and livestock grazing. Total residual disturbance from the Proposed Action is 422.7 acres or 0.46 percent of the WRPA. When combined with the residual disturbance from the existing development of 410.5 acres, the total residual disturbance is 833.2 acres or 0.91 percent. Quantitative data on cumulative disturbances from other past, present and reasonably foreseeable future activities are not available.

7.1 GEOLOGY/MINERALS/PALEONTOLOGY

Past, present, and reasonably foreseeable future activities would result in impacts to surficial geology, soil erosion, subsidence, depletion of petroleum resources, and damage to fossils. These activities may also result in the discovery of new fossil resources. The impacts of the proposed development combined with other impacts to geological, mineral, and paleontological resources would be minor. The implementation of Operator-committed and agency required mitigation measures would further reduce the cumulative impacts to these resources.

7.2 SOIL

Past, present and future activities include oil and gas development, residential and commercial development, and sand and gravel mining. Residential and commercial development, as well as additional oil and gas development, would result in removal of topsoil and vegetation, thus increasing runoff and erosion of surficial materials. Increased erosion would be a short-term impact for projects involving residential development and pipeline construction, since these areas would be revegetated after construction. Oil and gas development would potentially result in minor, long-term increases in erosion. Clear-cutting of timber would lead to increases in runoff from the affected areas. This increased runoff could lead to more erosion along waterways and the migration of the gullies of small streams in an upstream direction.

Oil and gas development has occurred in the Pavillion Field since 1960, and early drilling waste disposal practices in the Pavillion Field have resulted in soil contamination in this field. However, the extent of the contamination is unknown. Preliminary data collected during the summer of 2004 suggest that the soil on private property in the Pavillion field has been impacted by migration of petroleum constituents from unlined production pits (Dollhopf 2004). The contamination from past practices would add to the impacts from the proposed development and reasonably foreseeable future activities in the WRIR. Since the extent of the contamination is unknown, such impacts cannot be quantified. The impact to soils from the proposed development and reasonably foreseeable future activities is anticipated to be minor, since the Operators utilize closed mud systems on irrigated lands in the Pavillion Field.

7.3 AIR QUALITY

As an unavoidable result of project-related activities, additional pollutants would be emitted to the atmosphere. Emissions generated from project activities would act in concert with emissions generated from other cumulative sources, both existing and future. Predicted impacts would not exceed the ambient standards or PSD Class I or Class II increments. However, moderate impacts upon NO2 and PM10 concentrations are predicted. The duration of the PM10 impacts would be short-term, occurring predominately during the development phase of the project. Following the completion of construction activities, PM10 impacts would be reduced to minor levels. The moderate NO2 impacts would be long-term, existing for the duration of the project.

Total terrestrial deposition rates resulting from cumulative and project sources would be acceptable. Impacts upon total sulfur deposition would be negligible. Minor long-term nitrogen deposition impacts are predicted to occur at Could Peak Wilderness as a result of cumulative sources. The Wind River Project would not substantially contribute to the Cloud Peak deposition impacts. Nitrogen deposition impacts are predicted to be negligible for the remaining areas of special concern.

As a result of cumulative sources impacts are predicted to occur at two lakes located in Cloud Peak Wilderness. Moderate long-term impacts are predicted to occur at Florence Lake, where changes in acid neutralization capacity (ANC) are predicted to exceed the level of acceptable change. Minor long-term impacts are predicted to occur at Emerald Lake where changes in ANC levels would be detectable. The contribution of Project sources upon these cumulative impacts would be negligible. Impacts to ANC at the remaining lakes of special concern would be negligible.

Cumulative and Project sources would contribute to regional visibility impacts. Moderate long-term visibility impacts are predicted to occur at Cloud Peak Wilderness as a result of cumulative sources. However, the contribution from Project sources to the Cloud Peak impacts would be negligible. Moderate short-term visibility impacts are predicted to occur at Wind River Canyon and the Owl Creek Range, which includes Phlox Mountain. However impacts at these areas would be reduced to minor levels following the completion of project construction activities. Minor long-term visibility impacts would also occur at Bridger Wilderness, Popo Agie Wilderness, and the Wind River Roadless Area.

7.4 WATER

The Fivemile Creek, Muddy Creek, and Cottonwood Creek watersheds have a total area of 915 mi^2. Within the affected watersheds, there is a potential of cumulative impacts from other activities occurring upstream from the WRPA. Evaluation of the Wyoming Department of Environmental Quality (2003) database for National Pollution Discharge Elimination System (NPDES) permits indicate that six permits have been issued for the Fivemile Creek drainage basin, with only one permit being current. There are no NPDES permits issued for Muddy Creek or Cottonwood Creek. As development occurs upstream from the WRPA additional discharges into these streams may occur. Because produced water from each of the Alternatives will not be discharged into surface water, no NPDES permit would be required for the proposed operations. Thus, there would only be cumulative impacts to the streams from produced water, if accidental spills occurred.

Based on a report by the USGS (1994), it is estimated that 243 tons of sediment are generated per square mile of the watersheds in the Wind River Basin or 222,300 tons/year for the combined basins of Fivemile, Muddy, and Cottonwood Creeks. The predicted average increase in sediment loading from the Proposed Action is 23 tons/yr greater than from natural conditions, from Alternative A is 36 tons/yr greater than natural conditions, from Alternative B is 12 tons/yr, and from Alternative C is 3 tons/yr. These increases represent a small fraction of the total sediment loading in these basins. These changes would not be measurable and are considered negligible in terms of potential cumulative impacts.

In the upper portions of the watershed there have been no serious groundwater pollution problems. By complying with federal and applicable tribal and state law, using state-of-the-art drilling methods, lining pits, and implementing SPCC plans, the Proposed Action and alternatives would not impact the groundwater systems. Because up-gradient groundwater systems discharge into streams prior to reaching the WRPA, no cumulative impacts would be expected to the groundwater system.

7.5 VEGETATION

Past oil and gas, residential, commercial development and sand and gravel mining have resulted in incremental ecological changes in native Wyoming big sagebrush and desert shrub vegetation, associated with proportionately higher growth of non-native grasses and loss of shrub cover. Past introduction of invasive grasses has changed the habitat and contributed to the decline in native species. Invasive grasses have changed the sagebrush habitat's physical structure, hydrology and salinity, productivity, energy flow, and fire cycle. Dominance of cheatgrass, and the shortening of fire return intervals, has modified ecosystem relationships. Declines in species diversity through competition, disruption of the food web, and genetic hybridization of sagebrush species is evident. These sagebrush habitat modifications and species modifications could create an irreversible shift in the ecosystem, creating a long-term altered, but stable state. With more sagebrush vegetation burned, there are fewer roots to hold the soil, resulting in increased erosion. Erosion would increase sediment in the streams and reduces vegetative cover along riparian areas.

Long-term vegetation disturbances are 422.7 acres under the Proposed Action, 611.9 acres under Alternative A, 325.1 acres under Alternative B, and 79.3 acres under Alternative C. When these effects are combined with the incremental effects resulting from vegetation removal associated with gravel and sand mining, future transportation improvements, and other residential and commercial development, the cumulative impacts could vary from minor to moderate.

7.6 LAND USE

In addition to the gas development within the WRPA, it is reasonable to foresee future oil and gas development occurring on other lands within the WRIR. The cumulative impact of further gas development in the region may influence land-use within the WRPA as a result of the gradual industrialization of the area. The land-use type that would most likely reflect this change would be residential development. As the WRPA becomes more industrial in character, landowners in the area may find it more difficult to develop their property for residential use.

Agriculture and ranching within the WRPA may be also be affected by cumulative long-term disturbances. If gas development interferes with normal farm or ranching operations, farmers and ranchers may cease operations on those portions of land that are most affected.

Gravel/sand mining operations within the WRPA on tribal and/or BOR lands may displace some rangeland uses, but it is likely that cattle grazing would continue on lands immediately adjacent to the gravel/sand mine. Therefore, the cumulative impacts of oil and gas development, residential development, gravel mining and other reasonably foreseeable future activities would be minor.

7.7 WILDLIFE

The fish and wildlife species present in the Muddy Creek, Fivemile Creek, and Cottonwood Creek sub-basins include large and small game animals; raptors, game birds, and migratory birds; game and non-game fish; and reptiles and amphibians. Cumulative impacts to wildlife would occur from past and existing development, the proposed development project, and reasonably foreseeable future activities within the Boysen Reservoir watershed. These activities would include oil and gas construction and drilling; increased vehicle traffic and noise from construction and development activities; residential and commercial development; and sand and gravel mining. The cumulative impacts from these activities would include loss of habitat, habitat displacement, habitat fragmentation, reduction in prey species, increased predation, mortality from vehicles, potential exposure to contaminants, behavioral changes in response to noise and human activity. The extent of the impact would be related to the amount development at any one time and the wildlife species that would be impacted (e.g. game species).

Under the proposed development project, potential impacts to fish and wildlife would be reduced by the implementation of the Operator-committed and agency-required mitigation measures, described in Chapter 2 of the DEIS. The mitigation measures would include avoiding disturbance within ½ to 1 mile of an active raptor nest during the breeding season; minimizing noise from construction and drilling activities and vehicle traffic in wildlife breeding habitats; flagging or netting of reserve pits; and reclaiming disturbed habitats immediately after drilling operations at a well have been completed. Overall, it is anticipated that the cumulative impacts of past, present, and reasonably foreseeable future activities to fish and wildlife species would vary from minor to moderate, depending on the species.

7.8 THREATENED/ ENDANGERED AND STATE-SENSITIVE SPECIES

The threatened and endangered species that may be present within and near the WRPA include the bald eagle, black-footed ferret, Canada lynx, gray wolf, and grizzly bear. Sensitive species observed in this area include the greater sage-grouse and mountain plover. Oil/gas development under the Proposed Action or alternatives would be a minor contributor of the cumulative impacts to federally listed, or state-sensitive species and their habitats from past, present, and reasonably foreseeable future activities within and near the WRPA. Cumulative impacts to threatened/endangered and sensitive species would occur from past and existing development, the proposed development project, and reasonably foreseeable future activities within the Boysen Reservoir watershed. These activities would include oil and gas construction and drilling; increased vehicle traffic and noise from construction and development activities; residential and commercial development; and sand and gravel mining. The cumulative impacts from these activities would include loss of habitat, habitat displacement, habitat fragmentation, reduction in prey species, increased predation, mortality from vehicles, potential exposure to contaminants, behavioral changes in response to noise and human activity. The extent of the impact would be related to the amount of development at any one time and the special status species that would be impacted.

Under the proposed development project, potential impacts to special status species would be reduced by the implementation of the Operator-committed and agency-required avoidance and minimization measures, described in Chapter 2 of the DEIS. These measures would include avoidance of disturbance within one mile of active bald eagle nests; annual monitoring of bald eagle winter roost sites; minimizing impact to white-tailed prairie dog colonies, which serve as potential habitats for the endangered black-footed ferret; removal of road-killed carcasses from Operator-controlled roads to minimize exposure of the bald eagle, gray wolf, and grizzly bear to vehicles; and restricting disturbance from development operations within two miles of an active sage grouse lek during sage grouse breeding season. With the implementation of the avoidance and minimization measures, the proposed development is "not likely to adversely affect" the threatened and endangered species. However, since quantitative data about other reasonably foreseeable future activities are not available, the cumulative impacts of those activities cannot be determined.

7.9 RECREATION

The effect of residual disturbance from the proposed gas development project would be concentrated within the five development areas, increasing the percentage of disturbed lands in those areas. Increased recreational access to lakes, streams and related facilities from new roads constructed for the gas development project could increase use of Boysen State Park, Sand Mesa WHMA, and Ocean Lake WHMA. Recreation opportunities are greater today because of water development and irrigated agriculture, which have jointly had a beneficial impact on recreation in the WRPA. Residential development can impact recreation resources by absorbing or fragmenting habitat, changing game populations and distribution, and increasing demand for recreation. However, impacts to recreation, to date, from residential development in and near the WRPA have been minimal. The nearest residential area to the WRPA is the Town of Pavillion, one mile west of the WRPA. Most of the residences in and near the WRPA are isolated homes that are part of larger agricultural areas. Tribal land in and near the WRPA has no residential development. These tribal lands are devoted to rangeland and resource extraction, and most are in more remote areas of the WRIR that are not served by Federal or State highways. These characteristics suggest that reasonably foreseeable future activities are unlikely to include more than limited residential development on private land and on tribal land. Given that scenario, residential development in the future would make a minor contribution to cumulative impacts to recreation resources in and near the WRPA. Therefore, past, present and reasonably foreseeable future activities in and near the WRPA would have minor cumulative impacts on recreational activities.

7.10 VISUAL RESOURCES

The Proposed Action and Alternatives A, B and C (No Action) would add to the existing impact to visual resources associated with natural gas development in the WRPA. Impacts to visual resources within the WRPA under the Proposed Action and Alternatives A and B would shift the character of the landscape in some areas from farming and ranching to a more industrial nature. Alternative C (No Action) would result in similar cumulative impacts over a smaller geographic area, as development would be limited to the Pavillion field. However, because the Pavillion field is located within the most densely populated area of the WRPA, the limited geographic influence on cumulative impacts has the potential to affect a larger number of people, when compared to the entire population within the WRPA. Reasonably foreseeable future development of one or multiple gravel/sand extraction operations within the WRPA would contribute to the change in landscape character by creating additional contrasts in the line, color, form and texture with the surrounding landscape.

The cumulative effects of these visual impacts would modify the landscape and alter the visual experience for those traveling through or residing in the WRPA. Visitation to recreation areas within and adjacent to the WRPA may also be affected by this change in landscape character and visual experience.

7.11 CULTURAL RESOURCES

Available cultural resources records and literature sources have not indicated that outstanding cultural resources exist within and near the WRPA that might be affected by natural gas development and other past, present and reasonably foreseeable future activities. Elders of the Eastern Shoshone and Northern Arapaho Tribes have indicated that potential Traditional Cultural Properties do not exist within the WRPA. Execution of the proposed natural gas development in conjunction with other reasonably foreseeable future activity in the WRIR is, therefore, unlikely to have substantial cumulative impacts to cultural resources under the Proposed Action or Alternatives A, B, and C.

7.12 SOCIOECONOMICS

The Northern Arapaho Tribe has announced plans to build a casino on the WRIR south of Riverton, Wyoming. Current plans are to begin construction in the spring of 2005. Under the most optimistic schedule, it is likely to be several years before the casino would be operational. While the casino could require some non-local employees, most of the workforce is anticipated to come from the WRIR and Fremont County. The small non-local workforce would not appreciably add to county population or housing demand in the early years of operation. Depending on the scale and success of the casino, the effects on indirect employment in retail, wholesale, service and other sectors of the local economy could be substantial. However, many of these jobs would also be filled from the local labor pool. Therefore, population increases associated with the casino would be anticipated to be negligible to minor.

The Town of Riverton has recently decided to pursue location of a Wyoming Department of Corrections prison facility in the Riverton area. The site selection process is in the early stages; therefore, it is not yet known if Riverton will be successful in its efforts (Riverton Ranger 2003b, Thorsen 2004). Consequently the potential prison facility was not considered in this cumulative assessment.

There are considerable oil and gas reserves in Fremont County. In 2001, Fremont County produced six percent of all oil produced in Wyoming and nine percent of all gas. Exploration and production of oil and gas resources is driven in large part by price. Substantial increases in the price of oil and gas could accelerate oil and gas exploration and development in the county and elsewhere in the state, resulting in increases in employment and potentially population. As described in Section 4.13 of the DEIS, the regional oil and gas service industry could accommodate a substantial increase in activity with existing capacity and by hiring, or in some cases, re-hiring currently unemployed or underemployed workers in the region. Moreover, community infrastructure in Riverton has capacity to accommodate population levels that are higher than currently exist. Consequently, moderate increases in oil and gas exploration and development could be accommodated by the existing oil and gas service industry, local labor pool and community infrastructure.

Currently, there are 178 producing wells in the WRPA, including 100 in the Pavillion field, 75 in the Muddy Ridge field and 3 in the Sand Mesa field. These wells, ancillary facilities and the associated development and production activity have affected socioeconomic conditions in the WRPA. The existing WRPA wells are in the production stage, and generate lower levels of activity than during development. But, when combined with the development associated with the Proposed Action and alternatives, the existing development would contribute to cumulative impacts on certain elements of the socioeconomic environment. Cumulative economic, employment and fiscal effects would be positive. Cumulative effects on split estates and the rural character of certain areas within the WRPA would be negative.

Most cumulative socioeconomic effects would occur in the Pavillion and Muddy Ridge fields; the Sand Mesa field has only three producing wells; there has been no development in the Sand Mesa South field and no recent development in the Coastal Extension field. Under Alternative C – No Action, cumulative socioeconomic effects would occur only in the Pavillion field.

For recently developed wells on irrigated lands, where well heads have been reclaimed to 8x8 feet, the total amount of residual disturbance would be less than six acres, which would result in losses of $90.00/year to the MID, if the BOR reclassified the land. The amount of existing residual disturbance associated with older wells and facilities on all lands is 410.5 acres, and some portion of those wells and facilities are located on irrigated lands. The proportion of older wells and facilities on irrigated land has not been identified for this assessment; however, it is substantially less than 100 acres. If all 100 acres were reclassified by the BOR, the MID would lose $1,500/year in assessment revenues, which, when added to the potential lost revenue amounts associated with existing new wells on irrigated lands and proposed wells on irrigated lands, the total lost revenue would be less than $2,000 a year under any alternative.

Cumulative gas field activities would increase demand for law enforcement and emergency response services under all alternatives, but the increment of demand associated with current production activities is minor. Although the potential for conflict on split-estate lands is diminished during the production phase, conflict still could occur, particularly during reentry on surface lands for re-completion and other well maintenance activities.

Although natural gas development has been ongoing in the Pavillion field for over 40 years, the recent acceleration in the pace of development has changed the rural character of the area for some residents and the gas field development associated with any of the alternatives would further change the rural character of the Pavillion field and the other development areas.

Potential future commercial and industrial activities, which may affect socioeconomic conditions in the WRPA include sand and gravel mining on tribal lands within the WRPA and sand and gravel mining, oil and gas exploration and development, and timber harvesting on the WRIR lands north and west of the WRPA. At present, the location, timing, size and other characteristics of these activities are unspecified, so the cumulative effects of these activities on socioeconomic conditions within the WRPA cannot be assessed.

7.13 TRANSPORTATION

Baseline average annual daily traffic (AADT), associated with existing gas production operations, would decline over time as existing wells cease production and are plugged and abandoned, but compression and production facilities AADT would remain relatively constant as new production replaces production from existing wells. Cumulative gas operations AADT would peak at an estimated 158 in the third year of the Proposed Action and decline to about 58

after the development phase of the Proposed Action is completed. Cumulative gas production AADT would continue to decline over time as wells are plugged and abandoned.

In addition to the natural gas-related activities discussed above, existing traffic within the WRPA is generated by residential, agricultural and recreational land uses, and by the activities of the MID. Residential land uses in the WRPA may increase in the near term as larger parcels of farm land are subdivided, sold and developed into low-density residential housing. This trend is currently occurring in parts of the WRPA, but at current levels would not increase traffic appreciably across the entire WRPA over the next several decades. Agricultural activities and related traffic are anticipated to remain relatively constant. Recreational use within the WRPA may also increase over time increasing traffic in the area. Recreational use data for Boysen Reservoir, Bass Lake and Ocean Lake all show generally flat or slightly upward trends, with seasonal variations and changes in use in response to fluctuations in reservoir levels.

The MID has an ongoing program of maintenance of water distribution and drainage systems within the WRPA and elsewhere in the district, which generates fluctuating volumes of truck and heavy equipment traffic on a short-term basis. In addition, the MID is emphasizing conversion from open conduits to pipelines and sprinklers. Conversion of water distribution and delivery systems may generate additional construction traffic, but this traffic would be short-term in nature.

Potential future commercial and industrial activities, which may affect traffic conditions, include sand and gravel mining on tribal lands within the WRPA and sand and gravel mining, oil and gas exploration and development, and timber harvesting on the WRIR lands north and west of the WRPA. At present, the location, timing, size and other characteristics of these activities are unspecified, so the cumulative effects of these activities on highways and roads providing access to and within the WRPA cannot be assessed.

The Northern Arapaho Tribe is planning to build a casino on Tribal land located south of Riverton. This development would likely increase thru-traffic on US 26 north and west of Riverton, but the cumulative effect of casino and WRPA traffic is likely to be a relatively small when compared to peak summer-time traffic volumes that already occur on this highway. Development of the casino would be unlikely to have a measurable affect on other highways and roads providing access to and within the WRPA.

The Riverton City Council has decided to actively pursue the construction and operations of a new medium security state prison in Riverton (Riverton Ranger 2003b). At present, it is not known when or whether the State of Wyoming will decide to locate a prison in the Riverton area, so the effects of the prison on area highways cannot be assessed.

The AADT increased on every affected segment between 1991 and 2001. Increases ranged from 8 percent at the west corporate limits of Shoshoni (or less than one percent per year) to 59 percent at the junction of US 26 and WYO 134 (almost 6 percent per year). In contrast, truck traffic decreased on most segments, with the notable exception on WYO 134, which had a 47 percent increase at the junction with US 26, a 20 percent increase at Midvale, and a 20 percent increase at the junction of WYO 133 and US 26. Although the percentage increase in truck traffic at these locations was substantial, the numerical increase was modest, ranging from 35 more trucks per day at the junction of WYO 134 and US 26, to 15 more trucks per day at both WYO 134 at Midvale and the junction of WYO 133 and US 26.

WYDOT has not prepared forecasts of future traffic conditions on the highways which provide access to the WRPA, but the agency generally assumes that traffic increases on highways across the state will average from 3 to 5 percent annually (Steele 2003), which is consistent with average annual increases on most of the affected segments between 1991 and 2001. If this assumption holds in the future, traffic on the affected segments would double in 15 to 25 years. As traffic on affected highway segments increases, traffic associated with the Proposed Action and alternatives would become a smaller portion of total traffic on these highways, and the contribution of the Proposed Action or other alternatives to cumulative impacts of natural gas activities within the WRPA would be negligible to minor on most segments, except where gas traffic converges on WYO 134 in the Midvale area, where impacts and particularly truck impacts could be minor to moderate.

Traffic associated with agricultural activities is anticipated to remain relatively stable and traffic associated with the MID may show short term increases during facility construction and reconstruction. Traffic associated with existing natural gas operations would decline over time. Although there may be some traffic associated with other natural resource extraction activities within the WRPA (sand and gravel mining) and outside the WRPA to the north and west (sand and gravel mining, oil and gas exploration and development, timber harvesting) schedules and locations for these activities have not been specified and have not been considered for this assessment. Therefore, the only activities which would have a substantial impact on county roads within the WRPA would be the Proposed Action and alternatives.

7.14 HEALTH AND SAFETY

The Proposed Action and alternatives, when considered with other past, present, and reasonably foreseeable future projects, would result in a slight increase in occupational accidents in the region above those identified for the Proposed Action alone, resulting in a minor impact. Human health and safety effects to the residents of properties adjacent to the major access roads within the WRPA would be minor. These minor risks would result from generation of increased traffic, noise, air emissions, and fugitive dust from project-related vehicles associated with any of the alternatives. Truck trips and related hazards to public safety associated with increased accident risks, dust, and noise emissions from the multiple activities would be slightly greater than described for the Proposed Action or alternatives alone. The cumulative impact associated with traffic increases would be experienced over a broader geographic area than just in and around the WRPA. Given the broad geographic area affected and the rural charter of the region, the cumulative impacts to health and safety would be minor.

Pipeline ruptures could potentially occur anywhere in the region where pipelines would be located. Given the relatively infrequent incidence of pipeline accidents, the rural character of the region, and modest level of overall construction and utility installation activity, the low potential for pipeline–related ruptures and accidents would result in minor cumulative impacts to health and safety. Other projects and construction activities in the region that would utilize, store or transport hazardous materials, and/or generate hazardous wastes would be subject to regulations that would minimize the potential for accidental spills or releases into the environment. Assuming that the Proposed Action or Alternatives and all other projects comply with applicable regulations, the cumulative human health and safety impacts within and near are rated as negligible.

7.15 NOISE

Since no additional noise sources other than natural gas development are anticipated within or adjacent to the WRPA, the cumulative impacts from noise within the WRPA would result from construction, drilling, and completion of wells, compressor stations, and project-related traffic along access roads. These impacts during development activities would be moderate. However, over the long term, cumulative noise effects within the WRPA would be minor, as there would be sufficient distance between project construction sites, facilities, and compressor stations, and residences within the WRPA and WRIR.

Under all alternatives, there would be minor increases in the cumulative noise resulting from increases in traffic along roads leading into the WRPA. The traffic would be greatest during the development phase (well pad construction, drilling, and completion) of the Wind River Gas Field Development Project. Additionally, the traffic noise would generally be the greatest during morning and evening when workers and equipment would be arriving and departing the construction sites. After all the wells are operational, traffic noise would decrease. Cumulative noise increases would be the highest along Gables Road and Eight Mile Road because approximately 70 percent of project traffic would use these routes to enter the WRPA from U.S. Highway 134. The other 30 percent would use Wyoming Highways 133 and 134 from U.S. Highway 26, resulting in a smaller increase of traffic noise along these roads. These minor increases in noise would be similar for each alternative. However, the length of the construction phase of each alternative would vary, so that the cumulative noise effects would last the longest time under Alternative A, followed by the Proposed Action, then Alternative B, and Alternative C.

8.0 AGENCY-PREFERRED ALTERNATIVE

The Proposed Action, involving development of 325 new wells, is the BIA's Preferred Alternative for the Wind Natural Gas Field Development Project. The selection of the Proposed Action incorporates implementation of various avoidance, minimization, and mitigation measures identified in the appendices in this FEIS. Such measures include the following: (1) Operator-committed and agency-required avoidance, minimization and mitigation measures for specific resources (Appendix B), (2) Agency Mitigation/Minimization Guidelines – (Appendix C), (3) Reclamation Plan (Appendix D), (4) Hazardous Materials Management Plan (Appendix E), (5) Wildlife Monitoring/Protection Plan (Appendix F), (6) Raptor Mitigation and Monitoring Plan (Appendix G). The BIA has concluded that these avoidance and minimization measures would reduce the potential environmental impacts resulting from the development and management in the WRPA. The BIA also feels that the analyses demonstrate that the Proposed Action would meet the requirements of 43 CFR 3162(a), which directs the Operators to conduct "....all operations in a manner which ensures the proper handling, measurement, disposition, and site security of leasehold production; which protects other natural resources and environmental quality; which protects life and property; and which results in maximum ultimate economic recovery of oil and gas with minimum waste, and with minimum adverse effect on ultimate recovery of other mineral resources."

Disclosure of the Proposed Action as the Agency-Preferred Alternative does not imply that this will be the BIA's final decision. Additional information that may be provided to the BIA during the FEIS waiting period, and public and BIA internal review comments, may result in the selection of an alternative in the ROD that combines components of the Proposed Action and the other alternatives to provide the best mix of operational requirements and mitigation measures needed to reduce environmental harm.

Alternative C – No Action is the environmentally preferable alternative [40 CFR 1505.2 (b)]. Only a limited number of wells could be approved resulting in fewer impacts than the other alternatives analyzed. Although Alternative C would result in fewer impacts, this alternative does not provide for the continued use of public minerals for oil and gas development consistent with the Report of the Energy Policy Development Group (2001b) and Executive Order 13212 (2001a).

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Table 1-1. Summary of Direct and Indirect Impacts from the Wind River Gas Field Development Project[1,2,3]

DESCRIPTION OF POTENTIAL IMPACT	MAGNITUDE AND DURATION			
Resource	**Proposed Action (325 Wells)**	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
PROPOSED DISTURBANCE (ACRES)				
Disturbance – Project Area Before reclamation – acres (% WRPA) After reclamation – acres (% WRPA)	 1,982 (2.15) 423 (0.46)	 2,819 (3.06) 612 (0.67)	 1,610 (1.75) 325 (0.35)	 317 (0.34) 79 (0.09)
GEOLOGY				
Increased surface runoff	Minor, Short term	Moderate, Short term	Minor, Short term	Minor, Short term
Increased surface erosion	Minor, Short term	Moderate, Short term	Minor, Short term	Minor, Short term
Collapse/piping/gullying	Minor, Short term	Moderate, Short term	Minor, Short term	Minor, Short term
Initiate mass movements	Negligible	Negligible	Negligible	Negligible
MINERALS				
Deplete petroleum reserves	Major, permanent	Major, permanent	Major, permanent	Major, permanent
Impede development of non petroleum resources	Negligible	Negligible	Negligible	Negligible
PALEONTOLOGY				
Damage to fossils	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
Uncover new fossils and localities **(beneficial)**	Minor, Long term	Moderate, Long term	Minor, Long term	Minor, Long term
Increased vandalism	Minor, Long term	Minor, Long term	Minor, Long term	Minor, Long term
Increased illegal collection	Minor, Long term	Minor, Long term	Minor, Long term	Minor, Long term
SOIL				
Exposure of soil from vegetation removal\	Minor, Short term	Moderate, Short term	Minor, Short term	Minor, Short term
Compaction/decreased permeability	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
Collapse/piping/gullying	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
Increased susceptibility of soil to wind and water erosion	Minor, Short term	Moderate, Short term	Minor, Short term	Minor, Short term
AIR QUALITY				
Increases in Local Pollutant Concentrations	PM_{10}: Minor, Short Term; NO_2, CO O_3: Minor, Long Term	PM_{10}: Minor, Short Term; NO_2, CO O_3: Minor, Long Term	PM_{10}: Minor, Short Term; NO_2, CO O_3: Minor, Long Term	PM_{10}: Minor, Short Term; NO_2, CO O_3: Minor, Long Term
Increases in Regional Pollutant Concentrations	PM_{10}: Minor, Short Term; NO_2, SO_2:	PM_{10}: Minor, Short Term; NO_2, SO_2:	PM_{10}: Minor, Short Term; NO_2, SO_2:	All Pollutants: Negligible, Long Term

DESCRIPTION OF POTENTIAL IMPACT	MAGNITUDE AND DURATION			
Resource	**Proposed Action (325 Wells)**	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
	Negligible, Long Term	Negligible, Long Term	Negligible, Long Term	
Hazardous Air Pollutant Non-Cancerous Health Effects	Negligible, Long Term	Negligible, Long Term	Negligible, Long Term	Negligible, Long Term
Hazardous Air Pollutant Cancerous Health Effects	Minor, Long Term	Minor, Long Term	Negligible, Long Term	Negligible, Long Term
Increases in Terrestrial Acid Deposition	Nitrogen Deposition: Minor, Long Term; Sulfur Deposition: No Impacts	Nitrogen Deposition: Minor, Long Term; Sulfur Deposition: No Impacts	Nitrogen Deposition: Minor, Long Term; Sulfur Deposition: No Impacts	Nitrogen Deposition: Negligible, Long Term; Sulfur Deposition: No Impacts
Increases in Aquatic Acid Deposition (Decreased Lake ANC)	No Impacts	No Impacts	No Impacts	No Impacts
Reductions in Visibility (Regional Haze)	Moderate, Short Term; Minor, Long Term	Moderate, Short Term; Minor, Long Term	Minor, Short Term	No Impacts
SURFACE WATER				
Disruption of surface drainage systems	Moderate, Short term; Minor, Long term	Moderate, Short term; Minor, Long term	Minor, Long term	Negligible, Long
Increased runoff and erosion	Moderate, Short term; Minor, Long term	Moderate, Long term	Minor, Long term	Minor, Long term
Reduction in peak flows	Minor, Long term	Minor, Long term	Minor, Long term	Minor, Long term
Increased sedimentation in lakes and reservoirs	Minor, Short term; Negligible, Long term	Moderate, Short term; Minor, Long term	Negligible, Long term	Negligible, Long term
Change in surface water networks	Moderate, Short term; Minor, Long term	Moderate, Short term; Minor, Long term	Minor, Long term	Minor, Long term
Increase in suspended solids (turbidity)	Moderate, Short term; Minor, Long term	Moderate, Short term; Minor, Long term	Minor, Long term	Minor, Long term
Change in water quality	Minor, Short term; Negligible, Long term	Minor, Short term; Negligible, Long term	Negligible, Long term	Negligible, Long term

DESCRIPTION OF POTENTIAL IMPACT	MAGNITUDE AND DURATION			
Resource	**Proposed Action (325 Wells)**	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
GROUNDWATER				
Decrease in water levels	Negligible, Long term	Negligible, Long term	Negligible, Long term	Negligible, Long term
Change in water quality	Negligible, Long term	Negligible, Long term	Negligible, Long term	Negligible, Long term
Change in hydraulic properties	Negligible, Long term	Negligible, Long term	Negligible, Long term	Negligible, Long term
VEGETATION				
Increased erosion	Minor, Short term	Moderate, Short term	Minor, Short term	Minor, Short term
Placement of riprap	Negligible, Long term	Negligible, Long term	Negligible, Long term	Negligible, Long term
Loss of vegetation[4]	Minor, Short- to long term	Moderate, Short- to long term	Minor, Short- to long term	Minor, Short- to long term
Reduction in species diversity	Minor, Long term	Moderate, Long term	Minor, Long term	Minor, Long term
Increase in bare ground	Minor, Long term	Moderate, Long term	Minor, Long term	Minor, Long term
Increase in noxious weeds and nuisance species	Minor, Long term	Moderate, Long term	Minor, Long term	Minor, Long term
WETLANDS				
Loss of wetlands	Minor, Long term	Minor, Long term	Minor, Long term	Minor, Long term
Reduction in wetland species diversity	Minor, Long term	Minor, Long term	Minor, Long term	Negligible, Long term
Exposure to contaminants	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
Loss of riparian areas	Negligible, Long term	Negligible, Long term	Negligible, Long term	Negligible, Long term
LAND USE				
Impact to agricultural lands	Moderate, Long term	Moderate, Long term	Minor, Long term	Minor, Short term[5]
Impact to range resources	Minor, Short term	Minor, Short term	Minor, Short term	Negligible, Short term
Impact to residential areas	Moderate, Long term	Moderate, Long term	Minor, Long term	Minor, Long term
Impact to recreational areas/ WHMAs	Minor, Long term	Minor, Long term	Minor, Long term	Negligible, Long term
Impact to Land Use Plans	Negligible, Long term	Negligible, Long term	Negligible, Long term	Negligible, Long term
WILDLIFE				
Impacts to fish and wildlife populations[6]	Minor, Short- to long term	Moderate, Short- to long term	Minor, Short- to long term	Minor, Short- to long term
Loss of wildlife habitat[6]	Minor, Short- to	Moderate, Short-	Minor, Short- to	Minor, Short- to

DESCRIPTION OF POTENTIAL IMPACT	MAGNITUDE AND DURATION			
Resource	**Proposed Action (325 Wells)**	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
	long term	to long term	long term	long term
Wildlife displacement[6]	Minor to moderate, Short- to long term	Moderate, Short- to long term	Minor, Short- to long term	Short- to long term
Increased mortality from vehicles	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
Habitat fragmentation	Minor, Long term	Moderate, Long term	Minor, Long term	Minor, Long term
Potential exposure to contaminants	Negligible, Short term	Negligible, Short term	Negligible, Short term	Negligible, Short term
Reduction in prey species	Minor, Short term	Moderate, Short term	Minor, Short term	Negligible, Short term
Increased predation	Minor, Short term	Minor, Short term	Minor, Short term	Negligible, Short term
Noise from human activities and equipment[6]	Minor to moderate, Short term	Moderate, Short term	Minor, Short term	Minor, Short term
Changes in wildlife behavior[6]	Minor to moderate, Short- to long term	Moderate, Short- to long term	Minor, Short- to long term	Minor, Short- to long term
THREATENED/ENDANGERED/STATE SENSITIVE SPECIES				
Loss of Canada lynx habitat	No habitat ("No effect")	No habitat ("No effect")	No habitat ("No effect")	No habitat ("No effect")
Loss of bald eagle nesting, roosting, foraging habitat	Minor, Short term ("not likely to adversely affect")	Minor, Short term ("not likely to adversely affect")	Minor, Short term ("not likely to adversely affect")	Minor, Short term ("not likely to adversely affect")
Loss of black-footed ferret habitat	Negligible, Long term ("not likely to adversely affect")	Negligible, Long term ("not likely to adversely affect")	Negligible, Long term ("not likely to adversely affect")	Negligible, Long term ("not likely to adversely affect")
Loss of gray wolf habitat	Negligible, Short term ("not likely to adversely affect")	Negligible, Short term ("not likely to adversely affect")	Negligible, Short term ("not likely to adversely affect")	Negligible, Short term ("not likely to adversely affect")
Loss of grizzly bear habitat	Negligible, Short term ("not likely to adversely affect")	Negligible, Short term ("not likely to adversely affect")	Negligible, Short term ("not likely to adversely affect")	Negligible, Short term ("not likely to adversely affect")
Loss of mountain plover habitat	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
Increase in bare ground **(beneficial for mountain plover)**	Minor, Long term	Minor, Long term	Minor, Long term	Minor, Long term

DESCRIPTION OF POTENTIAL IMPACT	MAGNITUDE AND DURATION			
Resource	**Proposed Action (325 Wells)**	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
Loss of sage-grouse habitat	Minor, Long term	Moderate, Long term	Minor, Long term	Negligible, Long term
Increased mortality of T/E or State-sensitive species	Minor, Short term	Minor, Short term	Minor, Short term	Negligible, Short term
Potential exposure to contaminants	Negligible, Short term	Negligible, Short term	Negligible, Short term	Negligible, Short term
RECREATION				
Loss of federal and trust lands available for recreation	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
Reduction in hunting opportunities	Minor, Short- to long term	Moderate, Short-long term	Minor, Short- to long term	Minor, Short- to long term
Reduction in fishing opportunities	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
Reduction in ORV recreation	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
Decreased wildlife viewing opportunity	Minor, Long term	Moderate, Long term	Minor, Long term	Minor, Long term
Impacts to hunting on tribal lands	Minor, Short- to long term	Moderate, Short- to long term	Minor, Short- to long term	No impact
Impacts to fishing on tribal lands	Minor, Short term	Minor, Short term	Minor, Short term	No impact
VISUAL RESOURCES				
Alteration of landscape character	Moderate, Long term	Moderate, Long term	Minor, Long term	Minor, Long term
Reduction in scenic quality	Moderate, Long term	Moderate, Long term	Moderate, Long term	Minor, Long term
Reduction in night sky quality	Moderate, Short term	Moderate, Short term	Moderate, Short term	Minor, Short term
Impact to VRI Class IV areas	Negligible, Long term	Negligible, Long term	Negligible, Long term	Negligible, Long term
Impact to VRI Class III areas	Minor, Long term	Moderate, Long term	Negligible, Long term	Negligible, Long term
CULTURAL RESOURCES				
Increased vandalism	Minor, Long term	Minor, Long term	Minor, Long term	Minor, Long term
Increased unauthorized collection	Minor, Long term	Minor, Long term	Minor, Long term	Minor, Long term
Construction damage to sites	Minor, Long term	Minor, Long term	Minor, Long term	Minor, Long term
Disturbance of Native American traditional uses	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
SOCIOECONOMICS				
Regional economic output **(beneficial)**	Moderate, Long term	Moderate, Long term	Moderate, Long term	Minor, Long term
Employment **(beneficial)**	Moderate, Long term	Moderate, Long term	Moderate, Long term	Minor, Long term
Personal income **(beneficial)**	Major, Long term	Major, Long term	Major, Long term	Minor, Long term

DESCRIPTION OF POTENTIAL IMPACT	MAGNITUDE AND DURATION			
Resource	**Proposed Action (325 Wells)**	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
Revenues to the Eastern Shoshone and Northern Arapaho Tribes **(beneficial)**	Major, Long term	Major, Long term	Moderate, Long term	Minor, Long term
Revenues to Fremont County taxing entities **(beneficial)**	Moderate, Long term	Moderate, Long term	Minor, Long term	Minor, Long term
Increased local population	Negligible to minor, Long term	Minor, Long term	Negligible to minor, Long term	Negligible, Long term
Housing demand	Negligible, Long term	Negligible to minor, Long term	Negligible, Long term	Negligible, Long term
Law enforcement and emergency response	Minor, Long term	Minor, Long term	Minor, Long term	Negligible, Long term
Midvale Irrigation District revenues and operations	Negligible, Long term	Negligible, Long term	Negligible, Long term	Negligible, Long term
Split estate conflicts	Moderate, Long term	Moderate, Long term	Moderate, Long term	Moderate, Long term
Change in rural character	Moderate, Long term	Moderate, Long term	Moderate, Long term	Moderate, Long term
TRANSPORTATION				
Increased traffic and maintenance demands on state and federal Highways	Minor (except for WYO 134, which would be moderate), Long term	Minor (except for WYO 134, which would be moderate), Long term	Minor (except for WYO 134, which would be moderate), Long term	Negligible (except for WYO 134, which would be minor), Long term
Increased traffic and maintenance demand on county roads.	Minor to Moderate (varying over time and across the WRPA), Long term	Minor to Moderate (varying over time and across the WRPA), Long term	Minor to Moderate (varying over time and across the WRPA), Long term	Minor to Moderate (varying over time and across the WRPA), Long term
Traffic on private and operator-maintained roads	Minor, Long term	Moderate, Short term, Minor, Long term	Minor, Long term	Minor, Long term
Highway and road safety	Minor, Long term	Minor, Long term	Minor, Long term	Minor, Long term
HEALTH AND SAFETY				
Increased work-related accidents	Minor, Long term	Minor, Long term	Minor, Long term	Negligible, Long term
Increased vehicle traffic and accidents	Minor, Long term	Minor, Long-Term	Minor, Long term	Minor, Long term
Increased likelihood of wildfires	Negligible, Short term	Negligible, Short term	Negligible, Short term	Negligible, Short term
Pipeline Fire and Explosion Hazards	Minor, Long term	Minor, Long term	Minor, Long term	Negligible, Long term
Hazardous Materials and	Negligible, Long	Negligible, Long	Negligible, Long	Negligible,

DESCRIPTION OF POTENTIAL IMPACT	MAGNITUDE AND DURATION			
Resource	**Proposed Action (325 Wells)**	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
Waste – spills and releases	term	term	term	Long term
Use of magnesium chloride for dust control	Negligible, Long term	Negligible, Long term	Negligible, Long term	Negligible, Long term
NOISE				
Well pad and access road construction	Moderate, Short term	Moderate, Short term	Moderate, Short term	Moderate, Short term
Drilling operations	Moderate, Short term	Moderate, Short term	Moderate, Short term	Moderate, Short term
Venting operations	Moderate, Short term	Moderate, Short term	Moderate, Short term	Moderate, Short term
Compressor stations	Moderate, Long term	Moderate, Long term	Moderate, Long term	Moderate, Long term
Vehicle-related noise during construction/drilling	Moderate, Short term	Moderate, Short term	Moderate, Short term	Moderate, Short term
Vehicle-related noise from production activities	Minor, Long term	Minor, Long term	Minor, Long term	Minor, Long term

[1]**Definitions:**
Negligible impacts – Changes in resource condition are lightly above level of detection.
Minor Impacts – Changes is resource condition are measurable, but small and localized.
Moderate Impacts – Changes in resource condition are measurable and result in consequences that are relatively localized.
Major Impacts – Changes in resource condition are measurable and have substantial consequences at a regional level.
Short-term Impacts – Effects of short duration, that would occur during construction, drilling, completion and reclamation of a well.
Long-term Impacts – Effects of long duration, that would persist beyond the construction, drilling and reclamation phases, or continue for the life of the project.
[2]See Chapter 4 for detailed discussion of impacts.
[3]All impacts are adverse unless identified as "beneficial."
[4]Impacts would vary with vegetation species. Sagebrush recovery is long term; recovery of grasses is short term.
[5]Impacts from gas development in the Pavillion field are considered Short term, since disturbance from well pads will be reduced to 8'x8' in agricultural areas.
[6]Impacts would vary with wildlife species. Impacts to wildlife species foraging on sagebrush or desert shrub would be long term; impacts to species foraging on grasses or prey species would be short term

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Table 1-2. Summary of Cumulative Impacts from the Proposed Wind River Gas Field Development Project. 1,2,3,[4]

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
DISTURBANCE (ACRES)[5]					
Disturbance – WRPA Before reclamation – acres (% WRPA) After reclamation – acres (% WRPA)	Varies with resource analyzed	1,982 (2.15) 423 (0.46)	2,819 (3.06) 612 (0.67)	1,610 (1.75) 325 (0.35)	317 (0.34) 79 (0.09)
GEOLOGY/MINERALS/PALEONTOLOGY					
Increased surface runoff and erosion	Wind River Indian Reservation	Minor	Moderate	Minor	Minor
Deplete petroleum reserves	WRIR	Major	Major	Major	Major
Deplete other resources, e.g. sand and gravel	WRIR	Negligible	Negligible	Negligible	Negligible
Damage to fossils	WRIR	Negligible	Minor	Negligible	Negligible
Uncover new fossils and localities **(beneficial)**	WRIR	Minor	Moderate	Minor	Minor
SOILS					
Increased runoff and	Boysen Reservoir Watershed: includes Fivemile Creek, Muddy Creek, Cottonwood Drain, Cottonwood Creek	Minor	Moderate	Minor	Minor
Soil compaction	Boysen Reservoir Watershed	Minor	Moderate	Minor,	Minor
Loss of topsoil productivity	Boysen Reservoir Watershed	Minor	Moderate	Minor	Minor
Soil contamination (petroleum hydrocarbons and	Boysen Reservoir Watershed	Unknown	Unknown	Unknown	Unknown

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
salts)					
AIR QUALITY					
Increases in Local Pollutant Concentrations	Near Field – Project Area + 22.7 miles	PM_{10}: Moderate; NO_2,: Moderate SO_2: negligible	PM_{10}: Moderate; NO_2,: Moderate SO_2: negligible	PM_{10}: Moderate; NO_2,: Moderate SO_2: negligible	PM_{10}: Moderate; NO_2,: Moderate SO_2: negligible
Increases in Regional Pollutant Concentrations	Far Field -Regional including northwestern portion of WY, Grand Teton and Yellowstone National Parks and Bridger, Fitzpatrick, Popo Agie, Cloud Peak, North Absaroka, Teton, and Washakie wilderness areas	PM_{10}: Moderate, NO_2,: Moderate SO_2: negligible	PM_{10}: Moderate, NO_2,: Moderate SO_2: negligible	PM_{10}: Moderate NO_2,: Moderate SO_2: negligible	PM_{10}: Moderate NO_2,: Moderate SO_2: negligible
Increases in Terrestrial Acid Deposition (nitrogen only: sulfur is negligible in all cases).	Far Field - Regional	Cloud Peak: Minor, Other areas: negligible.	Cloud Peak: Minor, Other areas: negligible	Cloud Peak: Minor, Other areas: negligible	Cloud Peak: Minor, Other areas: negligible
Increases in Aquatic Acid Deposition (Decreased Lake ANC)	Far Field - Regional	Florence Lake: Moderate Emerald Lake: minor, Other lakes: negligible.	Florence Lake: Moderate Emerald Lake: minor, Other lakes: negligible	Florence Lake: Moderate Emerald Lake: minor, Other lakes: negligible	Florence Lake: Moderate Emerald Lake: minor, Other lakes: negligible
Reductions in Visibility (Regional Haze)	Far Field - Regional	Days > 1.0 dv: 30 Max Δ dv: 2.15, Wind River Canyon	Days > 1.0 dv: 34 Max Δ dv: 2.22, Wind River Canyon	Days > 1.0 dv: 28 Max Δ dv: 2.12, Wind River Canyon	Days > 1.0 dv: 24 Max Δ dv: 2.04, Wind River Canyon
SURFACE WATER					
Disruption of surface drainage systems	Boysen Reservoir Watershed	Minor to moderate	Minor to moderate	Minor	Minor

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
Increased runoff and erosion	Boysen Reservoir watershed	Minor to moderate	Minor to moderate	Minor	Minor
Increased sedimentation in lakes and reservoirs	Boysen Reservoir Watershed	Minor	Moderate	Negligible	Negligible
Increased suspended solids (turbidity)	Boysen Reservoir Watershed	Moderate	Moderate	Minor	Minor
Change in water quality	Boysen Reservoir Watershed	Minor	Minor	Negligible	Negligible
GROUNDWATER					
Change in water quality,	Boysen Reservoir Watershed	Negligible	Negligible	Negligible	Negligible
VEGETATION					
Loss of vegetation	Boysen Reservoir Watershed	Minor	Moderate	Minor	Minor
Reduction in species diversity	Boysen Reservoir Watershed	Minor	Moderate	Minor	Minor
Increase in noxious weeds and nuisance species	Boysen Reservoir Watershed	Minor	Moderate	Minor,	Minor
WETLANDS					
Loss of wetlands, riparian areas.	Boysen Reservoir Watershed	Minor	Minor	Minor	Minor
LAND USE					
Impact to agricultural lands	WRPA plus Surrounding area	Moderate	Moderate	Minor	Minor[4]
Impact to range resources	WRPA plus Surrounding area	Minor	Minor	Minor	Negligible
Impact to residential areas	WRPA plus Surrounding area	Moderate	Moderate	Minor	Minor
Impact to recreational areas/ WHMAs	WRPA plus Surrounding area	Minor	Minor	Minor	Negligible

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
WILDLIFE					
Impacts to fish and wildlife species	Boysen Reservoir Watershed:	Minor to moderate depending on species	Minor to moderate depending on species	Minor to moderate depending on species	Minor to moderate depending on species
Loss of habitat	Boysen Reservoir Watershed	Minor to moderate depending on species	Minor to moderate depending on species	Minor to moderate depending on species	Minor to moderate depending on species
Wildlife displacement	Boysen Reservoir Watershed	Minor to moderate	Moderate	Minor	Minor
Increased mortality	Boysen Reservoir Watershed	Minor	Minor	Minor	Minor
Habitat fragmentation	Boysen Reservoir Watershed	Minor to moderate depending on species	Minor to moderate depending on species	Minor to moderate depending on species	Minor to moderate depending on species
THREATENED/ ENDANGERED/STATE SENSITIVE SPECIES					
Loss of Canada lynx habitat	Boysen Reservoir Watershed	None	None	None	None
Loss of bald eagle nesting, roosting, foraging habitat	Boysen Reservoir Watershed	Minor	Minor	Minor	Minor
Loss of black-footed ferret habitat	White-tailed prairie dog colonies in WRPA	Negligible	Negligible	Negligible	Negligible
Loss of gray wolf habitat	Boysen Reservoir Watershed	Negligible	Negligible	Negligible	Negligible
Loss of grizzly bear habitat	Boysen Reservoir Watershed	Negligible	Negligible	Negligible	Negligible
Loss of mountain plover habitat	Boysen Reservoir Watershed	Minor	Minor	Minor	Minor
Loss of sage-grouse habitat	Boysen Reservoir Watershed	Moderate	Moderate	Moderate	Moderate
RECREATION					

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
Reduction in hunting and fishing opportunities, wildlife viewing and ORV recreation.	WRPA, WRIR, and WHMAs adjacent to WRPA	Minor	Minor	Minor	Minor
VISUAL RESOURCES					
Alteration of landscape character	WRPA + Surrounding area	Moderate	Moderate	Minor	Minor
Reduction in scenic quality	WRPA + Surrounding area	Moderate	Moderate	Moderate	Minor
Impact to VRI Class III areas	WRPA + Surrounding area	Minor	Moderate	Negligible	Negligible
CULTURAL RESOURCES					
Impacts to cultural resources.	WRPA + 5 mi Buffer	Minor	Minor	Minor	Minor
Disturbance of Native American traditional uses	WRPA + 5 mi Buffer	Minor	Minor	Minor	Minor
SOCIOECONOMICS					
Regional economic output **(beneficial)**	WRIR, Fremont County	Moderate	Moderate	Moderate	Minor
Employment **(beneficial)**	Moderate, WRIR, Fremont County	Moderate	Moderate	Moderate	Minor
Personal income **(beneficial)**	WRIR, Fremont County	Major	Major	Major	Minor
Revenues to the Eastern Shoshone and Northern Arapaho Tribes **(beneficial)**	Major, Long term WRIR, Fremont County	Major	Major	Moderate	Minor

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
Revenues to Fremont County taxing entities **(beneficial)**	WRIR, Fremont County	Moderate,	Moderate	Minor	Minor
Split estate conflicts	WRIR, Fremont County	Moderate,	Moderate	Moderate	Moderate
Increased traffic and maintenance demands on state and federal Highways	WRPA and Public Access into Area	Minor (except for WYO 134, which would be moderate	Minor (except for WYO 134, which would be moderate),	Minor (except for WYO 134, which would be moderate),	Negligible (except for WYO 134, which would be minor
Increased traffic and maintenance demand on county roads.	WRPA, Public Access into Area	Minor to Moderate (varying over time and across the WRPA),	Minor to Moderate (varying over time and across the WRPA	Minor to Moderate (varying over time and across the WRPA	Minor to Moderate (varying over time and across the WRPA
HEALTH AND SAFETY					
Increased work-related accidents	WRPA, Public Access into Area	Minor	Minor	Minor	Negligible
Increased vehicle traffic and accidents	WRPA, Public Access into Area	Minor	Minor	Minor	Negligible
Increased likelihood of wildfires	WRPA, Public Access into Area	Negligible	Negligible	Negligible	Negligible
Pipeline Fire and Explosion Hazards	WRPA, Public Access into Area	Minor	Minor	Minor	Negligible
Hazardous Materials and Waste – spills and releases	WRPA, Public Access into Area	Negligible	Negligible	Negligible	Negligible
NOISE					
Noise from construction	WRPA and surrounding area	Moderate	Moderate	Moderate	Moderate
Noise from drilling	WRPA and surrounding area	Moderate	Moderate	Moderate	Moderate
Vehicle noise	WRPA and surrounding area	Minor	Minor	Minor	Minor

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
Compressor noise	WRPA and surrounding area	Moderate	Moderate	Moderate	Moderate

[1]**Definitions:**
Negligible impacts – Changes in resource condition are lightly above level of detection.
Minor Impacts – Changes is resource condition are measurable, but small and localized.
Moderate Impacts – Changes in resource condition are measurable and result in consequences that are relatively localized.
Major Impacts – Changes in resource condition are measurable and have substantial consequences at a regional level.
[2]See DEIS Chapter 5 for detailed discussion of cumulative impacts.
[3]All impacts are adverse unless identified as "beneficial."
[4] Note that these determinations assume implementation of mitigation.
[5] Quantitative data are not available for disturbances from past, present, and RFFA

SECTION 2: ADDENDA AND ERRATA

Section 2, Addenda and Errata, has been prepared in response to public and agency review comments on the Draft EIS. This section includes additions to the Draft EIS and corrections of errors identified by the agency and public comments received. When the changes in the text were minor, only the corrections and page number from the Draft EIS are identified. Where more substantial revisions were made, a complete revised section to the Draft EIS is included.

VOLUME I

Dear Reader Letter: Add the following phone numbers: "Bureau of Indian Affairs (307-332-3718), Bureau of Land Management (307-332-8400), Midvale Irrigation District (307-856-6359)"

EXECUTIVE SUMMARY

After **"EXISTING DEVELOPMENT"**, p. ii, add a new paragraph:

INTERIM DEVELOPMENT DURING PREPARATION OF EIS

Development of minerals within the jurisdiction of the BIA would be allowed as detailed in a Memorandum of Agreement, effective December, 2003 between The Wind River Natural Gas Development Project Operators, USDI-BIA, The Shoshone and Arapaho Tribes Joint Business Council, and USDI-BLM for an Interim Activity Plan.

PROPOSED ACTION AND ALTERNATIVES

Alternative C – No Action

p. vi, first full sentence, change as shown "…~~a~~ Communitization Agreements…"

Geology/Mineral Resource/Paleontology

p. vii, third paragraph, third sentence change as noted: "…would be minor in the ~~and~~ short or long term…"

Water Resources

p. ix, third paragraph, revise as noted: "Impacts to groundwater from implementation of either the Proposed Action or alternatives could result in decrease in water levels, change in water quality and change in hydraulic properties. ~~These impacts would be negligible under all alternatives.~~ Since the operators would utilize well casing and cementing pursuant to Onshore Order No. 1 and WOGCC rules, ~~there is a low probability of any impact, and that impact would be negligible under any alternative~~ the likelihood of any impacts would be negligible.

Health and Safety

p. xv, first paragraph, second sentence, revise as shown: "…potential natural gas ~~and hydrogen sulfide~~ leaks,…".

Wildlife

p. xix, second sentence, revise as underlined "…to the amount of development…"

Socioeconomics

p. xx, revise first sentence, as underlined: "….Current plans are to begin construction in the ~~spring of 2004~~ winter of 2005." Note: in the DEIS it was assumed that construction would begin in 2004.

p. xxi, fourth paragraph, revise first sentence, as underlined: "…on irrigated lands in the Pavillion Field, where well heads have been reclaimed to 8x8 feet…"

ABBREVIATIONS AND ACRONYMS

Add the following:

FONSI	Finding of No Significant Impact
HP	Horsepower
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
$PM_{2.5}$	Particulates 2.5 microns or smaller
PM_{10}	Particulates 10 microns or smaller
SO_2	Sulfur dioxide
SO_x	Sulfur oxides

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Replace the entire Table of Contents with the following:

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CHAPTER 1: PURPOSE AND NEED

There were no changes to Chapter 1 text.

CHAPTER 2: PROPOSED ACTION AND ALTERNATIVES

2.3 PROPOSED ACTION – 325 NEW GAS WELLS

p. 2.1-5, last line, add after "…(LOP) of 20-40 years.": "Development of minerals within the jurisdiction of the BIA would be allowed as detailed in a Memorandum of Agreement, effective December, 2003 between the Wind River Natural Gas Development Project Operators, ~~USDI~~ BIA, the Shoshone and Arapaho Tribes Joint Business Council, and ~~USD~~I-BLM for an Interim Activity Plan."

p. 2.1-7 through 8, revise the first eight bulleted items as shown:

- On ~~agricultural~~irrigated farm land in the Pavillion field, wells would only be drilled in the winter months (November to April) to minimize the impact on the irrigated fields.
- On ~~agricultural~~ irrigated farm land in the Pavillion field, only the wellhead and flowline would be located in the crop field for new wells. The wellhead in ~~agricultural~~irrigated farm areas would be reduced to 8x8 feet after construction and drilling have been completed.
- Production facilities would be centralized on dry ground or the edge of ~~agricultural~~irrigated farm areas adjacent to the roads.
- "Topsoil would be removed and stockpiled prior to all surface disturbing activities as detailed ~~in Appendix D~~, Reclamation Plan appendix D in the FEIS."
- After topsoil removal and stockpiling, fill material, purchased from the landowner or other source acceptable to the landowner, would be used to pad the irrigated field during drilling operations to protect the crops~~land~~ and would be removed before the spring thaw. An impervious geomembrane or other acceptable barrier would be placed between the subsoil of the irrigated field and fill material used to build the drill pad.
- The Operators would accommodate the landowners, as much as possible, in the location of the well pads, while maintaining well spacing required in the spacing orders.
- Existing rights-of-way would be used for pipeline construction, where possible.
- Closed mud systems for drilling would be used on ~~agricultural~~irrigated farm lands to eliminate the need for a reserve pit.
- Reserve pit spoil material would be relocated as soon as drilling is completed (not applicable to ~~agricultural~~irrigated farm lands).

p. 2.1-8, delete the eleventh bulleted item, beginning:

- "The size of the reserve pit would be reduced in agricultural areas …"

p. 2.1-8, add the following bullet after the 12th bullet:

- "Regardless of ownership, no wells or facilities would be located closer than ~~200~~ 300 feet from a ~~house~~ residence, barn, or place where people are known to congregate without written permission of the lessor or surface owner."

2.6 ALTERNATIVE C – NO ACTION

p. 2.1-13, second paragraph, revise as shown: "…and on tribal minerals to offset drainage ~~on adjacent tribal~~ from adjacent fee minerals."

2.7 PLAN OF OPERATIONS

2.7.2.1 Access Road Construction

p. 2.1-15, second paragraph, fourth sentence, revise as underlined: "Roads located on private ~~lands~~ surface/tribal minerals would be…"

2.7.2.2 Well Pad Design and Construction

p. 2-21, first paragraph, last sentence, revise, as underlined: "…is planned to include, but not be limited to, the Wind River…"

2.7.2.3 Drilling Operations

p. 2-29, third paragraph, first sentence, revise, as underlined: "…in the WRPA will include, but not be limited to, the Wind River…"

p. 2-30, first full paragraph, revise, as underlined: "…would be self-contained, or use the BLM/BIA approved envirotech system when not self-contained, and would not require a septic system."

2.7.2.4 Directional Drilling

p. 2-30, first sentence of section, revise as noted: "…4) considerations of ~~health and safety~~ health, safety, and environmental concerns associated with occupied residences…"

2.7.2.11 Site Restoration and Abandonment

p. 2-47, paragraph after bulleted item list, revise third sentence as shown: "…well pads in irrigated fields would be reclaimed to 8x8 feet, unless a larger pad is requested by the landowner ~~the landowner specified otherwise~~."

2.8 MITIGATION MEASURES

Revised avoidance, minimization and mitigation measures are provided in Appendix B of the FEIS.

2.8.1 Project-Wide Mitigation Measures

p. 2-57, first paragraph, revise as noted: "~~Mitigation requirements~~ Minimization measures for listed and proposed species were developed through coordination with the Service's Cheyenne and Lander Field Offices ~~for threatened and endangered species have been prepared by the USFWS~~ (~~2002~~ 2004c; also see appendix C of the FEIS) for the Wind River Gas Field Development Project."

p. 2-57, second paragraph, first sentence, revise, as underlined: "…would also be applied in privately owned surface overlying tribal minerals, unless otherwise specified…"

2.8.1.1 Pre-construction Planning and Design Measures

p. 2-57, second bulleted item, revise, as underlined: "…unless the BIA, BOR, or private surface/tribal minerals landowners, whichever is applicable, specifies otherwise.

Third bulleted item, revise as shown: "

- The Operators would prepare and submit an APD for each proposed well site on ~~federal and~~ tribal leases to the ~~BIA~~ BLM for approval prior to initiation of construction. Prior to construction, the Operators or their contractors would submit a Sundry Notice and/or ROW application for each pipeline and access road segment on tribal ~~or federal~~ leases. The APD would be complete in accordance with Onshore Order No. 1 and 43 CFR 3160.~~include a Surface Use Plan that will show the layout of the well pad over the existing topography, dimensions of the pad, volumes and cross sections of cut and fill, location and dimensions of reserve pits, and access road egress and ingress.~~ The APD, Sundry Notice, and/or ROW application would also itemize project administration, time frame, and responsible parties. In addition, a Reclamation Plan would be developed by the Operators for each facility in consultation with tribal, federal, and private surface owners.

2.8.2.7 Land Use

p. 2-62, revise the first two bulleted items as shown:

- Utilize off-site production facilities in ~~agricultural~~ irrigated farm areas to reduce impacts to landowners.
- Expedite construction and reclamation activities within ~~agricultural~~ irrigated farm lands to minimize total time of disruption to landowners. Concentrate construction activities during the non-productive crop seasons (i.e. winter).

2.8.2.8 Wildlife

p. 2-63, fourth bulleted item, revise, as underlined: "All carcasses would be removed promptly from Operator-controlled access roads…"

2.8.2.13 Socioeconomics

p. 2-67, revise the first two bulleted items of the subheading as shown:

- ~~Require all contractors to comply with applicable tax laws.~~
- Implement hiring policies that encourage the use of local and tribal workers who would not have to relocate in the vicinity of the WRPA. ~~Require compliance with the Tribes' TERO laws.~~

2.8.2.14 Transportation

p. 2-67, replace the third bulleted item of the subheading, and add two other items, as shown:

- A transportation planning committee would be formed within six months after signing the Record of Decision (ROD) to address natural gas access and road maintenance issues. The committee would include the Operators, the Shoshone and Arapaho Tribes, the BIA, Fremont County, the BOR and WYDOT. Prior to each year's drilling program, the Operators would meet with the committee and present their drilling and field development program. The members of the committee would identify road maintenance issues, road and bridge sufficiency and safety issues, and preferred access

routes. The committee as a whole would identify measures to avoid or minimize impacts and assign responsibilities for addressing issues. The committee would meet semi-annually or, more frequently, as necessary.
- The Transportation Committee would develop a formal Transportation Plan within one year of issuance of the ROD.
- The Operators would encourage all employees and contractors to comply with federal, state, county and WRIR traffic laws and regulations.

2.8.2.16. Noise

p. 2-68, third bulleted item, replaced as shown:

- Facilities (e.g., compressors) will be placed at a minimum of 350 feet from existing residences, in accordance with the requirements of the Sate of WYoming

2.9.4 Natural Resource Protection

p. 2-79, first paragraph, last sentence, revise, as underlined: "Mitigation measures on private surface/tribal minerals are established with the individual landowner."

p. 2-80, second bulleted item, revise, as underlined: "On irrigated agricultural land…".

p. 2-80, third bulleted item revise, as underlined: "Fill material, purchased from the landowner or other source acceptable to the landowner, would be…"

"2.8.5 FORTY-ACRE SPACING…" SHOULD BE "2.9.5 FORTY-ACRE SPACING…"

p. 2-81, third paragraph of the section, revise as shown: "The Mineral Leasing Act, ~~and~~ 43 CFR parts 3160-3165, and Wyoming Oil and Gas Conservation Commission Statute §30-5-109, Rules and Regulations Governing Drilling Units require~~s~~ the lease holders to conduct their drilling program…"

CHAPTER 3: AFFECTED ENVIRONMENT

After **Section 3.3.3,** p. 3.1-30, add the following text to the DEIS:

3.3.4 Soil Hydrocarbon Hazards

Current drilling and development practice proscribes and implements measures to prevent soil contamination by hydrocarbon waste products during oil and gas development. Many of these measures were not implemented during previous drilling and development practices during the previous oil and gas development in the WRPA. As a result hazardous wastes may be present at some locations within the project area. Private landowners have noted the occurrence of hydrocarbon wastes which exceed maximum contaminant limits at two well pads near Pavilion, Wyoming (Dollhopf, 2004). The wastes are presumed to have accumulated in open pits and occur between 4.5 feet to 10 feet in depth. The extant of contamination within the project area is presently unknown.

3.4 CLIMATE AND AIR QUALITY

p. 3.4-1, Replace entire section 3.4 in the DEIS with the following text:

3.4.1 Introduction

Regional air quality is influenced by a combination of factors including climate, meteorology, the magnitude and spatial distribution of local and regional air pollution sources, and the chemical properties of emitted pollutants. Within the lower atmosphere, regional and local scale air masses interact with regional topography to influence atmospheric dispersion and transport of pollutants. The following sections summarize the climatic conditions and existing air quality within the Wind River Project Area (WRPA) and surrounding region.

3.4.2 Climate

The WRPA is located in a semiarid mid-continental climate regime typified by dry windy conditions, limited rainfall, and long cold winters. Low relative humidity, a high percentage of sunshine, and windy conditions generally contribute to high rates of evaporation typical of the area. There is little spatial variability in climatic conditions within the WRPA, as the topography and elevation are fairly uniform.

3.4.2.1 Temperature and Precipitation

Dry conditions prevail near the WRPA with average annual precipitation rate between six and eight inches measured near Boysen Reservoir (Daddow 1996; Plafcan et al. 1995). Outside the WRPA on the flanks of the surrounding mountains, precipitation is greater than 30 inches per year, and near the top of the Wind River Range it is greater than 50 inches per year. Between October and March, precipitation occurs as snow. In the WRPA snowfall is generally less than 20 inches per year. In the Owl Creek Mountains just north of the WRPA, snowfall averages 40 to 80 inches per year and in the Wind River Range to the southwest over 150 inches.

The nearest National Weather Service (NWS) climatological measurements were recorded at Pavillion, Wyoming for the period 1948 through 2002. The Pavillion station is located approximately 10 miles west of the WRPA at an elevation of 5,440 feet (Western Regional Climate Center 2003a). Table 3.4-1 presents the average temperature range, precipitation and snowfall by month as recorded at the Pavillion, WY station. The Pavillion climatic conditions are charted in Figures 3.4-1 and 3.4-2.

Table 3.4-1. Average Temperature Range, Average Precipitation and Snowfall at Pavillion, Wyoming (1948 – 2002

Month	Average Temperature Range (°F)		Average Precipitation (inches)	Average Snowfall (inches)
	Low	High		
January	7.8	32.4	0.17	3.2
February	13.2	38.8	0.18	3.0
March	20.7	47.9	0.36	4.8
April	29.7	58.2	0.94	4.0
May	39.1	67.7	1.71	0.7
June	47.0	77.0	1.22	0.2
July	53.3	85.2	0.79	0.0
August	51.6	83.4	0.51	0.0
September	42.3	72.7	0.82	0.6
October	31.9	60.3	0.53	1.7
November	18.3	43.2	0.35	3.8
December	9.9	34.0	0.22	3.3
Annual Average	30.4	58.4	7.81	25.3

Source: Western Regional Climate Center (2003a). Data collected at Pavillion, Wyoming from 1948 through 2002.

Prevailing synoptic-scale westerly air masses originating from the Pacific Ocean are interrupted by the Continental Divide and subsequently lose much of their moisture before reaching the eastern plains and the WRPA. The annual average precipitation at Pavillion is 7.81 inches, and ranges from a minimum of 2.50 inches recorded in 1974, to a maximum of 12.54 inches recorded in 1971. January is the driest month with an average precipitation rate of 0.17 inches, and May is the wettest month with an average of 1.71 inches. The annual average snowfall is 25 inches, with March, April and November being the snowiest months. A maximum snowfall of 65.5 inches was recorded in 1959. In contrast, annual average precipitation and snowfall at the Pinedale station, located west of the Continental Divide, is 11 inches and 61 inches, respectively (Western Regional Climate Center 2003b).

In the direct vicinity of the WRPA there are eight weather stations (Daddow 1996). Table 3.4-2 presents a summary of precipitation and temperature data for these stations. The stations located closest to the WRPA are Boysen Dam, Riverton, and Pavillion.

Table 3.4-2. Average Annual Precipitation and Temperature for Selected Stations Near the WRPA.

Weather Station	Latitude (deg-min)	Longitude (deg-min)	Altitude (ft. amsl)	Period of Record	Average Annual Precipitation (inches)	Average Annual Temperature (F)
Anchor Dam	43° 40’	108° 50’	6,460	1961-1979	15.2	41.3
Boysen Dam	43° 25’	108° 11’	4,642	1961-1990	9.29	47.4
Burris	43° 22’	109° 17’	6,140	1961-1990	8.93	44.3
Diversion Dam	43° 14’	108° 56’	5,575	1961-1990	8.97	44.9
Fort Washakie	42° 59’	108° 53’	5,550	1961-1990	11.9	42.2
Lander WSO AP	42° 49’	108° 44’	5,370	1951-1979	13.0	46.0
Pavillion	43° 15’	108° 41’	5,440	1961-1990	7.53	44.3
Riverton	43° 01’	108° 23’	4,950	1961-1990	7.74	42.6

Source: Daddow 1996.

The WRPA, which is situated on the eastern slope of the Continental Divide, ranges in elevation from 5,000 feet to 5,500 feet above mean sea-level (amsl), resulting in a relatively cool climate with an annual average temperature of 44.4°F. Recorded daily extreme temperatures are – 40° F in 1983 and 98 F in 1949.

In the wintertime, it is characteristic to have rapid and frequent changes between mild and cold spells. Average winter temperatures at Pavillion range from 10 F to 35 F, while average summer temperatures range from 51 to 82 °F.

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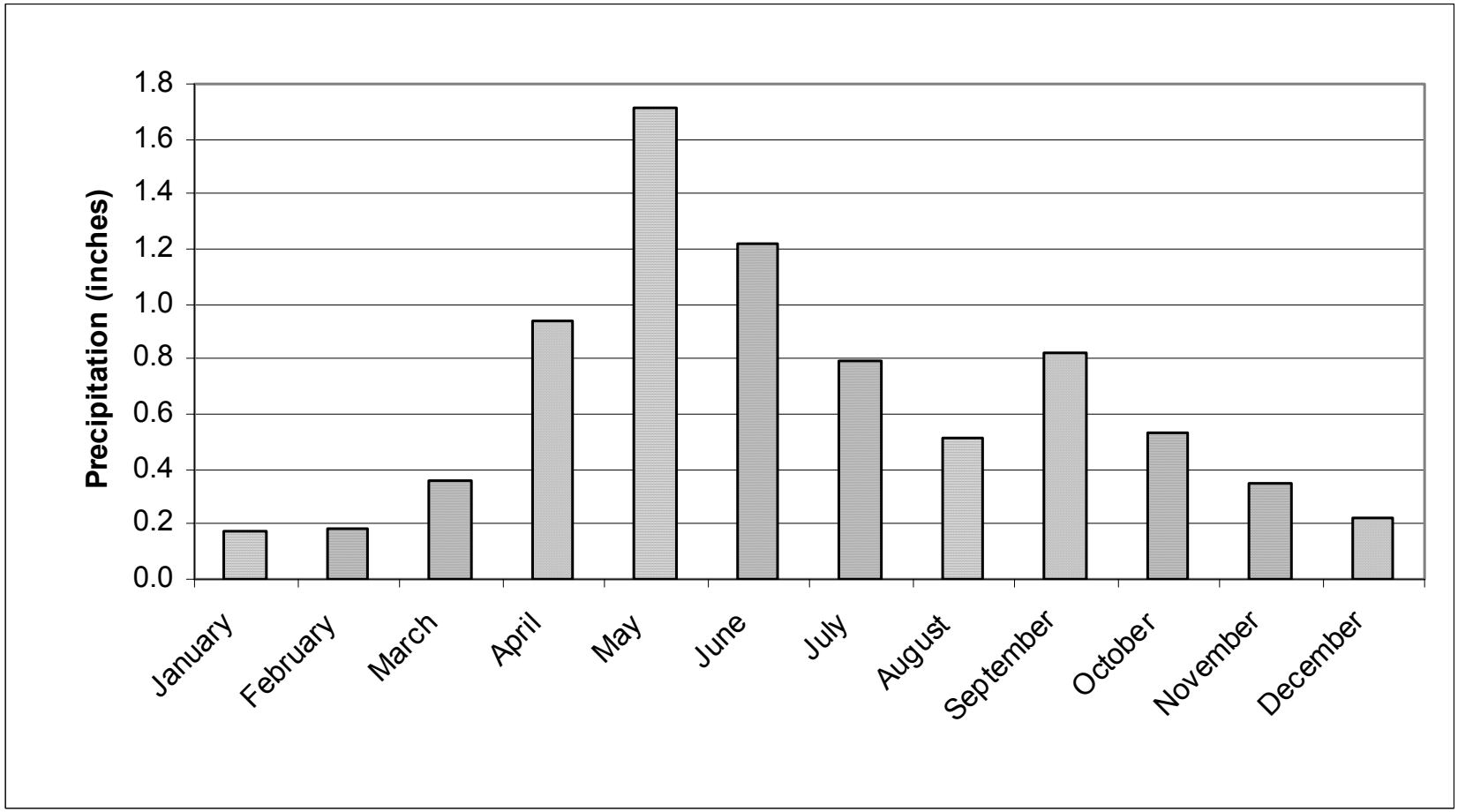


Figure 3.4-1. Average Monthly Precipitation at Pavillion, Wyoming (1948 – 2002).

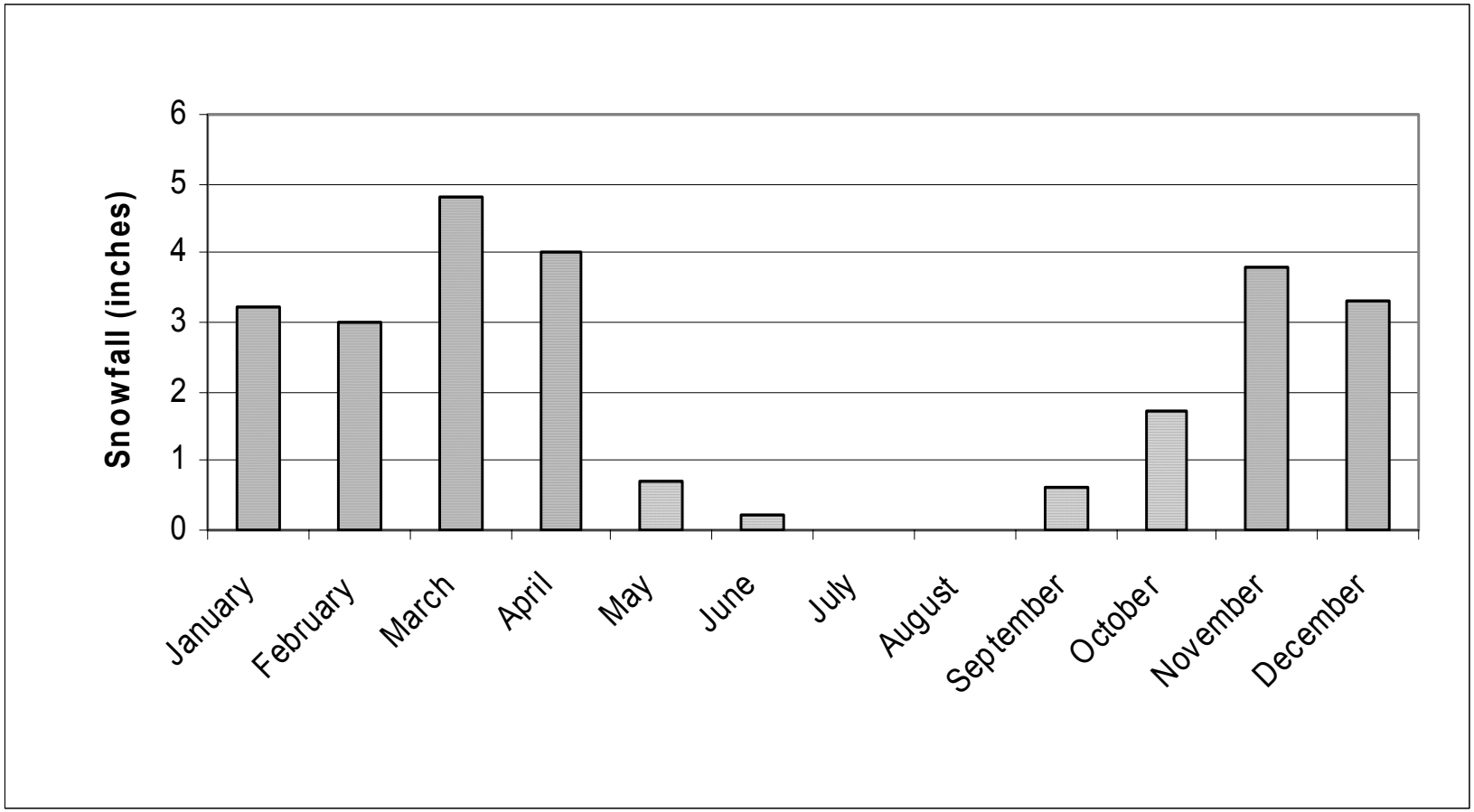


Figure 3.4-2. Average Monthly Snowfall at Pavillion, Wyoming (1948 - 2002).

3.4.2.2 Winds and Atmospheric Stability

Wind speed and direction, along with vertical profiles of heat and wind in the lower atmosphere, greatly affect the transport and dispersion of air pollutants. The potential for atmospheric dispersion is relatively high for the WRPA due to the frequency of strong winds. During warm spells in the winter, strong down slope winds which facilitate pollutant dispersion are common along the eastern slopes of the Wind River Range. However, calm periods and nighttime cooling may enhance air stability, thereby inhibiting air pollutant transport and dilution. The area experiences frequent temperature inversions in winter when cold stable air masses settle into the valleys and snow cover and shorter days inhibit ground-level warming. During periods of atmospheric stability, cold air tends to be trapped at the surface and vertical mixing of pollutants is limited. Temperature inversions are less common during the summer months when daytime ground-level heating rapidly leads to inversion break-up and increased vertical mixing.

The nearest comprehensive surface and corresponding upper air meteorological data are recorded about 35 miles south-southwest of the WRPA at the Lander/Hunt Field Station (EPA 2003). Atmospheric stability can be categorized by stability classes "A" through "F", with "A" representing a high degree of atmospheric turbulence, and "F" representing a high degree of atmospheric stability. A "D" stability represents a neutral atmosphere. Table 3.4-3 present the frequency distribution of the atmospheric stability classes as recorded at the Lander/Hunt Field station for the years 1985, 1987, 1988, 1990, and 1991. As illustrated, neutral (Class D) atmospheric conditions occur the majority of the time (32.3%), followed by slightly stable conditions (21.3%) and slightly unstable stable conditions (14.6%).

Table 3.4-3. Atmospheric Stability Class Frequency of Occurrence.

Stability Class	Frequency of Occurrence
A – Strongly Unstable	1.2%
B – Moderately Unstable	11.1%
C – Slightly Unstable	14.6%
D – Neutral	32.3%
E – Slightly Stable	21.3%
F – Moderately Stable	19.5%
Total	**100%**

Source: EPA (2003). Wind data collected at Lander/Hunt field for years 1985, 1987, 1988, 1990, and 1991, available from the National Climatic Data Center (NCDC).

Wind direction and speed data as measured at the Lander/Hunt Field are tabulated in Tables 3.4-4 and 3.4-5. Figure 3.4-4 presents a wind rose illustrating wind speed and direction for the Lander data. Note that the data represent the direction from which the wind is blowing (Wind Direction Origin). As shown, the winds predominately originate from the west to southwest 26.9 percent of the time, with an average wind speed of 7.8 miles per hour (3.47 meters/second).

Table 3.4-4. Wind Direction Frequency of Occurrence.

Direction of Wind Origin	Frequency Of Occurrence	Direction of Wind Origin	Frequency Of Occurrence
North	4.0%	South	3.6%
North Northeast	2.9%	South Southwest	3.7%
Northeast	4.0%	Southwest	10.4%
East Northeast	2.7%	West Southwest	10.7%
East	2.8%	West	5.8%
East Southeast	5.2%	West Northwest	5.8%
Southeast	6.7%	Northwest	5.5%
South Southeast	4.1%	North Northwest	4.4%
Calm (No Direction)	17.6%	Total	100%

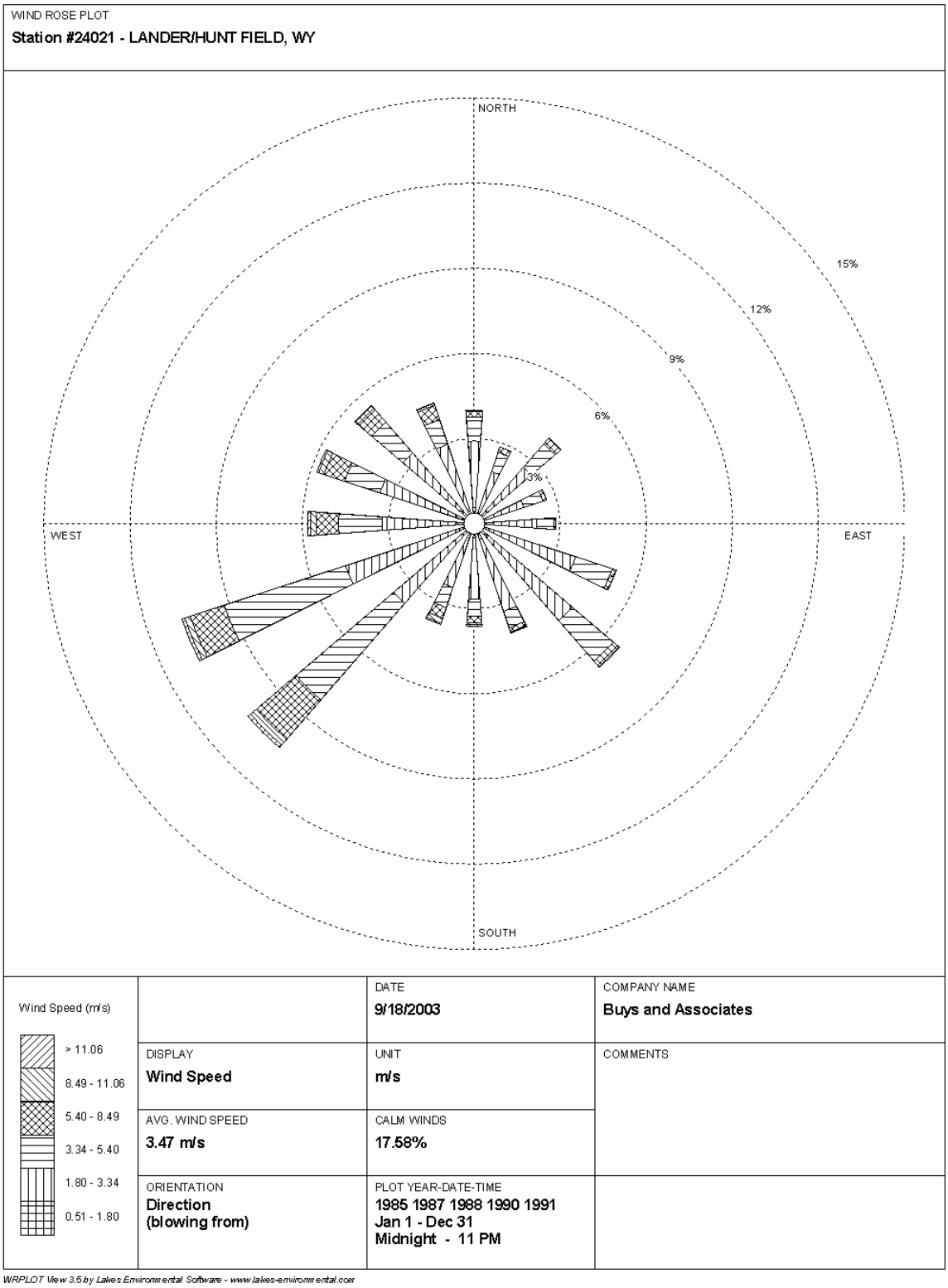
Source: EPA (2003). Wind data collected at Lander/Hunt field for years 1985, 1987, 1988, 1990, and 1991, available from the National Climatic Data Center (NCDC).

Table 3.4-5. Wind Speed Frequency of Occurrence

Wind Speed Category (miles per hour)	Frequency Of Occurrence
Calm to 4.0	25.7%
4.0 to 7.5	41.3%
7.5 to 12.1	23.2%
12.1 to 19.0	7.9%
19.0 to 24.7	1.4%

Source: EPA (2003). Wind data collected at Lander/Hunt field for years 1985, 1987, 1988, 1990, and 1991, available from the National Climatic Data Center (NCDC).

Figure 3.4-3. Lander, Wyoming Wind Rose.



3.4.3 Air Quality

3.4.3.1 Regulatory Environment

In general, the Environmental Protection Agency (EPA) has primary regulatory authority for implementing various air quality control statutes established by Congress. However, EPA has granted this authority to states, pending EPA's approval of state implementation plans (SIPs). Indian tribes may implement environmental programs and assume enforcement authority for these environmental statutes on tribal lands. However, when tribes do not assume that authority, the EPA, rather than the state, retains primary enforcement authority.

Jurisdiction over lands within an Indian reservation generally depends on the nature and history of land ownership. However, even where the land ownership and history are clear, some controversy still exists as to which government agency has jurisdiction. The WRPA resides within the Wind River Indian Reservation (WRIR), which contains federal lands, federal lands held in trust for the tribes, Indian private lands, and non-Indian private lands. Therefore, several federal, state, and local authorities could have jurisdiction over the Proposed Action.

For most areas within the WRIR the EPA is the primary agency for implementing the Federal Clean Air Act (CAA) and the permitting of air emission sources. However, there are some areas of the WRIR that the State of Wyoming classifies as "non-reservation" lands and are therefore subject to the Wyoming Air Quality Standards and Regulations (WAQSR). Therefore, it is possible that over the life of the project, air emission sources within the WRPA could be regulated by the EPA, the Wyoming Department of Environmental Quality (WDEQ), or Wind River Tribal regulatory authorities.

Ambient Air Quality Standards

National and Wyoming Ambient Air Quality Standards (NAAQS and WAAQS) have been promulgated for the purpose of protecting human health and welfare with an adequate margin of safety. The CAA established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. Pollutants for which standards have been set include sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and particulate matter less than 10 microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$).

Comprehensive air quality monitoring has not been conducted within the WRPA. However, air quality in and surrounding the area is expected to be relatively good due to the limited number of large industrial emission sources and predominately favorable atmospheric dispersion conditions. Background values recorded in the region are below the NAAQS and WAAQS. Measured regional background concentrations are presented in Table 3.4.6 with the applicable ambient air quality standards

Prevention of Significant Deterioration (PSD) Increments

Under the Prevention of Significant Deterioration (PSD) provisions, incremental increases of specific pollutant concentrations are limited above a legally defined baseline level. Many national parks and wilderness areas are designated as PSD Class I. The PSD program protects air quality within Class I areas by allowing only slight incremental increases in pollutant concentrations. Areas of the state not designated as PSD Class I are classified as Class II. For Class II areas, greater incremental increases in ambient pollutant concentrations are allowed. The PSD increments for both Class I and II areas are presented in Table 3.4-6.

The WRPA and surrounding region is federally designated as a PSD Class II. The two nearest PSD Class I areas are Bridger and Fitzpatrick Wilderness areas located directly west of the WRPA in the Wind River Mountain Range. Contiguous with Bridger Wilderness are Popo Agie Wilderness and the Wind River Roadless Area, both designated as PSD Class II. Nearby tribal areas of special concern include Wind River Canyon (PSD Class II) located northeast of the WRPA, and Phlox Mountain, located in the Owl Creek range (PSD Class II) just north of the WRPA. The Wind River Canyon and the Owl Creek Range are both located within the Wind River Indian Reservation boundary. More distant Class I areas include Grand Teton and Yellowstone National Parks, and Washakie, Teton, and North Absaroka Wilderness areas. Cloud Peak Wilderness is designated as PSD Class II. Figure 3.4-4 presents a regional map indicating the location of the WRPA and the areas of special concern.

Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are chemicals that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental impacts. The EPA has classified 189 air pollutants as HAPs. Examples of classified HAPs include formaldehyde (CH_2O), BTEX compounds (benzene, toluene, ethylbenzene, and isomers of xylene) and normal-hexane (*n*-hexane).

The CAA requires the EPA to regulate emissions of toxic air pollutants from a published list of industrial sources referred to as "source categories." As required under the CAA, EPA has developed a list of source categories that must meet control technology requirements for these toxic air pollutants. Under section 112(d) of the CAA, the EPA is required to develop regulations establishing national emission standards for hazardous air pollutants (NESHAP) for all industries that emit one or more of the pollutants in major source quantities. These standards are established to reflect the maximum degree of reduction in HAP emissions through application of maximum achievable control technology (MACT). Source categories for which MACT standards have been implemented include Oil and Natural Gas Production and Natural Gas Transmission and Storage.

Table 3.4-6. Air Pollutant Background Concentrations, National and State Ambient Air Quality Standards, and PSD Increments.

Pollutant And Averaging Time	Measured Background Concentration ($\mu g/m^3$)	National and Wyoming Ambient Air Quality Standard ($\mu g/m^3$)	PSD Class I Increment ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)
Carbon Monoxide (CO)				
1-hour	3,336 a	40,000	n/a	n/a
8-hour	1,381 a	10,000	n/a	n/a
Nitrogen Dioxide (NO_2)				
Annual	3.4 b	100	2.5	25
Ozone (O_3)				
1-hour	169 c	235	n/a	n/a
8-hour	147 c	157	n/a	n/a
Particulate Matter (PM_{10})				
24-hour	61 d	150	8	30
Annual	22 d	50	4	17
Particulate Matter ($PM_{2.5}$)				
24-hour	35 d	65	n/a	n/a
Annual	10 d	15	n/a	n/a
Sulfur Dioxide (SO_2)				
3-hour	132 e	1,300	25	512
24-hour (National)	n/a	365	5	91
24-hour (Wyoming)	43 e	260	5	91
Annual (National)	n/a	80	2	20
Annual (Wyoming)	9 e	60	2	20

Note: Measured background ozone concentration value represents the top tenth percentile maximum 1-hour value. Other short-term background concentrations are second-maximum values.
n/a: Not Applicable.
Wyoming Ambient Air Quality Standards from: Wyoming Air Quality Standards and Regulations, Chapter 2 - Ambient Standards.
National Ambient Air Quality Standards from: 40 CFR part 50 National Primary and Secondary Air Quality Standards.
PSD Increments from: 40 CFR part 51.166 Prevention of Significant Deterioration of Air Quality.

Sources of Measured Background Concentrations

a Data collected by Amoco at Ryckman Creek for an 8 month period during 1978-1979, summarized in the Riley Ridge EIS (BLM 1983).

b Data collected at Green River Basin Visibility Study site, Green River, Wyoming during the period January-December 2001. (ARS 2002)

c Data collected at Green River Basin Visibility Study site, Green River, Wyoming during the period June 10, 1998 through December 31, 2001 (ARS 2001).

d Data collected from the Lander, Wyoming monitors for the year 2002 (WDEQ).

e Data collected at LaBarge Study Area at the Northwest Pipeline Craven Creek site, 1982-1983 (WDEQ).

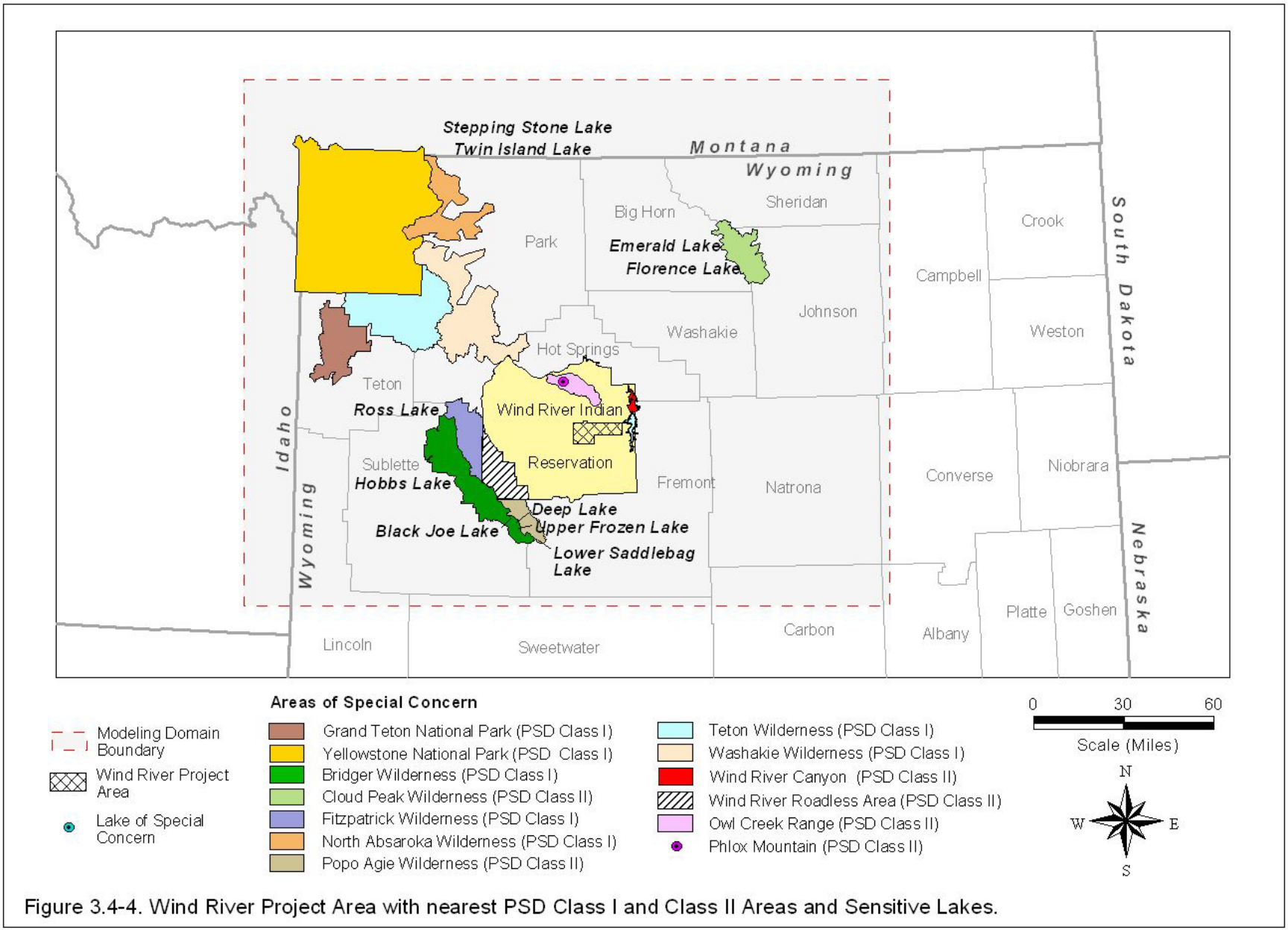


Figure 3.4-4. Wind River Project Area with nearest PSD Class I and Class II Areas and Sensitive Lakes.

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3.4.3.2 Pollutant Sources and Characteristics

Sources of Air Pollution

- Existing sources of air pollution within the WRPA and surrounding region include the following:
- Exhaust emissions, primarily CO, oxides of nitrogen (NO_x), and formaldehyde (CH_2O) from existing natural gas fired compressor engines used in the production of natural gas;
- Natural gas dehydrator still-vent emissions including volatile organic compounds (VOC), BTEX and *n*-hexane;
- Power plant SO_2, CO, NO_x and particulate emissions;
- Gasoline- and diesel-fueled vehicle tailpipe emissions consisting of VOC, NO_X, CO, SO_2, PM_{10}, and $PM_{2.5}$;
- Fugitive dust (PM_{10} and $PM_{2.5}$) from vehicle traffic on unpaved roads, wind erosion in areas of soil disturbance, road sanding during winter months, and from coal mines; and
- Long-range transport of pollutants from distant sources.

Criteria Air Pollutant Characteristics

The term NO_X is used to describe mixtures of nitrogen oxide compounds including nitrogen monoxide (NO), nitrogen dioxide (NO_2), nitrate (NO_3) and other nitrogen species including dinitrogen oxide (N_2O). The National Ambient Air Quality Standard refers only to NO_2, rather than all species of NO_X. Nitrogen oxides are by-products from the combustion of fossil fuels and the primary sources of anthropogenic NO_X include automobiles and power plants. Furnaces and gas stoves also contribute to NO_X emissions. Most NO_X emissions are emitted in the form of NO, which is not stable in the atmosphere and is eventually converted to NO_2. Nitrogen dioxide is a toxic, reddish-brown gas that is reactive in the atmosphere and plays a role in the formation of smog. Short-term human exposures (e.g. less than 3 hours) to elevated levels of NO_2 may lead to changes in airway responsiveness and lung function in individuals with pre-existing respiratory illness. Long-term human exposure to NO_2 may lead to increased susceptibility to respiratory infection and may cause alterations in the lung. Nitrogen oxides also contribute to the formation of acid rain and to visibility impairment.

Carbon monoxide is formed when fossil fuels are not burned completely. Nation-wide, the primary source of CO is automobile emissions. Other sources of CO include industrial processes, non-transportation fuel combustion and forest fires. Carbon monoxide is a colorless, odorless gas that is poisonous in high concentrations. When humans are exposed to CO, the gas enters the bloodstream through the lungs and reduces oxygen delivery to the body's organs and tissues. Reduced work capacity, reduced manual dexterity, poor learning capacity and difficulty in performing complex tasks are associated with exposure to elevated levels of CO.

Sulfur dioxide (SO_2) belongs to the family of sulfur oxide gases (SO_x). These gases are highly soluble in water. Sulfur is prevalent in many raw materials, including crude oil, coal, and ore that contains common metals like aluminum, copper, zinc, lead, and iron. SO_x gasses are formed when fuel containing sulfur, such as coal and oil, is burned, and when gasoline is extracted from oil, or metal is extracted from ore. SO_2 dissolves in water vapor to form an acid, and interacts with other gases and particles in the air to form sulfates and other compounds that can be harmful to people and the environment. The health effects of SO_2 exposure range from short-term difficultly with breathing to longer-term respiratory illness. SO_2 also contributes to the formation of acid rain and to visibility impairment.

Ground-level ozone (O_3) is a gas created through chemical reactions of NO_X and VOCs in the presence of heat and sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of NO_x and VOC that help to form ozone. Sunlight and hot weather expedite the formation of ground-level ozone. As a result, ozone is generally known as a summertime air pollutant. Ozone can be transported great distances and therefore contributes to air pollution issues on a regional scale. Primary health effects from O_3 exposure range from breathing difficulty to permanent lung damage. Ground-level ozone also contributes to plant and ecosystem damage.

Particulate matter, or PM**,** is the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets. Particulate matter is frequently classified by size and typical categories include total suspended particulates (TSP), particulate matter less than 10 microns in diameter (PM_{10}) and PM less than 2.5 microns in diameter ($PM_{2.5}$). Particulate matter may be emitted directly to the atmosphere from mobile and stationary sources such as cars, trucks, buses, factories, construction sites, tilled fields, unpaved roads, stone crushing, and wood burning. Additionally, PM may be generated from secondary chemical reactions in the atmosphere involving oxides of nitrogen and sulfur. The primary health hazard stems from inhalation of fine particulate matter or $PM_{2.5}$. Many health studies have correlated increased $PM_{2.5}$ exposure with increases in premature death as well as a range of serious respiratory and cardiovascular effects. Environmentally, particulate matter in the form of atmospheric sulfates and nitrates, organics, and elemental carbon (soot), represents the primary source of visibility impairment and contributes to acid deposition.

Hazardous Air Pollutant Characteristics

Formaldehyde, a recognized irritant to humans, may be released from consumer products such as particle board and carpet, or may be formed as a byproduct during the combustion of natural gas. Acute (short-term) and chronic (long-term) exposures can result in eye, nose and throat irritation and respiratory symptoms including coughing, wheezing and bronchitis. The Environmental Protection Agency (EPA) has classified formaldehyde as a Group A, probable human carcinogen of medium carcinogenic hazard (EPA 1994). The highest levels of airborne formaldehyde have been found in indoor air, where it is released from various consumer products (EPA 2002). One survey (EPA 1988) reports measured formaldehyde levels in homes ranging from 0.10 to 3.68 parts per million (ppm), or 122 to 4,520 $\mu g/m^3$. The smoking of tobacco products also represents a critical source of human formaldehyde exposure.

Benzene emissions typically result from coal and oil combustion, volatilization from gasoline service stations, and motor vehicle exhaust. Acute inhalation exposure to benzene may cause drowsiness, dizziness and headaches, as well as eye, skin, and respiratory tract irritation. Exposure to high concentrations of benzene may cause unconsciousness. Chronic inhalation exposure has caused various disorders in the blood, including reduced numbers of red blood cells and aplastic anemia. Adverse reproductive effects have been reported for women exposed by inhalation to high levels, and adverse effects on the developing fetus have been observed in animal tests. Increased incidences of leukemia (cancer of the tissues that form white blood cells) have been observed in humans occupationally exposed to benzene. EPA has classified benzene as a Group A, human carcinogen (EPA 1994).

Additional BTEX compounds including toluene, ethylbenzene, and xylene, as well as *n*-hexane, are of concern for both acute and chronic health effects. EPA has classified these compounds as a Group D, not classifiable as to human carcinogenicity (EPA 1994). These compounds are released to the atmosphere through a variety of pathways, including volatilization through their

use as solvents, as fugitive emissions from industrial sources, and through automobile exhaust.

3.4.3.3 Air Quality Related Values

Areas of special concern, including National Parks and some Class I and II wilderness areas are monitored for Air Quality Related Value (AQRV) impacts. These AQRVs include terrestrial and aquatic deposition of acidic pollutants and visibility impairment.

Atmospheric Deposition

Atmospheric deposition refers to the processes by which air pollutants are removed from the atmosphere and deposited on terrestrial and aquatic ecosystems. Deposition is frequently reported as the mass of material deposited on an area (kilograms per hectare or kg ha^{-1}) or as a flux (kilograms per hectare per year or kg ha^{-1} $year^{-1}$). Air pollutants are deposited by wet deposition (precipitation) and by dry deposition (gravitational settling of particles and adherence of gaseous pollutants).

Incremental project-level Deposition Analysis Thresholds (DATs) for Class I areas have been established jointly through the National Park Service (NPS) and U.S. Fish and Wildlife Service (USFWS). DATs are incremental amounts of deposition that trigger management concerns. However, deposition rates in excess of the DATs do not necessarily constitute an adverse impact to the environment. Both the NPS and the USFWS utilize a case-by-case approach to permit review and National Environmental Policy Act (NEPA) related proposals. Adverse impact determinations are considered on a case-by-case basis for predicted deposition values that are higher than the DAT. The DAT for sulfur and nitrogen deposition in Western Class I areas, developed as a function of natural background deposition, has been set at 0.005 kg/ha/yr for nitrogen (N) and sulfur (S) species (National Park Service 2003).

In order to characterize the current deposition rates at Bridger Wilderness, dry and wet deposition monitoring data measured at Pinedale, Wyoming (as recommended in the FLAG [2000] Phase I report) were evaluated. Wet deposition data for the Pinedale station are available through the National Atmospheric Deposition Program (NADP) for the period 1982 through 2002. The NADP assesses wet deposition by measuring the chemical composition of precipitation (rain and snow). Similarly, the Clean Air Status and Trends Network (CASTNet) measures the dry deposition rates of nitrogen and sulfur compounds. Data from the Pinedale, Wyoming CASTNet station are available from 1989 through 2001.

Tables 3.4-7 and 3.4-8 summarize the annual average wet and dry components of total nitrogen and sulfur deposition at Pinedale while Figures 3.4-5 and 3.4-6 present graphical representations of the data. Note that wet deposition data are available from 1982 through 2002, while dry deposition data are available only from 1989 through 2001.

The average annual pH of precipitation measured at Pinedale from 1982 through 2002 was 5.1, and ranged from 4.9 to 5.5 over the period. The natural acidity of precipitation is considered to range from 5.0 to 5.6 pH (Seinfeld 1986); therefore the pH of precipitation at Pinedale is at the acidic end of the normal range.

Table 3.4-7. Nitrogen Deposition at Pinedale, Wyoming.

Chemical Species	Dry Deposition[1] (kg N ha^{-1} yr^{-1})	Wet Deposition[2] (kg N ha^{-1} yr^{-1})	Total Deposition (kg N ha^{-1} yr^{-1})
Ammonium (NH_4^+)	0.1	0.3	0.4
Nitrate (NO_3^-)	0.0	0.5	0.5
Nitric acid (HNO_3)	0.4	-	0.4
TOTAL	**0.5**	**0.8**	**1.3**

Table 3.4-8. Sulfur Deposition at Pinedale, Wyoming.

Chemical Species	Dry Deposition[1] (kg S ha^{-1} yr^{-1})	Wet Deposition[2] (kg S ha^{-1} yr^{-1})	Total Deposition (kg S ha^{-1} yr^{-1})
Sulfate (SO_4^{2-})	0.1	0.7	0.8
Sulfur dioxide (SO_2)	0.3	-	0.3
TOTAL	**0.4**	**0.7**	**1.1**

[1] Source: Dry deposition collected at Pinedale CASTNet site (PND165) from 1989-2000.
[2] Source: Wet deposition data collected at Pinedale NADP site (WY06) from 1982-2002.
Deposition data represent the annual average over each respective time period.

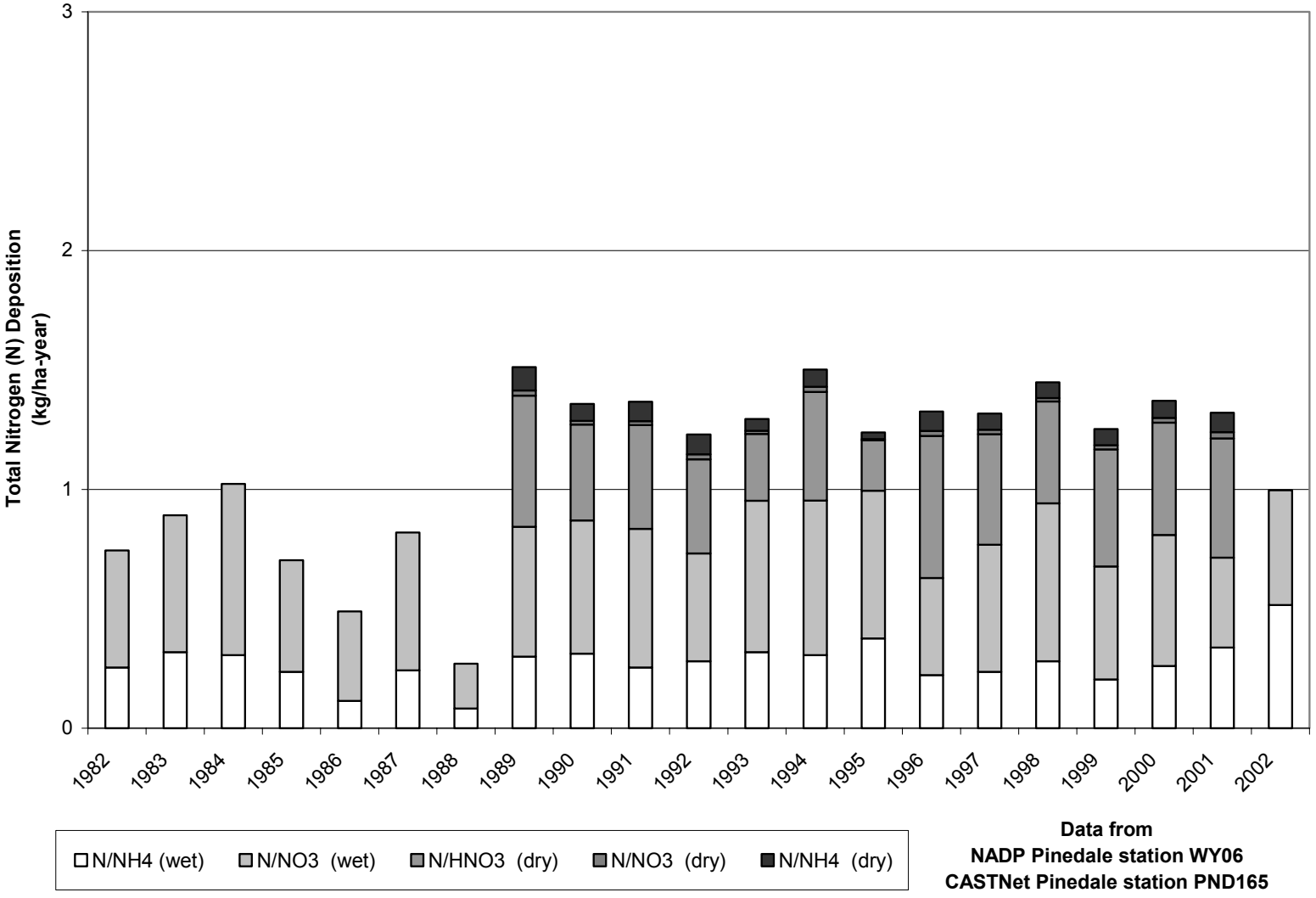

Figure 3.4-5. Total Nitrogen Deposition near Bridger Wilderness, Wyoming.

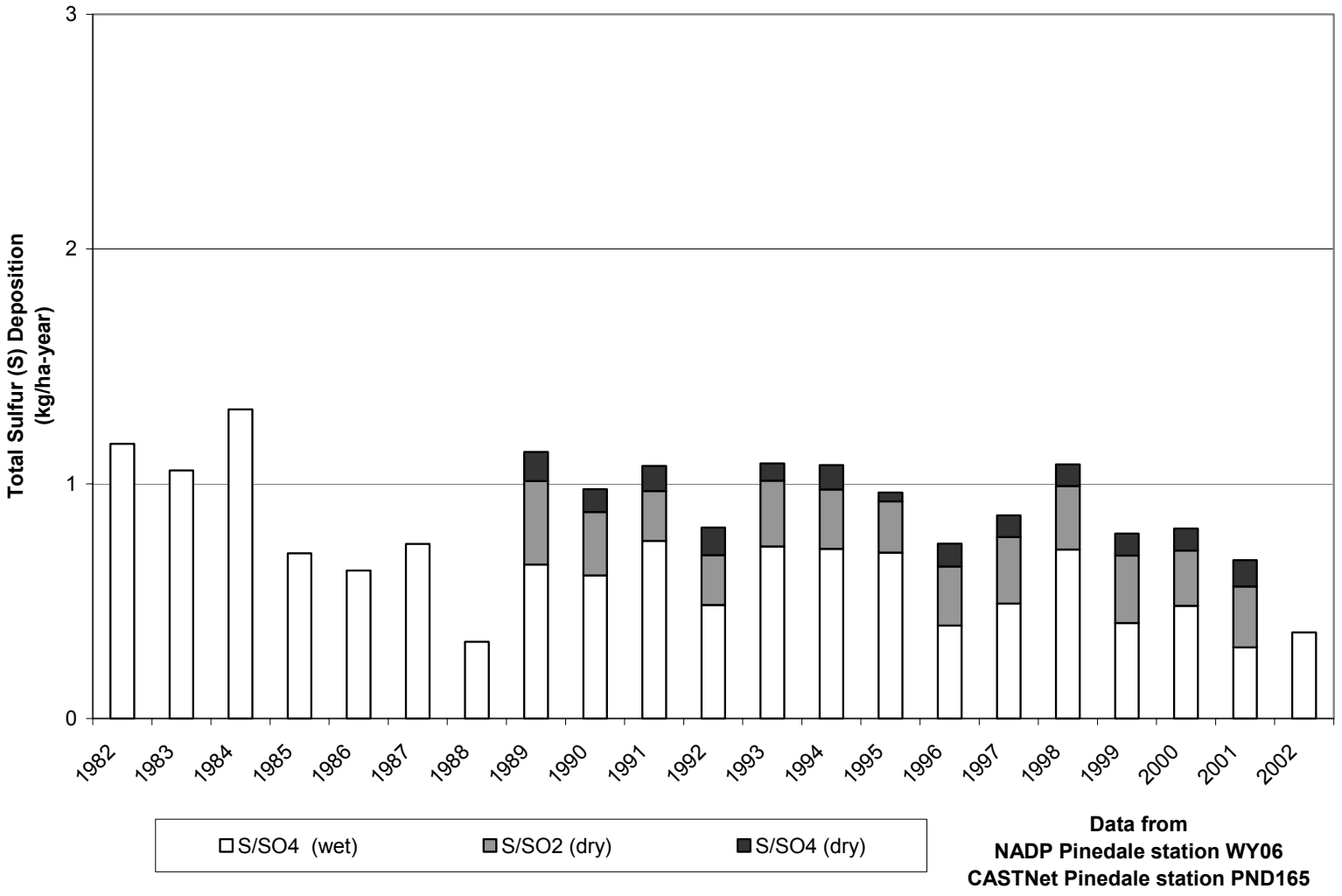

Figure 3.4-6. Total Sulfur Deposition near Bridger Wilderness, Wyoming.

Acid Neutralization Capacity

Aquatic bodies are important resources in most wilderness areas. Acid deposition resulting from industrial emissions of sulfur and nitrogen based compounds can have a direct effect on the acid neutralization capacity (ANC) of sensitive lake ecosystems. The following table (3.4-9) summarizes the existing ANC for selected lakes of special concern.

Table 3.4-9. Background Acid Neutralization Capacity for Sensitive Lakes in Wyoming.

Lake	Area Of Special Concern	10% Lowest ANC Recorded at Outlet (µeq/l)	Number Of Samples	Monitoring Period
Black Joe	Bridger Wilderness	67.0	61	1984 – 2003
Deep	Bridger Wilderness	59.9	58	1984 – 2003
Emerald Lake	Cloud Peak Wilderness	69.8	26	1993 – 2003
Florence Lake	Cloud Peak Wilderness	33.0	28	1993 – 2003
Hobbs	Bridger Wilderness	69.9	65	1984 – 2003
Lower Saddlebag	Popo Agie Wilderness	55.5	43	1989 – 2003
Ross	Fitzpatrick Wilderness	53.5	44	1988 – 2003
Stepping Stone	Absaroka-Beartooth	19.9	10	1993 – 2003
Twin Island	Absaroka-Beartooth	17.6	10	1993 – 2003
Upper Frozen	Bridger Wilderness	5.0	6	1997 – 2003

Source: U.S. Department of Agriculture, Forest Service 2003.

Visibility

Visitors to national parks and wilderness areas list the ability to view unobscured scenic vistas as an important part of a satisfying experience. Unfortunately, visibility impairment in the form of regional haze has been documented in many Class I areas. In the intermountain west, atmospheric sulfate, organics and elemental carbon are the main cause of regional haze and visibility impairment (FLAG 2000).

Visibility is usually characterized by two parameters, standard visual range (SVR) and the light-extinction coefficient (b_{ext}). The standard visual range parameter represents the greatest distance that a large dark object can be seen. The light extinction coefficient represents the attenuation of light per unit distance due to scattering and absorption by gases and particulate matter in the atmosphere. Under typical conditions, the visual range and b_{ext} parameters are inversely related to each other. Long visual ranges and low b_{ext} values represent good visibility conditions, while poor visibility conditions are represented by short visual ranges and high b_{ext} values. The dimension of visual range is length, and the parameter is usually expressed in kilometers (km). The dimension for b_{ext} is inverse length (1/length) and the coefficient is typically expressed as "inverse kilometers" (km^{-1}), or "inverse megameters" (Mm^{-1}), the reciprocal of 1 million meters.

Visibility impairment is frequently expressed in terms of deciview (dv). The deciview index was developed as a linear perceived visual change and increasing deciview values represent proportionately larger perceived visibility impairments. A change in visibility of 1.0 dv represents a "just noticeable change" by the average person under most circumstances. However, under ideal visibility conditions, changes in visibility of less than 1.0 dv may be noticeable. The U.S. Forest Service (USFS) has identified specific "Level of Acceptable Change" (LAC) values to evaluate potential air quality impacts within wilderness areas (USDA-FS 1993). The USFS

utilizes visibility LAC thresholds of 1.0 and 0.5 deciviews.

Visibility related background data collected as part of the Interagency Monitoring of PROtected Visual Environments (IMPROVE) program are available for Bridger Wilderness, Yellowstone National Park, and North Absaroka Wilderness. Long-term (10 years or greater) data are available for Bridger Wilderness and Yellowstone National Park; however the available data for North Absaroka is limited to two years.

Figures 3.4-7 and 3.4-8 present long-term visibility conditions (as reconstructed from aerosol measurements) for the 20% cleanest, 20% haziest, and mid-range 40% to 60% days at Bridger Wilderness and Yellowstone National Park (IMPROVE 2004). Both annual average and 5-year rolling average visibility data are presented. The annual average data illustrate the variability in visibility conditions that results from forest fires or other short-term factors. The 5-year data represent long-term average conditions analogous to the natural visibility conditions tracked under the regional haze program. As shown, monitored visibility conditions at Bridger Wilderness have been stable over time, neither improving nor degrading. Monitored conditions at Yellowstone National Park indicate visibility conditions have been improving slightly over time.

Seasonal visibility conditions can be reconstructed utilizing quarterly particle concentrations measured at the IMPROVE monitoring sites in conjunction with monthly relative humidity factors. Tables 3.4-10 through 3.4-12 summarize the seasonal visibility conditions at Yellowstone National Park, Bridger Wilderness and North Absaroka Wilderness. Figure 3.4-9 presents the Standard Visual Range for each of the IMPROVE monitoring areas. As shown, visibility is very good at all three areas with a Standard Visual Range of 192 to 307 km (119 to 190 miles). Bridger and North Absaroka Wilderness areas typically exhibit the clearest visibility conditions, while Yellowstone N.P. is consistently the haziest. Seasonal visibility conditions are typically the clearest during the fall and winter months (October through March) when particulate concentrations are at a minimum, while hazier conditions predominate during the spring and summer months (April through September) when particulates are at a maximum.

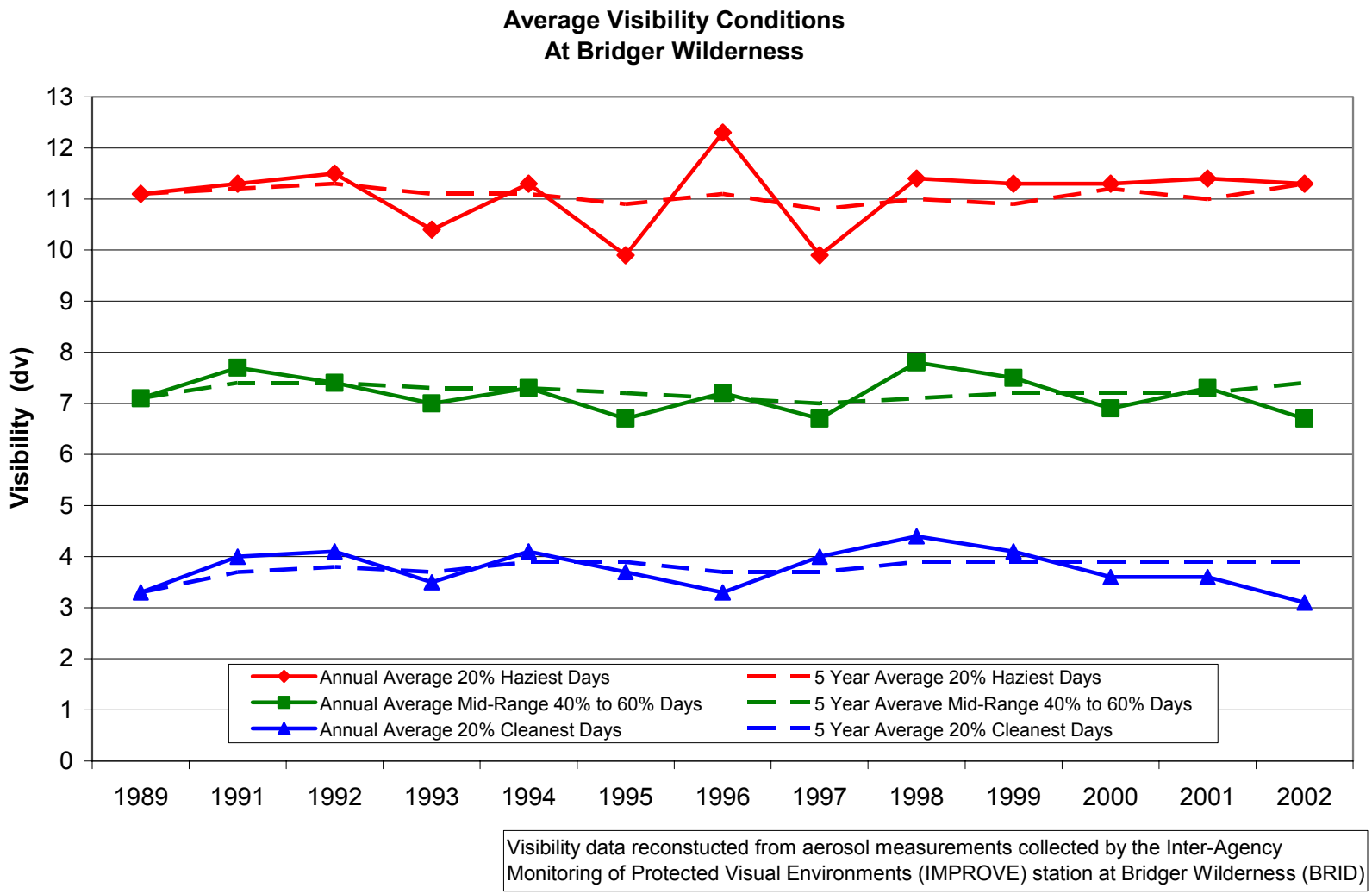

Figure 3.4-7. Visibility Conditions at Bridger Wilderness, Wyoming.

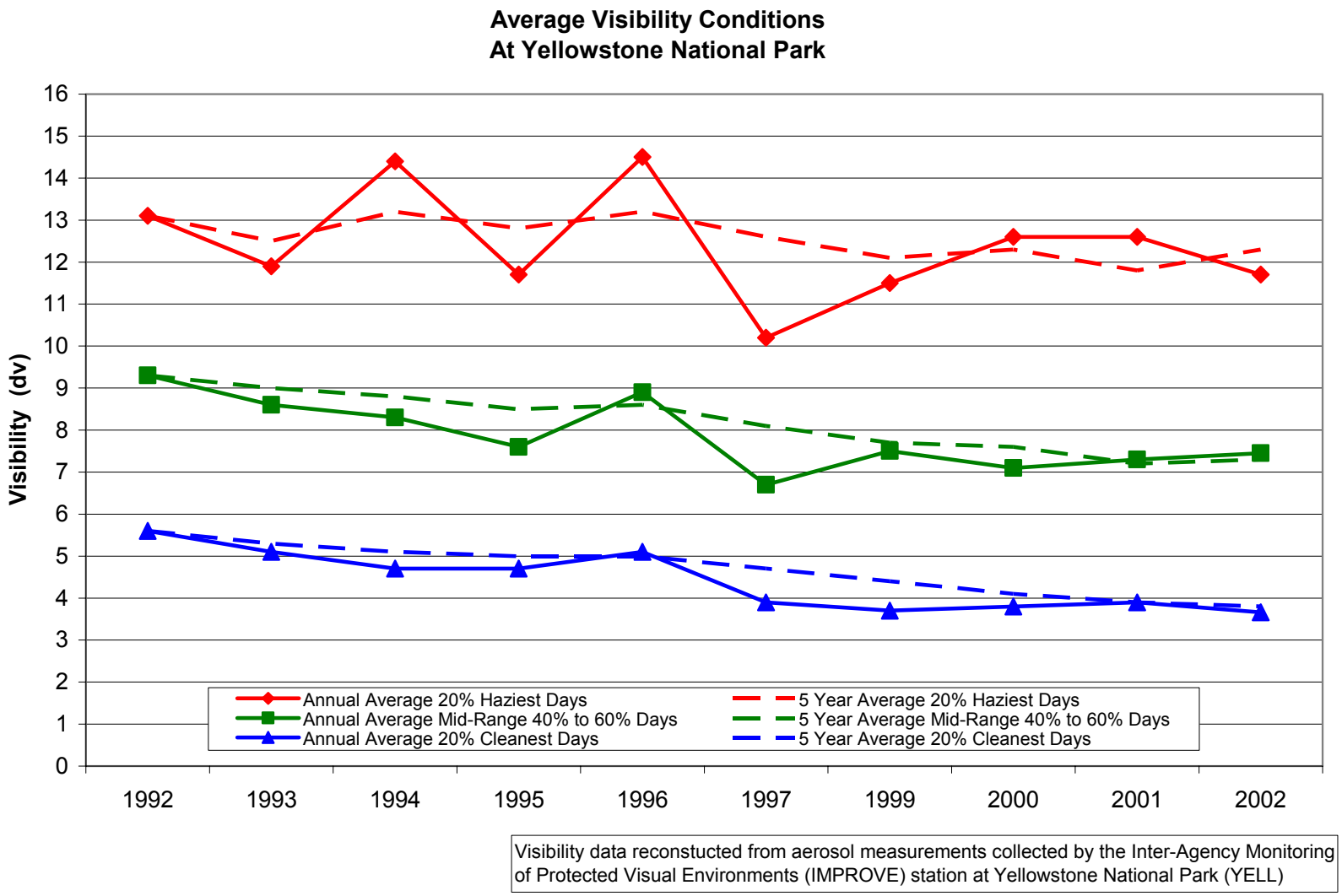

Figure 3.4-8. Visibility Conditions at Yellowstone National Park, Wyoming.

Table 3.4-10. Bridger Wilderness Reconstructed Visibility Conditions (20% Cleanest).

Month	Relative Humidity Factor [1] f(Rh) (unitless)	Dry Hygroscopic Extinction [2] (1/Mm)	Dry Non-Hygroscopic Extinction [2] (1/Mm)	Reconstructed Extinction (bext) (1/Mm)	Deciview (dv)	Standard Visual Range (km)
Jan	2.5	0.845	1.666	13.778	3.2	284
Feb	2.3	0.845	1.666	13.609	3.1	287
Mar	2.3	0.845	1.666	13.609	3.1	287
Apr	2.1	1.730	3.800	17.432	5.6	224
May	2.1	1.730	3.800	17.432	5.6	224
Jun	1.8	1.730	3.800	16.914	5.3	231
Jul	1.5	1.902	5.637	18.489	6.1	211
Aug	1.5	1.902	2.035	18.489	6.1	211
Sep	1.8	1.902	2.591	19.060	6.5	205
Oct	2.0	0.915	4.163	13.865	3.3	282
Nov	2.5	0.915	5.151	14.323	3.6	273
Dec	2.4	0.915	2.262	14.231	3.5	275

[1] Relative humidity factors [f(Rh)] from Table A-2, Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule, September 2003.
[2] Quarterly particle extinction data provided by Scot Copeland, USFS, Washakie Ranger District, Lander, WY. October 2003.

Table 3.4-11. Yellowstone N. P. Reconstructed Visibility Conditions (20% Cleanest).

Month	Relative Humidity Factor [1] f(Rh) (unitless)	Dry Hygroscopic Extinction [2] (1/Mm)	Dry Non-Hygroscopic Extinction [2] (1/Mm)	Reconstructed Extinction (bext) (1/Mm)	Deciview (dv)	Standard Visual Range (km)
Jan	2.5	1.126	2.973	15.8	4.6	248
Feb	2.3	1.126	2.973	15.6	4.4	251
Mar	2.2	1.126	2.973	15.5	4.4	253
Apr	2.1	1.502	4.531	17.7	5.7	221
May	2.1	1.502	4.531	17.7	5.7	221
Jun	1.9	1.502	4.531	17.4	5.5	225
Jul	1.7	1.811	7.330	20.4	7.1	192
Aug	1.6	1.811	7.330	20.2	7.0	193
Sep	1.8	1.811	7.330	20.6	7.2	190
Oct	2.1	1.033	2.990	15.2	4.2	258
Nov	2.4	1.033	2.990	15.5	4.4	253
Dec	2.5	1.033	2.990	15.6	4.4	251

[1] Relative humidity factors [f(Rh)] from Table A-2, Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule, September 2003.
[2] Quarterly particle extinction data provided by Scot Copeland, USFS, Washakie Ranger District, Lander, WY. October 2003.

Table 3.4-12. North Absaroka Reconstructed Visibility Conditions (20% Cleanest).

Month	Relative Humidity Factor [1] f(Rh) (unitless)	Dry Hygroscopic Extinction [2] (1/Mm)	Dry Non-Hygroscopic Extinction [2] (1/Mm)	Reconstructed Extinction (bext) (1/Mm)	Deciview (dv)	Standard Visual Range (km)
Jan	2.4	1.091	1.696	14.3	3.6	273
Feb	2.2	1.091	1.696	14.1	3.4	277
Mar	2.2	1.091	1.696	14.1	3.4	277
Apr	2.1	1.660	2.897	16.4	4.9	239
May	2.1	1.660	2.897	16.4	4.9	239
Jun	1.9	1.660	2.897	16.1	4.7	244
Jul	1.6	1.718	6.949	19.7	6.8	198
Aug	1.5	1.718	6.949	19.5	6.7	200
Sep	1.8	1.718	6.949	20.0	7.0	195
Oct	2.0	0.681	1.167	12.5	2.3	312
Nov	2.3	0.681	1.167	12.7	2.4	307
Dec	2.4	0.681	1.167	12.8	2.5	305

[1] Relative humidity factors [f(Rh)] from Table A-2, Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule, September 2003.
[2] Quarterly particle extinction data provided by Scot Copeland, USFS, Washakie Ranger District, Lander, WY. October 2003.

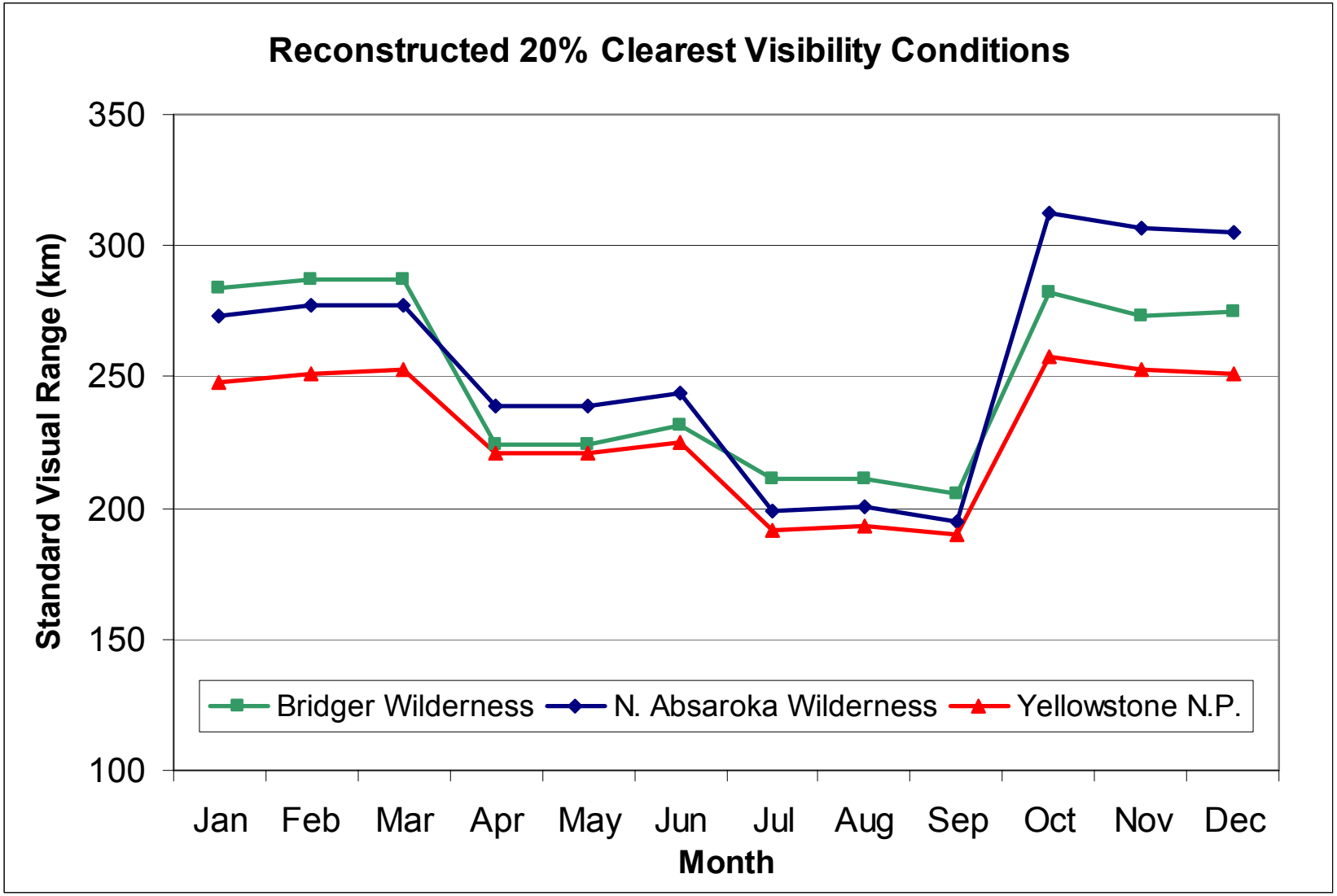

Figure 3.4-9. Reconstructed 20% Clearest Seasonal Visibility Condition

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3.5.5 Groundwater Quality

p. 3.5-37, first paragraph, revise as shown:

Groundwater quality is affected by a variety of factors, including the geochemical composition of the aquifer materials, retention time in the aquifer, and the quality of recharge water. Numerous studies have been completed on water quality characteristics of the aquifers in the immediate vicinity of the WRPA. These include those by Daddow (1996), Plafcan et al. (1995), and McGreevy et al (1969). In addition, the results of suitability studies, including aquifer vulnerability (Munn and Arneson 1998) are available. Most recently, Dolhopf (2004) noted in testimony that past oil and gas activities in the Wind River Basin have contaminated soil with hydrocarbon concentrates exceeding state action level criteria. The following presents a general overview of the water quality characteristics of the two main aquifers which underlie the WRPA: the Tertiary aquifer in the Wind River Formation and the unconsolidated deposits of Quaternary age. Water quality for deep aquifers was described briefly in the previous section in terms of dissolved solid concentrations and will not be discussed in more detail here.

3.5.6 Water Rights and Groundwater Use

p. 3.5-38, revise second and third sentences of the first paragraph to read "Pre-1950 water rights are recognized by the compact. This arrangement indicates that there is significant available water for new consumptive uses in Wyoming, given that the Bighorn River discharges approximately 2.3 million acre-feet of flow from Wyoming in an average year."

Table 3.5-17, p. 3.5-32, correct spelling to third column heading: Stratigraphic Unit

3.6.2 Vegetation

p. 3.6-1, first paragraph of section, revise as noted: "The Wind River Project Area (WRPA) consists of a relatively level, gently sloping valley, with low lying, hilly terrain at elevations that range from 5,500 feet to less than ~~3,000~~ 4,500 feet …"

second paragraph of section, revise as shown: "…Land Cover Classification (GAP) system for the State of Wyoming have been identified in the WRPA (WGFD 1996). The…"

p. 3.6-5, replace Table 3.6-3 with the table below. "Dry Land Crops" have been eliminated, and acreages adjusted :

Table 3.6-3. Distribution of Primary Vegetation Cover by Subshed for the Three Watersheds within the WRPA

Vegetation Cover	Muddy Creek ac	Cottonwood Creek ac	Fivemile Creek ac	Total Acres ac	% Cover ac
Wyoming Big Sagebrush	9176	0	11156	20332	22
Desert Shrub	13926	10680	2135	26741	29
Greasewood Fans and Flats	695	0	148	843	1
Irrigated Cropland	14208	1317	20485	36010	39
Mixed Grass Prairie	1364	0	1885	3249	4
Saltbrush Fans and Flats	0	114	0	114	<1
Shrub Riparian	4162	0	92	4254	5
Total Acres	**43531**	**12111**	**35901**	**91543**	**100**

[1] Values are estimated based on WYNDD land cover data. Error is less than 1%.

p. 3.6-6, under "Wyoming Big Sagebrush" subheading, revise list after first paragraph to be bulleted, as follows:

"Plant associations within this alliance that may occur within the WRPA include:

- Wyoming Big Sagebrush / Bluebunch Wheatgrass Shrubland.
- Wyoming Big Sagebrush / Threadleaf Sedge Shrubland.
- Basin Big Sagebrush/Foothill Big Sagebrush Shrub Herbaceous."

3.6.4 Wetlands and Riparian Areas

p. 3.6-12, second paragraph, fourth sentence, revise error: "The ~~rivering~~ riverine perennial (RP) wetlands are widespread along natural drainages."

p. 3.6-13, first paragraph, first sentence, revise as shown: "The riparian wetland habitats, which represent ~~79~~ 76 percent of all wetlands within the WRPA (Table 3.6-5) consist of the riparian shrub association…"

3.8 WILDLIFE

3.8.1 Introduction

p. 3.8-1, third paragraph, first sentence, correct as shown: "Wildlife habitats that could be affected by the Wind River Gas Field Development Project…"

3.8.2 Terrestrial Wildlife

3.8.2.1 Big Game Species

Pronghorn Antelope

p. 3.8-2, second paragraph, revise as noted: "Pronghorn antelope, from the Project Pronghorn Antelope Herd, ~~Unit~~ occur throughout the WRPA, as shown on Figure 3.8-1. The y~~Y~~earlong range~~s~~ exists throughout ~~much of the eastern portion of~~ the WRPA (G. Anderson, WGFD, personal communication, October 8, 2004). ~~which is dominated by sagebrush. Although, pronghorn have been documented in marginal habitats in the western portion of the WRPA, their occurrence there is limited.~~

Mule Deer

p. 3.8-2, last sentence of the paragraph under "Mule Deer" subheading, revise as shown: "Mule deer, from the Project Mule Deer Herd, ~~Unit~~ occur throughout the WRPA, as shown in Figure 3.8-2.~~Although yearlong mule deer habitat occurs within the WRPA, no mule deer herd units are contained within the WRPA boundary (Figure 3.8-2).~~ Yearlong ranges exist ~~across~~ throughout the entire WRPA, and mule deer have been observed using all habitat types. ~~No crucial ranges occur in the WRPA."~~

White-tailed Deer

p. 3.8.3, last sentence under the "White-tailed Deer" subheading, revise as shown: "Although there are no white-tailed deer herd units within the WRPA ~~WGFD GIS data suggests that no white-tailed deer habitat herd units occurs within the WRPA~~ (Figure 3.8-3), ~~there have only been~~

~~incidental observations of this species within the WRPA~~ white-tailed deer are common within ~~do inhabit~~ the WRPA and adjacent areas on a year-round basis (Tom Ryder, WGFD, personal communication, October 6, 2004). In the WRPA, white-tailed deer are generally found along Muddy Creek and Fivemile Creek during the day and in the croplands at night. ~~White-tailed deer habitat occurs throughout the area, and observations of the species are quite common. "~~

Elk

p. 3.8-7, Second paragraph under the "Elk" subheading, revise as noted: "In the Wind River area, elk ranges include the Owl Creek Mountains and foothills. The northern portion of the WRPA is identified as a "limited use" area by the WGFD ~~which extend into the northern portion of the WRPA and represent elk limited use areas~~ (Figure 3.8-4). ~~Although elk habitat exists throughout the WRPA, Although identified elk ranges do exist in the WRPA,~~ most elk ~~elk are rarely present, and utilize the northern portion of the WRPA activities in the WRPA would not cause any adverse affects to the species across its range~~ However, only sporadic occurrences of the elk have been reported in the WRPA (Tom Ryder, WGFD, personal communication, October 6, 2004)~~(Figure 3.8-4)~~. "

Moose

p. 3.8-7, last sentence of section, add as shown: "Moose occasionally have been observed in the WRPA (Baldes 2003)."

3.8.2.3 Game Birds

p. 3.8-16, first paragraph, second sentence, revise as noted: "Table ~~H~~I-1 in Appendix I in the DEIS provides a listing of the game birds that have been observed within the WRPA…"

3.8.3.2 Fish

p 3.8-37, replace entire section 3.8.3.2 of the DEIS with the following text:

"The Wyoming Game and Fish Department (WGFD) lists forty-nine game and non-game fish species that occur in the State of Wyoming (Table 3.8-3). Those species that have been observed by WGFD during surveys conducted between 1967-1986 and 2004 are marked on the table.

Game species, which are presently stocked or have been stocked in the past, provide recreational ~~angling~~ opportunities for the Tribes and the public throughout the State. ~~while n~~ Non-game fish species are important because they balance the ecological health of aquatic communities by controlling the growth of aquatic plants and by providing prey for game species.

Ten ~~of these~~ fish species were collected during a ~~F~~fisheries ~~and Wildlife S~~survey carried out during August and September 2003 by R. Baldes, Environmental Legacy LLC (Appendix J-3 in the FEIS).

Qualitative fisheries surveys were conducted at the following sites, as shown on Table 3.8-4.

- Five sites on Fivemile Creek (G50, G50a, G50b, and at upstream reference sites 3 and 4);
- Five sites on Muddy Creek (G52, G52a, G52b and upstream reference sites 1 and 2);
- One site on the lower portion of Cottonwood Creek (CCR). Other potential sampling locations along Cottonwood Creek were found to be dry.

Fish communities in various habitat types, such as pools, riffles, and runs were sampled using a seine (4 foot x 20 foot) and/or fish trap (7 inch x 17 inch). All fish captured were identified to species in the development areas and separated into 20 mm total length groups (see Appendix J-3 in the DEIS for details).

Table 3.8-4 lists the species and numbers of fish collected at each sampling site within the WRPA during the Summer 2003 survey (Baldes 2003). Overall, Muddy Creek had the most diverse fish fauna with eight species, followed by Cottonwood Creek and Fivemile Creek, which contained six species each. Three of the five sites on Muddy Creek contained four fish species. Of the sites sampled, only reference site 2 on Muddy Creek failed to contain any fish. Longnose dace (*Rhinichthys cataractae*) was the most common species collected. It occurred at eight of the 10 stations sampled.

Game fish were not collected during ~~this~~ the 2003 survey. However, game species have been stocked in ~~previously recorded in~~ Fivemile Creek, Muddy Creek in the Sand Mesa Wildlife Habitat Management Area (WHMA) in the WRPA, and their absence in this survey can be attributed to high water volumes in the creek that prevented ~~data~~ fish collection at two of the lower survey stations (Baldes 2003).

Brown Trout

Brown trout *(Salmo trutta)* occur from southern Canada to the northeastern United States, and throughout the Appalachians and the Mississippi Valley. This species is also found throughout the western United States at higher elevations. Brown trout occur in a variety of habitats from small streams to large lakes. They require a year-round supply of cold, well-oxygenated water. Spawning in this species typically occurs on gravel bars from late October through November. Brown trout consume a variety of aquatic insects and other invertebrates, as well as fish, crayfish and a wide variety of land insects, such as ants, beetles, gnats, caterpillars, and inch worms. This non-native game species ~~has been~~ was ~~observed~~ stocked by the WGFD in Boysen Reservoir and the Sand Mesa Wildlife Habitat Management Area (WHMA) in the past ~~within the WRPA~~ (WGFD 1982, 1967, 1979, 2004).

Burbot (Ling)

The burbot (*Lota lota*) is the only representative of the cod (Gadidae) family in fresh water in North America. This species is also known as ling, lingcod, and freshwater cod. The burbot is native to Wyoming streams and is considered to be an important source of food by the Shoshone and Arapaho Tribes on the Wind River Indian Reservation. However, some anglers do not consider the burbot to be a desirable game species and discard it (D. Dufek, WGFD, personal communication, October 25, 2004). This species is common in Fivemile Creek and Muddy Creek within the WRIR (Baldes, 2003) and in the Sand Mesa WHMA (WGFD 1967, 1975, 1979, 1982, 1986, 2004).

Table 3.8-3. List of Game and Non-game Fishes Occurring In Wyoming. (~~Wyoming Game and Fish Department –~~WGFD, Cheyenne, ~~WY~~; WGFD, Lander)

COMMON NAME	SCIENTIFIC NAME	GAME/NON-GAME
Arctic grayling		Game
Bigmouth shiner	*Notropis dorsalis*	Non-game
Black bullhead	*Ameiurus melas*	Game
Bluehead sucker	*Catostomus discobolus*	Non-game
Brassy minnow	*Hybognathus hankinsoni*	Non-game
Brown trout1	*Salmo trutta*	Game
Burbot (ling)1,2	*Lota lota*	Game
Central stoneroller	*Campostoma anomalum*	Non-game
Channel catfish	*ctalurus punctatus*	Game
Common carp1,	*Cyprinus carpio*	Non-game
Common shiner	*Luxilus cornutus*	Non-game
Creek chub	*Semotilus atromaculatus*	Non-game
Cutthroat trout1	*Oncorhynchus clarki*	Game
Emerald shiner2	*Notropis atherinoides*	Non-game
Fathead minnow	*Pimephales promelas*	Non-game
Finescale dace	*Phoxinus neogaeus*	Non-game
Flannelmouth sucker	*Catostomus latipinnis*	Non-game
Flathead chub1,2	*Platygobio gracilis*	Non-game
Goldeye	*Hiodon alosoides*	Non-game
Hornyhead chub	*Nocomis biguttatus*	Non-game
Iowa darter	*Etheostoma exile*	Non-game
Johnny darter	*Etheostoma nigrum*	Non-game
Lake chub1	*Couesius plumbeus*	Non-game
Leatherside chub	*Gila copei*	Non-game
Longnose dace1,2	*Rhinichthys cataractae*	Non-game
Longnose sucker1,2	*Catostomus catostomus*	Non-game
Mottled sculpin	*Cottus bairdi*	Non-game
Mountain sucker1	*Catostomus platyrhynchus*	Non-game
Mountain whitefish1	*Prosopium williamsoni*	Game
Orangethroat darter	*Etheostoma spectabile*	Non-game
Paiute sculpin	*Cottus beldingi*	Non-game
Pearl dace	*Margariscus margarita*	Non-game
Plains killfish	*Fundulus zebrinus*	Non-game
Plains minnow	*Hybognathus placitus*	Non-game
Plains topminnow	*Fundulus sciadicus*	Non-game
Quillback	*Carpiodes cyprinus*	Non-game
Rainbow trout2	*Oncorhynchus mykiss*	Game
Red shiner	*Cyprinella lutrensis*	Non-game
Redside shiner	*Richardsonius balteatus*	Non-game

River carpsucker	*Carpiodes carpio*	Non-game
Roundtail chub	*Gila robusta*	Non-game
Sand shiner2	*Notropis stramieus*	Non-game
Sauger1	*Stizostedion canadense*	Game
Shorthead redhorse	*Moxostoma macrolepidotum*	Non-game
Shovelnose sturgeon	*Scaphirhynchus platorynchus*	Game
Speckled dace	*Rhinichthys osculus*	Non-game
Stonecat	*Noturus flavus*	Game
Sturgeon chub	*Macrhybopsis gelida*	Non-game
Suckermouth minnow	*Phenacobius mirabilis*	Non-game
Utah chub	*Gila atraria*	Non-game
Utah sucker	*Catostomus ardens*	Non-game
Walleye2	*Stizostedion vitreum*	Game
Western silvery minnow	*Hybognathus argyritis*	Non-game
White sucker1,2	*Catostomus commersoni*	Non-game

[1]- Fish species collected by the WGFD in Muddy Creek and Fivemile Creek in the vicinity of the WRPA between 1967 and 1986
[2]- Species collected by WGFD in Muddy Creek and Fivemile Creek in the vicinity of the WRPA during Spring 2004.

Common Carp

The common carp (*Cyprinus carpio*) ~~were~~ was introduced into the United States in the early 1800's, from Europe. Currently the carp~~y~~ inhabits a wide variety of ~~conditions~~ waterbodies, but generally favors large water bodies with slow flowing or standing water and soft bottom sediments. ~~Common~~ The carp thrives in large turbid rivers ~~where they~~ and ~~are omnivorous,~~ feed~~s~~ing mainly on aquatic insects, crustaceans, annelids, molluscs, weed and tree seeds, wild rice, aquatic plants and algae; mainly by grubbing in sediments. The female ~~Carp~~ spawns in spring and summer, laying sticky eggs in shallow vegetation. The common carp was reported from Muddy Creek and Fivemile Creek in the Sand Mesa WHMA ~~observed in the WRPA (Muddy Creek)~~ within the WRPA (Appendix J-3 in the DEIS) (WGFD 1967, 2004; Baldes 2003).

Creek Chub

Creek chub (*Semotilus atromaculatus*) occur throughout most of the eastern and central United States and adjacent southern Canada. They prefer small to moderate size streams and rivers, as opposed to large rivers and lakes. They are tolerant of turbid (cloudy) water but favor clear to faintly cloudy waters over hard bottoms (gravel, sand, or rubble). Creek ~~Chub~~ chub are opportunistic feeders, eating a variety of prey, including insect larvae, insects, and small fish. Creek chub typically spawn in gravel beds from early May into July when water temperatures are 13-18° C (55-65° F). This species was observed in the WRPA (Cottonwood Creek, Fivemile Creek) (Appendix J-3 in the DEIS) (Baldes 2003).

Table 3.8-4. Number of Individual Fish Species Identified within the WRPA[1]

Sampling Location	Species (Common Name)	Species (Scientific Name)	Number of Individuals
Cottonwood Creek	Creek chub	*Semotilus atromaculatus*	25
	Flathead chub	*Platygobio gracilis*	20
	Johnny darter	*Etheostoma nigrum*	1
	Lake chub	*Couesious plumbeus*	3
	Longnose dace	*Rhinichthys cataractae*	2
	White sucker	*Semotilus atromaculatus*	4
Muddy Creek - Reference Site 2 (upstream)	No fish collected		
Muddy Creek - Reference Site 1 (upstream)	Lake chub	*Couesious plumbeus*	70
	Longnose dace	*Rhinichthys cataractae*	24
	Fathead minnow	*Pimephales promelas*	4
Upper Muddy Creek (G52)	Lake chub	*Couesious plumbeus*	1
	Longnose dace	*Rhinichthys cataractae*	1
	Plains killifish	*Fundulus zebrinus*	28
Middle Muddy Creek (G52b)	Fathead chub	*Platygobio gracilis*	7
	Longnose dace	*Rhinichthys cataractae*	3
	Mountain sucker	*Catostomus platyrhynchus*	1
	White sucker	*Semotilus atromaculatus*	1
Lower Muddy Creek (G52a)	Flathead chub	*Platygobio gracilis*	7
	Longnose dace	*Rhinichthys cataractae*	6
	White sucker	*Semotilus atromaculatus*	2
	Common carp	*Cyprinus carpio*	1
Fivemile Creek - Reference Site 4 (upstream)	Lake chub	*Couesious plumbeus*	32
	Longnose dace	*Rhinichthys cataractae*	1
	White sucker	*Semotilus atromaculatus*	1
Fivemile Creek - Reference Site 3 (upstream)	Lake chub	*Couesious plumbeus*	15
	Fathead minnow	*Pimephales promelas*	1
	Longnose dace	*Rhinichthys cataractae*	6
	White sucker	*Semotilus atromaculatus*	7
Upper Fivemile Creek (G50)	Creek chub	*Semotilus atromaculatus*	4
	Lake chub	*Couesious plumbeus*	26
	Longnose dace	*Rhinichthys cataractae*	18
	Mountain sucker	*Catostomus platyrhynchus*	1
	White sucker	*Semotilus atromaculatus*	2
Middle Fivemile Creek (G50b)	No fish collected		
Lower Fivemile Creek (G50a)	No fish collected		

Source: Baldes 2003.

Cutthroat Trout

Originally one of the most numerous fish species in North America, cutthroat trout are now confined to the Snake River drainage in Idaho and Wyoming (Behnke 1992). In recent years this species has been successfully stocked in waters across much of the West. Prime habitat for cutthroat trout includes small gravel-bottom mountain streams with cold, clear water, or high-mountain lakes of similar water quality. This species feeds primarily on insects, including grasshoppers, crickets, moths, or aquatic insects such as mayflies and caddis flies. Cutthroats mature in about four years and spawn from March through July. A female produces between 200 and 4,500 eggs, which are laid in the spaces between gravel in flowing water. Cutthroat trout have been stocked in Boysen Reservoir by the WGFD. The species has been reported present in Muddy Creek and Fivemile Creek in the Sand Mesa WHMA ~~observed~~ within the WRPA (WGFD 1975).

Fathead Minnow

The fathead minnow (*Pimephales promelas*) is found in cool to warm aquatic habitats throughout eastern and northern North America. This species lives in many kinds of lakes and streams, but is especially common in shallow, weedy lakes; bog ponds; low-gradient, turbid (cloudy) streams; and ditches. Fathead minnows are considered opportunist feeders. Their diet consists largely of algae, protozoa (like amoeba), plant matter, insects (adults and larvae), rotifers, and copepods. Spawning season for the fathead minnow starts in late May to early June when water temperature exceeds 16° C (about 60° F), and continues into mid-August when the water temperatures begin to cool. The fathead minnow was observed in the WRPA (Muddy Creek, Fivemile Creek) (Appendix J-3 in the DEIS) (Baldes 2003).

Flathead Chub

The flathead chub (*Platygobio gracilis*) is widely distributed in the United States. It ranges from New Mexico to the northern Yukon Territory in Canada. This species inhabits a diverse range of habitats. In the Missouri River, it is found in turbid waters where the current is swift and the bottom is composed of sand or fine gravel. In portions of its range it is also collected in pools with moderately clear water, little current, and bottoms composed of coarse gravel and bedrock. The diet of the flathead chub consists mostly of terrestrial insects supplemented by lesser quantities of other small invertebrates and plant material. This non-game species is native to Wyoming and was observed in Muddy Creek and Fivemile Creek within the WRPA (WGFD 1967, 1975, 1979, 1982, 1986, 2004; Baldes 2003).

Johnny Darter

In the United States, Johnny darter (*Etheostoma nigrum*) occur throughout the midwest, with smaller populations occurring as far west as Wyoming, south to Alabama and Mississippi, and east to the Carolinas and New York. They occur in sandy and muddy, sometimes rocky, pools of headwaters, creeks, and small to medium rivers, and in the sandy shores of lakes. Young Johnny darters eat mostly small copepods and waterfleas. As they grow, they add larger waterfleas, midge larvae, mayfly larvae, caddisfly larvae and sometimes sideswimmers to their diet. Spawning sites commonly occur in pools, slow runs, or shallow lake waters, where there are large rocks, tin cans, logs, mussel shells, or any other types of debris. This non-game species was observed in the WRPA (Cottonwood Creek) (Appendix J-3 in the DEIS) (Baldes 2003).

Lake Chub

The lake chub is a northern, periglacial species and is broadly distributed across Canada and the northern United States from Nova Scotia and Labrador to British Columbia and central Alaska. In the continental United States this species can be found in northern New England, New York, Michigan, Wisconsin, Idaho, Wyoming, and Colorado. This species lives in streams, lakes, and ponds, moving into deeper water during the summer. The lake chub is an early spawner. Zooplankton, aquatic insects, algae, and small fishes are this species' chief food items. This non-game species is native to Wyoming and was observed in Muddy Creek and Fivemile Creek within the WRPA (WGFD 1982; Baldes 2003).

Longnose Dace

Longnose dace are generally distributed above 40°N latitude from coast to coast, occurring as far north as the Arctic Circle in the Mackenzie River drainage, and to the south in the Appalachian Mountains as far south as northern Georgia, and from the Rocky Mountains to the Rio Grande drainage of Texas and northern Mexico (Page and Burr 1991). In Wyoming, this species has been recorded from several sites in the Green River drainage of the upper Colorado River basin, including Hams Fork Creek (Baxter and Simon 1970). The longnose dace is primarily a schooling species primarily found in sheltered areas. Spawning typically occurs through June and early July, most commonly in gravel bottom runs and riffles. This non-game species is native to Wyoming and was observed in Muddy Creek and Fivemile Creek within the WRPA (WGFD 1982, 1979, 1986; Baldes 2003).

Longnose Sucker

Longnose sucker are found throughout most of Canada and Alaska, along the Delaware River drainage in New York, within the Great Lakes basin, along the upper Monongahela River drainage in Maryland and West Virginia, and within the Missouri River drainage in Nebraska and Colorado. This species is typically found in the clear, cold, deep water of lakes and tributary streams (Page and Burr 1991). Longnose suckers move from lakes and deep pools into shallow, gravel-bottomed streams to spawn. This non-game species is native to Wyoming and feeds primarily on benthic invertebrates. Longnose sucker were observed in the Sand Mesa WHMA within the WRPA (WGFD 1975, 2004).

Mountain Sucker

This mountain sucker is found throughout western North America, ranging from South Dakota to the Pacific coastal states and British Columbia, Alberta, and Saskatchewan. This species can be found in cool rivers and streams with moderate currents and rocky substrates. These fish rarely occur in larger rivers and lakes. Mountain sucker feed primarily on diatoms and other types of algae. Spawning occurs in late spring or early summer, primarily in riffles near pools in fast flowing streams. This non-game species is native to Wyoming and was observed in Muddy Creek and Fivemile Creek within the WRPA (WGFD 1975, 1979, 1982, 1986; Baldes 2003).

Plains Killifish

In North America, plains killifish are found in the Mississippi River and Gulf Slope basins in the United States from northern central Montana to central Wyoming and south to the Colorado River, Brazos River, Galveston Bay and the Rio Grande drainages in Texas. This species inhabits shallow sandy runs, pools, backwaters, creeks and small to medium rivers. Killifish

tolerate extremely alkaline and saline streams, and often found where few other fishes can survive. This non-game species was observed within the WRPA (Muddy Creek) (Appendix J-3) (Baldes 2003).

Rainbow Trout

The rainbow trout was originally found in lakes and streams from Alaska to northern Baja, Mexico, as well as the coastal streams of Asia. The first stocking of rainbow trout in the eastern United States occurred in 1880, when the United States Fish Commission delivered rainbows that originated near McCloud River, California. The species now occurs throughout the United States and in many countries around the world (Behnke 1992). Prime habitat for rainbow trout includes swift-flowing rivers with clean rocky bottom with water temperatures remaining below 70°F. This species feeds primarily on insects, such as grasshoppers, mayflies, and caddisflies. However, they also feed on worms and fish, including other smaller trout. Rainbow trout spawn in March or April, primarily in shallow gravelly riffles. This non-native game species has been stocked in the Sand Mesa WHMA within the WRPA in the past, and is currently stocked in Middle Depression Reservoir (WGFD 1975, 2004).

Sauger

Sauger are native to North America. They are found in a wide band across mid-central North America from Quebec to Alberta, then in a progressively slimmer band further south through the Mississippi River drainage system, from Arkansas to northern Alabama and Tennessee. Sauger are found primarily in large muddy lakes and rivers, although they are tolerant of fast moving rivers. This species spawns in late spring to early summer in the north and earlier in the south, primarily when the water is between 39°F and 43°F. Nests are built in shallow water on gravel shoals. Sauger are mostly bottom feeders, with the majority of their diet consisting of fish such as shad, sunfish, and minnows. This game species is native to Wyoming and ~~has been~~was ~~observed~~ reported from Muddy Creek within the WRPA (WGFD 1967).

Walleye

The walleye (*Stizostedion vitreum*) is a widely distributed species found in freshwater lakes and streams in North America. It is a highly desirable game species and was stocked in the past in Middle Depression Reservoir (within the WRPA) and Boysen Reservoir in Boysen State Park. The walleye that are present in the creeks within the WRPA are descended from the individuals that were stocked in Boysen Reservoir in the past (D. Dufek, WGFD, personal communication, October 25, 2004).

White Sucker

The white sucker is a non-game species that is widely distributed species found in freshwater lakes and streams from Labrador to Georgia, and from Colorado to Alberta and British Columbia and the Mackenzie River delta. This species prefers deeper water in the late fall and winter months and shallow water in lakes and riffle areas in spring. White suckers spawn from April to early May, seeking areas with swift water and a gravel substrate to randomly spread their eggs. White suckers are bottom feeding fish, eating plants, mollusks, insects, diatoms, crustaceans, and protozoans. White suckers are native to Wyoming and have been observed within the WRPA (WGFD 1967, 1975, 2004)."

3.8.3.3 Macroinvertebrates

p. 3.8-37, second paragraph in section, revise as shown: "Macroinvertebrates in the basin region ~~that~~ include numerous species of arthropods, mollusks, and annelids, ~~nematodes, and platyhelmenthes~~.. These species are typically associated with stream channel bottoms or other stable aquatic surfaces and debris. Benthic macroinvertebrates are useful biological ~~monitors~~ indicators, because they are found…"

P. 3.8-38, first full paragraph, revise as noted: "In April and May 2002, a benthic macroinvertebrate study was conducted by Wind River Environmental Quality Commission (WREQC) at numerous sampling stations within the WRIR, of which six sampling stations were within the WRPA (WREQC 2003) (See Figure 3.5-1). Table 3.8-5 shows the total number of macroinvertebrates, by class collected at each aquatic sampling station within the WRPA. A detailed listing of species collected at each of the macroinvertebrate~~s~~ sampling stations is provided in ~~Appendex~~ Appendix ~~I~~ J, Table J-4 in the DEIS."

3.9.2.2 Black-footed Ferret

p. 3.9-6, paragraph after Table 3.9-3, revise text as noted: "In February 2004, the USFWS in coordination with the WGFD reviewed the current and historic status of prairie dog towns and related black-footed ferret surveys throughout Wyoming. The goal of this review was to determine whether survey guidelines should continue to be applied across the entire state. Through this process, the USFWS has developed a list of blocks of habitat that are not likely to be inhabited by black-footed ferrets. In those areas, take of individual ferrets and effects to a wild population are not an issue and surveys for ferrets are no longer recommended.

According to the USFWS letter (~~ES-61411/BFF/WY7746~~ 2004a), the prairie dog colonies within the WRPA would not require black-footed ferret surveys. This does not mean, however, that the area is without value to black-footed ferrets, nor does this block clearance relieve responsibility to evaluate the potential effects of development actions on the survival and recovery of the species.

~~Prior to construction and drilling operations in or immediately adjacent to the white-tailed prairie dog colonies, a black-footed ferret survey would be conducted. The results of the survey would determine whether proposed development would be permitted could occur within the prairie dog colonies.~~

3.9.3.2 Greater Sage-Grouse

p. 3.9-17, first paragraph, second sentence, revise as shown: "…species of high interest among federal and state agencies and ~~was~~ . ~~Several~~ petitioned for listing under the Endangered Species Act. The USFWS (2004b) has agreed to review the petition (69 FR 21484, April 21, 2004) ~~the sage grouse have been made in an effort to protect itby the USFWS in April, 2004. (Erwin, K., USFWS, personal communication,FR 04-8870 April 20034~~). "

p. 3.9-18, first full paragraph, revise as follows: "An aerial survey to search for sage-grouse leks was conducted within and adjacent to the WRPA by Buys & Associates on April 16 and 17, 2003. No sage grouse leks were identified within the WRPA during the aerial surveys. ~~Although there was some sage grouse habitat within the WRPA, the majority of the area did not appear to be suitable habitat for sage grouse. The most suitable sage grouse habitat was found immediately south of the WRPA, north of Fivemile Creek and south of the west end of Muddy~~

~~Ridge. The areas that appeared to be suitable habitat for sage grouse consisted of approximately 50-60 percent sagebrush (*Artemisia* spp.), 10-15 percent short grasses, and the 25 – 40 percent bare ground.~~ However, several sage-grouse leks have been documented south and west of the WRPA (Hnilicka, P., USFWS, personal communication, June 2003), and are identified in Figure 3.9-3."

3.9.3.3 Pygmy Rabbit

p. 3.9-18, insert the following text after the **Greater Sage-Grouse** section:

"The pygmy rabbit (*Brachylagus idahoensis*) is a Wyoming State Sensitive Species that was petitioned for listing under the Endangered Species Act on April 21, 2003. This species occurs in portions of many of the western states including southwestern Wyoming where they occur in a few isolated populations in Lincoln, Uinta, Sweetwater, Sublette and Fremont Counties (USFWS 2004).

Pygmy rabbits are found in close association with tall, dense stands of big sagebrush (*Artemesia tridentata*) on plains, alluvial fans, riparian gullies, and in fenced right-of-ways along roads. Pygmy rabbits are dietary and habitat specialists, and this habitat type dictates their elevational as well as their spatial distribution. In the big sagebrush habitat type, the pygmy rabbit is considered a keystone species for several reasons: 1) it does not flourish in habitats dominated by other vegetative species; 2) it exhibits unique fossorial behavior and its extensive burrow systems are utilized by invertebrates and other vertebrates within the habitat type, and 3) it offers terrestrial and avian predators a dependable food supply (Wilson and Ruff 1999).

Pygmy rabbits are most active at dawn and dusk, but can often be observed feeding at other times of the day, even within the upper canopy of sagebrush. In summer pygmy rabbits often rest outside the burrow or retreat to its cool recesses. In winter, individuals are often observed sunning themselves in the late morning and early evening next to a burrow in the snow. When the snow is so deep that it covers the sagebrush, pygmy rabbits may construct extensive burrows within the snow pack that give them access to the sagebrush canopy (Green and Flinders 1980).

Pregnant females have been observed from late February through late May. The gestation period has not been documented, but is probably 27 to 30 days. An average of six young are born per litter and a female may have as many as three litters per year. Young-of-the-year do not breed, but both sexes are fertile the next breeding season. Juvenile mortality is highest in the first five weeks of life and mortality of adults is highest in late winter and early spring (Green and Flinders 1980).

The pygmy rabbit's range once included most of the Great Basin and adjacent appropriate habitat in the intermountain areas of the western United States, but many historic populations of the pygmy rabbit have disappeared. Fire has had a devastating effect on mature stands of big sagebrush and thus on the pygmy rabbit. Massive rangeland improvement projects have replaced big sagebrush with exotic bunch grasses. Robust stands of big sagebrush have been, and continue to be, lost to agriculture and development (Wilson and Ruff 1999). Although potential habitat occurs in the WRPA for the pygmy rabbit, they have not been identified in the WRPA, and their presence in the area is not likely. "

3.13.5.1 Population, Demographics, and Mobility

p. 3.13-14, first paragraph, revise, as underlined: "…Bureau of Indian Affairs ~~agency~~. Ethete is the headquarters of the Northern Arapaho tribal government. Populations for…"

3.15 HEALTH AND SAFETY

p. 3-15.1, starting with the third paragraph, revise as shown: "Various hazardous materials are used in the construction, operation, and maintenance of natural gas exploration and production projects, including, diesel fuel and gasoline, various oils and lubricants, and cleaners. In addition, natural gas production can produce water and liquid hydrocarbons, or condensate, that may contain compounds deemed hazardous if spilled or ingested. Based on public comments provided and preliminary information provided to BIA, some existing and historic well sites and production facilities in the WRPA may have residual contamination from accidental spills or use of unlined production pits in the past. In recent years, the Operators have adopted new practices to minimize the potential for soil and groundwater contamination with hazardous materials. These practices include the use of tanks (instead of production pits), liners and berms, and other types of containment to properly collect, store, and haul produced liquids to appropriate disposal facilities. A Hazardous Materials Management Plan, prepared by the Operators in the WRPA, is provided in Appendix E of this EIS.

CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

4.3 SOILS

4.3.1 Introduction

p. 4.1-10, first paragraph of section, revise, as shown: "…soil compaction, loss of topsoil productivity (including increases in native soil salinity), and increased…".

p. 4.1-10, add the following to the first paragraph of the section: "Impacts due to soil contamination by hydrocarbons could result due to noncompliance with Wyoming DEQ regulations, current drilling practices, proponent mitigation measures, or as a result of accidental leakage of hydrocarbons."

p. 4.1-10, after the first paragraph of the section, revise text as shown:

"In the summer of 2004, subsequent to the publication of the DEIS, petroleum and salt contamination of surface and subsurface soil from past drilling practices was discovered by private landowners on their property within the Pavillion field. The results of preliminary soil sampling conducted by Dollhopf (2004) were provided to the BIA. This contamination is being addressed by the Operators. Under the Proposed Action or alternatives soil contamination in Pavillion from reserve pits would not occur, since a closed mud system is utilized on irrigated land within the Pavillion field. All muds and cuttings from drilling operations are stored by the Operators in a metal container and disposed of at an approved waste disposal site. The extent and severity of the contamination is unknown at the present time, and additional soil sampling to determine the extent of contamination is beyond the scope of this DEIS.

Potential impacts to soils from the Proposed Action or alternatives are similar for all alternatives, because all the alternatives involve the drilling of oil and gas wells and building of supporting infrastructure. The magnitude of potential impacts will vary proportionally with the number of

wells ultimately drilled under each alternative and the total amount of associated disturbance. Construction disturbance is greatest for Alternative A, less for the Proposed Action and Alternative B and least for Alternative C. ~~Cumulative~~ Post-reclamation disturbances are relatively low for all alternatives—Proposed Action (422.7 acres, Alternative A (611.9 acres), Alternative B (325.1 acres) and Alternative C (79.3 acres).

The following criteria were used to determine the significance of impacts to soils ~~within the WRPA~~ from the proposed project.

4.3.2 Proposed Action (325 wells) – Direct and Indirect Impacts

p. 4.1-10, first paragraph of this section, revise, as shown: "…soil compaction, loss of topsoil productivity (including increases in native soil salinity), and increased…"

4.3.7 Additional Mitigation Measures

p. 4.1-13, revise as shown: "~~With these measures and additional measures proposed for vegetation, wetlands, and water resources, no additional mitigation measures for soils are recommended.~~ Current Operator-committed measures in the irrigated croplands in the Pavillion Field involve utilization of a closed mud systems and a containment tank for storage of cuttings. After the completion of drilling, cuttings are taken to an approved disposal site. In dry land areas of the Pavillion Field, the Operators use a closed mud system and lined pit for the cuttings. In other fields, muds and cuttings are placed in a lined reserve pit. After the fluid has evaporated, cuttings are buried to a depth of three feet, as described in Section 2.7.2.3 of the DEIS. In order to mitigate for potential soil salinity impacts, topsoil will be stockpiled for later reclamation (see Appendix D in this FEIS)."

4.3.7 Residual Impacts, p. 4.1-13, should read: **4.3.8 Residual Impacts**

4.4 AIR QUALITY

p. 4.4-1, replace entire section 4.4 in the DEIS with the following text:

4.4.1 Introduction

As an unavoidable result of various Project-related activities, additional pollutants would be emitted to the atmosphere. Potential sources of emissions would include fugitive dust and vehicle exhaust from construction activities, exhaust from drill rig engines, and emissions related to well operations and gas compression. These project related emission sources have the potential to affect air quality on both a local and a regional scale. The magnitude of the potential impacts would vary according to the number of wells ultimately developed under each alternative. To assess potential air quality impacts, emission inventories were developed for the Proposed Action and alternatives. Potential emissions for the existing development within the Wind River Project Area (WRPA) and each of the alternatives are summarized in Table 4.4-1. Potential emissions for the Proposed Action and alternative are in addition to the emissions resulting from the existing development. Detailed documentation of the emission inventories is provided in a separate report: Emissions Inventory for the Wind River Natural Gas Field Development Project (Buys & Associates 2004).

Pollutant dispersion modeling was performed to assess the potential air quality impacts from the Proposed Action and alternatives. The modeling assessment evaluated air quality impacts on

sub-grid, near-field, and far-field scales. The Industrial Source Complex (ISC) dispersion model was used to evaluate impacts near construction and development activities (sub-grid impacts) and impacts within, and 50 kilometers beyond, the WRPA (near-field impacts). The CALPUFF dispersion model was used to evaluate far-field impacts at distant Class I and selected Class II areas.

The sub-grid analysis assessed air quality impacts from short-term activities such as well pad and road construction, well drilling, and well completion activities that would not only be geographically separated, but would not generally occur simultaneously. A construction scenario was developed and analyzed for each short-term activity. The sub-grid modeling also assessed impacts from hazardous air pollutants (HAP).

The mid-range analysis involved the impacts within the WRPA, and also to a distance of 50 kilometers beyond the project boundary, that would occur from permanent facilities installed for the 40 year life of the project. This analysis included existing project sources combined with all well pad, compressor station, and vehicle-related emissions that would occur after the field would be fully developed.

The far-field analysis evaluated potential air quality impacts as well as air quality related values (visibility and acid deposition) at distant federal Class I and selected Class II areas. The analysis assessed impacts from the combination of construction and operational emission sources.

This Section summarizes the sub-grid, near-field, and far-field air quality impacts of the WRPA Proposed Action and alternatives. The complete description of assumptions, emissions, processes, modeling methodology, modeling data, and results are presented in the Technical Support Documents provided in Volume III.

Table 4.4-1. Summary of Potential Project Emissions.

Pollutant	Existing Development [178 Wells 14,550 hp] (tons/yr)	Proposed Action [325 Wells 32,800 hp] (tons/yr)	Proposed Action Post-Construction[1] [325 Wells 32,800 hp] (tons/yr)	Alternative A Increased Development [485 Wells 46,050 hp] (tons/yr)	Alternative B Reduced Development [233 Wells 22,700 hp] (tons/yr)	Alternative C No Action [100 Wells 3,200 hp] (tons/yr)
NO_X	546	518	338	664	414	45
CO	303	719	656	988	516	72
VOC	518	906	779	1,224	681	204
SO_X	0.04	3.2	0.04	3.4	3.2	0.18
PM_{10}	128	597	24	629	589	87
$PM_{2.5}$	19	113	24	127	106	16
Formalde-hyde	4.4	22	22	31	15	2.2
Benzene	0.41	3.4	3.4	5.4	2.5	0.20
Toluene	0.65	1.3	1.2	1.7	0.93	0.18
Ethyl-benzene	0.04	0.09	0.08	0.11	0.06	0.03
Xylenes	0.23	0.44	0.43	0.60	0.32	0.04
n-Hexane	2.7	2.6	2.5	3.6	2.1	0.26

[1] Proposed Action Post-Construction is shown as an example of the reduction of pollutant levels after completion of construction.

4.4.1.1 Significance Criteria

In order to evaluate potential air quality impacts, a scale of measurement, or significance criteria, must be defined. Potential impacts to air quality that could result from the implementation of this project were compared to the following significance criteria:

- The most stringent Wyoming or national ambient air quality standards (WAAQS or NAAQS);
- Prevention of Significant Deterioration (PSD) Class I or Class II increments;
- Hazardous Air Pollutant (HAP) exposure thresholds for both acute and chronic exposures;
- A lifetime incremental cancer risk of one additional incident per million exposures;
- Incremental nitrogen (N) and sulfur (S) terrestrial Depositional Analysis Thresholds (DAT);
- Lake Acid Neutralizing Capacity (ANC) Levels of Acceptable Change (LAC).
- Visibility impact LACs of 0.5 and 1.0 Δ dv (delta deciview or change in deciview)

Wyoming and National Air Quality Standards

Wyoming and National Ambient Air Quality Standards (WAAQS and NAAQS) have been promulgated for the purpose of protecting human health and welfare with an adequate margin of safety. Within tribal lands, the EPA has jurisdiction for environmental issues including air quality and therefore the NAAQS have precedence. Within the remainder of the State of Wyoming the WDEQ-AQD has jurisdiction for air quality issues and the WAAQS have precedence. The WAAQS are as stringent, or in the case of SO_2 more stringent, than the NAAQS.

The Clean Air Act (CAA) established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. Pollutants for which standards have been determined include sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and particulate matter less than 10 microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$). The applicable ambient air quality standards are summarized in Table 4.4-2. It should be noted that the recently promulgated standard for $PM_{2.5}$ will not be enforced by the Wyoming Department of Environmental Quality (WDEQ) until the EPA issues an implementation rule. Therefore, it is not appropriate to demonstrate compliance with these standards at this time.

Table 4.4-2. Wyoming and National Ambient Air Quality Standards.

Pollutant And Averaging Time	Wyoming Ambient Air Quality Standard ($\mu g/m^3$)	National Ambient Air Quality Standard ($\mu g/m^3$)
Carbon Monoxide (CO)		
1-hour	40,000	40,000
8-hour	10,000	10,000
Nitrogen Dioxide (NO_2)		
Annual	100	100
Ozone (O_3)		
1-hour	235	235
8-hour	157	157
Particulate Matter (PM_{10})		
24-hour	150	150
Annual	50	50
Particulate Matter ($PM_{2.5}$)		
24-hour	65	65
Annual	15	15
Sulfur Dioxide (SO_2)		
3-hour	1,300	1,300
24-hour	260	365
Annual	60	80

Prevention of Significant Deterioration Increments

Under the Prevention of Significant Deterioration (PSD) provisions of the Clean Air Act (CAA), incremental increases of specific pollutant concentrations are limited above a legally defined baseline level. Many national parks and wilderness areas are designated as PSD Class I. The PSD program protects air quality within Class I areas by allowing only slight incremental increases in pollutant concentrations. Areas of the state not designated as PSD Class I are classified as Class II. For Class II areas, greater incremental increases in ambient pollutant concentrations are allowed. The PSD increments for both Class I and II areas are presented in Table 4.4-3.

Throughout this analysis all comparisons with PSD increments are intended only to evaluate a level of concern and do not represent a regulatory PSD increment consumption analysis. PSD Increment consumption analyses are applied to large industrial sources and are solely the responsibility of the State and the Environmental Protection Agency.

Table 4.4-3. Prevention of Significant Deterioration Class I and Class II Increments.

Pollutant and Averaging Time	PSD Class I Increment ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)
Carbon Monoxide (CO)		
1-hour	n/a	n/a
8-hour	n/a	n/a
Nitrogen Dioxide (NO_2)		
Annual	2.5	25
Ozone (O_3)		
1-hour	n/a	n/a
8-hour	n/a	n/a
Particulate Matter (PM_{10})		
24-hour	8	30
Annual	4	17
Particulate Matter ($PM_{2.5}$)		
24-hour	n/a	n/a
Annual	n/a	n/a
Sulfur Dioxide (SO_2)		
3-hour	25	512
24-hour	5	91
Annual	2	20

Acute and Chronic HAP Exposure Thresholds

There are no applicable Federal or Wyoming ambient air quality standards for assessing potential HAP impacts to human health. Therefore, reference concentrations (RfC) for chronic inhalation exposures and Reference Exposure Levels (REL) for acute inhalation exposures are applied as significance criteria. RfCs represent an estimate of the continuous, i.e. annual average, inhalation exposure rate to the human population (including sensitive subgroups such as children and the elderly) without an appreciable risk of harmful effects. The REL is the acute (i.e. one hour average) concentration at or below which no adverse health effects are expected. Both the RfC and REL guideline values are for non-cancer effects. Reference Exposure levels and reference concentrations are shown in Table 4.4-4.

Table 4.4-4. Reference Exposure Levels and Reference Concentrations.

Hazardous Air Pollutant	Reference Exposure Level [REL 1-hr Average] ($\mu g/m^3$)	Reference Concentration [3] [RfC Annual Average] ($\mu g/m^3$)
Benzene	1,300[1]	30
Toluene	37,000[1]	400
Ethylbenzene	350,000[2]	1,000
Xylenes	22,000[1]	100
n-Hexane	390,000[2]	200
Formaldehyde	94[1]	9.8

[1] EPA Air Toxics Database, Table 2 (EPA 2002)
[2] Immediately Dangerous to Life or Health (IDLH)/10, EPA Air Toxics Database, Table 2 (EPA, 2002) since no available REL
[3] EPA Air Toxics Database, Table 1 (EPA 2003)

Incremental Cancer Risk

Traditional risk assessment methods can be applied to assess the incremental risk resulting from long term exposure to carcinogenic HAP emissions. The calculated risk for the most likely exposure (MLE) scenario can be compared to the significance criterion of one additional cancer incident per one million exposures (1×10^{-6}). Two carcinogenic HAPs typically associated with oil and gas operations are evaluated, benzene and formaldehyde. The chronic (annual) inhalation cancer risk factors applied for the analysis are listed Table 4.4-5.

Table 4.4-5. Carcinogenic Unit Risk Factors.

Hazardous Air Pollutant	Carcinogenic Unit Risk Factor [Annual Inhalation Exposure] ($1/\mu g/m^3$)
Benzene	7.8×10^{-6}
Formaldehyde	5.5×10^{-9}

EPA Air Toxics Database, Table 1 (EPA 2003)

Terrestrial Acid Deposition

Incremental project-level Deposition Analysis Thresholds (DATs) for Class I areas have been established jointly through the National Park Service (NPS) and U.S. Fish and Wildlife Service (FWS). DATs are incremental amounts of deposition that trigger management concerns. However, deposition rates in excess of the DATs do not necessarily constitute an adverse impact to the environment. The DAT in western Class I areas, developed as a function of natural background deposition, has been set at 0.005 kg/ha/yr for nitrogen (N) and sulfur (S) species individually (National Park Service 2003).

Aquatic Acid Deposition

For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a Level of accepted change (LAC) of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC.

Visibility Criteria

Potential visibility degradation can be evaluated in terms of the change in deciview or Δdv. There are no applicable federal, state, tribal, or local visibility standards. Therefore, predicted visibility impacts are compared to Levels of Acceptable Change (LAC) utilized by Federal Land Managers. A LAC threshold of a 10% change in the reference background extinction or 1.0 Δdv is utilized. Comparisons to a LAC threshold of 0.5 Δdv were also computed and are presented separately in the Far-Field report included in the technical Support Document (Buys & Associates, Inc., 2004b).

4.4.1.2 Distance Scales Utilized for Assessment

Potential impacts to air quality were assessed on two scales: near-field and far-field. The near field assessment analyzed potential impacts that could occur within, and 30 miles (50 km) beyond, the boundaries of the WRPA. The far-field analysis analyzed potential impacts for 13 areas of special concern located between 12 miles and 170 miles (20 to 270 km) from the

WRPA. Both the near- and far-field analyses were conducted in accordance with an air quality assessment protocol specifically prepared for the project. The analysis protocol was refined though input received from regulatory agencies and stakeholders including the Bureau of Indian Affairs (BIA), the Wind River Environmental Quality Council (WREQC), the Environmental Protection Agency (EPA) Region VIII, the Bureau of Land Management (BLM), the National Park Service (NPS), the U.S. Forest Service (USFS), and the Wyoming Department of Environmental Quality (WDEQ).

4.4.2 Near-Field Air Quality

The near-field analysis (Buys & Associates 2004a) considered potential impacts to air quality that may occur within 30 miles (50 km) of the WRPA. The analysis considered short-term activities such as well pad and road construction, well drilling, and well completion activities that would not only be geographically separated, but would generally not occur simultaneously. For example, at any individual wellsite drilling activities would not commence until the construction of the well pad and access road was completed. Similarly, completion activities would begin only after drilling operations are completed. A reasonable emissions scenario was developed for each short-term activity that reflected potential air quality impacts with the assumption that other activities potentially occurring at the same time would be separated spatially. The near-field analysis also assessed impacts from long-term activities including production operations and natural gas treatment and compression.

4.4.2.1 Proposed Action (325 Wells) – Direct and Indirect Impacts

Proposed Action - Potential Particulate Matter Impacts

Particulate matter emissions would be generated primarily during the construction and development phases of the Project as a result of earth-moving activities and vehicle traffic on unpaved roads. Predicted PM_{10} impacts that could result during the construction and development phases are summarized in Table 4.4-6. In all cases the maximum impacts were predicted to occur 200 meters (650 feet) from the well access roads. The results indicate that the greatest fugitive dust concentrations would occur during the construction of well pads and roads. However, these impacts would be short-term at any one location since construction activities would typically last between two to four days. Potential PM_{10} impacts resulting from drilling and completion activities would persist for longer periods of time, from 12 to 90 days at any one location. As summarized below, predicted PM_{10} impacts would be below the ambient air quality standards.

Table 4.4-6. Proposed Action – Near-Field Particulate Matter Impacts.

Pollutant and Averaging Time	Construction Activity	Maximum Predicted Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS/ NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
PM_{10} 24-hour Average	Well Pad and Road Construction	81.0	61	142.0	150	95%
	Well Drilling Activities	7.3	61	68.3	150	46%
	Well Completion Activities	48.2	61	109.2	150	73%
PM_{10} Annual Average	Well Pad and Road Construction	11.0	22	33.0	50	66%
	Well Drilling Activities	1.0	22	23.0	50	46%
	Well Completion Activities	6.0	22	28.0	50	56%

Proposed Action – Potential Nitrogen Dioxide and Carbon Monoxide Impacts

Nitrogen dioxide and carbon monoxide emissions would be generated primarily from the following emissions sources:

- New compressor stations;
- Expansion of existing compressor stations;
- Existing compressor stations;
- Separators heaters located at well pads;
- Drill rigs engines, and
- Other small sources including treatment equipment at compressor stations and vehicle emissions.

Maximum predicted NO_2, CO and SO_2 concentrations that could occur as a result of the implementation of the Proposed Action are summarized and compared with the most stringent Wyoming and National ambient air quality standards and the PSD Class II increments in Tables 4.4-7 and 4.4-8. As demonstrated below, potential increases in pollutant concentrations are predicted to occur at levels below the ambient standards and NO_2 concentrations would be less than the PSD Class II increment.

Table 4.4-7. Proposed Action - Near-Field NO_2, and CO Impact Comparison to Ambient Standards.

Pollutant	Averaging Time	Maximum Predicted Impact (µg/m^3)	Maximum Impact Location (UTM)	Background Concentration (µg/m^3)	Background Plus Impact (µg/m^3)	WAAQS NAAQS Standard (µg/m^3)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	12.1	Sand Mesa Field 716,023 mE 4,798,063 mN	3.4	15.5	100	16%
CO	1-hour	1,553	Muddy Ridge Field 697,929 mE 4,795,013 mN	3,336	4,889	40,000	12%
	8-hour	497	Sand Mesa Field 716,040 mE 4,798,071 mN	1,381	1,878	10,000	19%

Table 4.4-8. Proposed Action – Near-Field NO_2 Impact Comparison to PSD Class II Increment.

Pollutant	Averaging Time	Maximum Predicted Impact (µg/m^3)	PSD Class II Increment	Impact Percentage of PSD Increment
NO_2	Annual	12.1	25	48%

Proposed Action – Potential Sulfur Dioxide Impacts

Sulfur dioxide emissions would be emitted primarily from drill rig engines as a result of the consumption of diesel fuel. Minor amounts of SO_2 would also be emitted from diesel vehicles traveling to and from the well site. Tables 4.4-9 and 4.4-10 summarize the potential SO_2 impacts and compare the results with the ambient air quality standards and PSD increments. As presented in the tables, potential SO_2 impacts are predicted to be less than the applicable ambient standards and PSD increments.

Table 4.4-9. Proposed Action - Near-Field SO_2 Impact Comparison to Ambient Standards.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location (meters)	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
Drill Rig SO_2	3-hour	4.4	500 meters from drill rig	132	136	1,300	11%
	24-hour	1.8	400 meters from drill rig	43	45	260	17%
	Annual	0.2	350 meters from drill rig	9	9.2	60	15%
Traffic SO_2	3-hour	73	50 meters from road	132	205	1,300	16%
	24-hour	15	50 meters from road	43	58	260	22%
	Annual	NA	NA	NA	NA	NA	NA

Table 4.4-10. Proposed Action – Near-Field SO_2 Impact Comparison to PSD Class II Increments.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	PSD Class II Increment	Impact Percentage of PSD Increment
Drill Rig SO_2	3-hour	4.4	512	Less than 1%
	24-hour	1.8	91	2 %
	Annual	0.2	20	1 %
Traffic SO_2	3-hour	73	512	14%
	24-hour	15	91	17%
	Annual	NA	NA	NA

Proposed Action – Potential Ozone Impacts

Ground-level ozone is formed through the chemical reaction of nitrogen oxides (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. A simplified screening tool, the Reactive Plume Model (RPM II), which was developed by EPA (Scheffe, 1988) was applied to estimate potential ozone impacts. The Scheffe methodology uses predicted VOC and NO_X emissions to provide a conservative estimate of ozone impacts. Potential increases in ozone concentrations that may occur should the Proposed Action be implemented are estimated at 50 $\mu g/m^3$. The predicted ozone concentrations are less than the ambient air quality standard as shown in Table 4.4-11.

Table 4.4-11. Proposed Action – Near-Field Predicted Ozone Impacts.

Pollutant	Averaging Time	Maximum Predicted Impact (µg/m^3)	Background Concentration (µg/m^3)	Background Plus Impact (µg/m^3)	WAAQS NAAQS Standard (µg/m^3)	Impact Percentage of WAAQS/ NAAQS
O_3	1-hour	50	169	219	235	93%

Proposed Action – Potential Hazardous Air Pollutant Impacts

The dominant sources of HAP emissions resulting from the implementation of the Proposed Action would be compressor engine exhaust (formaldehyde) and central dehydrator still vents (benzene, toluene, ethylbenzene, xylenes and n-hexane). Predicted maximum HAP concentrations that could occur if the Proposed Action were approved, are summarized in Table 4.4-12. All maximum HAP concentrations are predicted to occur at the fencelines of the central compression and treatment facilities. To assess acute health effects, maximum one-hour average concentrations are compared to the HAP-specific REL (reference exposure level). Chronic health effects are assessed by comparing the maximum predicted annual average concentrations to the HAP-specific RfC (reference concentration for continuous inhalation exposure). As summarized in Table 4.4-12, maximum acute and chronic HAP concentrations are not predicted to exceed the RELs or RfCs. Therefore, no adverse non-carcinogenic human health effects would be expected should the Proposed Action be implemented.

Table 4.4-12. Proposed Action – Near-Field Non-Carcinogenic RELs and RfCs Comparisons.

Hazardous Air Pollutant	Predicted Maximum 1-Hour Impact (µg/m^3)	REL (µg/ m^3)	Impact Percentage of REL	Predicted Maximum Annual Impact (µg/m^3)	RfC[3] (µg/m^3)	Impact Percentage of RfC
Benzene	159	1,300[1]	12%	3.1	30	10%
Toluene	0.96	37,000[1]	Less Than 1%	0.03	400	Less Than 1%
Ethylbenzene	0.03	350,000[2]	Less Than 1%	0.001	1,000	Less Than 1%
Xylenes	0.34	22,000[1]	Less Than 1%	0.01	100	Less Than 1%
n-Hexane	7.6	390,000[2]	Less Than 1%	0.20	200	Less Than 1%
Formaldehyde	32	94[1]	34%	0.71	9.8	7%

[1] EPA Air Toxics Database, Table 2 (EPA, 2002)
[2] Immediately Dangerous to Life or Health (IDLH)/10, EPA Air Toxics Database, Table 2 (EPA, 2002) since no available REL
[3] EPA Air Toxics Database, Table 1 (EPA, 2003)

Benzene and formaldehyde are classified as known carcinogens. The incremental cancer risk for these two carcinogens can be estimated by applying traditional risk assessment methodologies. Cancer risk was estimated for two exposure scenarios: the most likely exposure (MLE) corresponding to a resident that lives an average of 20 years at a particular location within the WRPA, and a maximally exposed individual (MEI) corresponding to an

individual that may be exposed for the entire life of the project (assumed as 40 years). The calculated incremental cancer risks were based on the maximum annual concentrations predicted to occur one-quarter mile (400 meters) from a compressor station and 300 feet (100 meters) from a well pad. These construction offsets represent the minimum distance that would be allowed between Project facilities and occupied residences.

The potential incremental cancer risks that may occur should the Proposed Action be approved are summarized in Table 4.4-13. As indicated, predicted incremental cancer risks are near or equal to the one incident per million exposures threshold. However, actual incremental cancer risks resulting from Proposed Action would be less than calculated if individuals were not continuously exposed to the maximum predicted concentrations for the duration of the assumed exposure scenarios. Predicted HAP concentrations decrease rapidly with distance and can vary dramatically within several hundred feet.

Table 4.4-13. Proposed Action – Near-Field Incremental Cancer Risks.

Hazardous Air Pollutant	Maximum Predicted Annual Concentration ($\mu g/m^3$)	Exposure Scenario	Incremental Cancer Risk (Incidents per Million Exposures)
Benzene	0.3	Most Likely Exposure	0.7 per million or 7 per ten million
		Maximally Exposed Individual	1 per million
Formaldehyde	0.2	Most Likely Exposure	0.0003 per million or 3 per ten billion
		Maximally Exposed Individual	0.0006 per million or 6 per ten billion

4.4.2.2 Alternative A (485 wells) – Direct and Indirect Impacts

Alternative A – Potential Particulate Matter Impacts

The annual development rate of Alternative A and the Proposed Action are nearly identical at 39 and 38 wells per year respectively. Therefore, potential short-term PM_{10} emission rates and associated ambient air quality impacts resulting from the implementation of Alternative A would be similar to the impacts predicted for the Proposed Action. PM_{10} impacts resulting from the implementation of Alternative A are not predicted to exceed the ambient air quality standards.

Alternative A – Potential Nitrogen Dioxide and Carbon Monoxide Impacts

Maximum predicted NO_2 and CO concentrations that could occur as a result of the implementation of Alternative A are summarized and compared with the most stringent Wyoming and National ambient air quality standards and the PSD Class II increments in Tables 4.4-14 and 4.4-15. As shown, predicted impacts that would result from Alternative A would be slightly greater than the impacts predicted for the Proposed Action. However, increases in pollutant concentrations would still occur at levels below the ambient standards and PSD Class II increments.

Table 4.4-14. Alternative A – Near-Field NO_2 and CO Impact Comparison to Ambient Standards.

Pollutant	Averaging Time	Maximum Predicted Impact (µg/m^3)	Maximum Impact Location (UTM)	Background Concentration (µg/m^3)	Background Plus Impact (µg/m^3)	WAAQS NAAQS Standard (µg/m^3)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	16.5	Sand Mesa Field 716,023 mE 4,798,063 mN	3.4	19.9	100	20%
CO	1-hour	2,174	Muddy Ridge Field 697,929 mE 4,795,013 mN	3,336	5,510	40,000	14%
	8-hour	695	Sand Mesa Field 716,040 mE 4,798,071 mN	1,381	2,076	10,000	20%

Table 4.4-15. Alternative A – Near-Field NO_2 Impact Comparison to PSD Class II Increment.

Pollutant	Averaging Time	Maximum Predicted Impact (µg/m^3)	PSD Class II Increment	Impact Percentage of PSD Increment
NO_2	Annual	16.5	25	66%

Alternative A – Potential Sulfur Dioxide Impacts

The annual development rate of Alternative A and the Proposed Action are nearly identical at 39 and 38 wells per year respectively. Therefore, potential SO_2 impacts resulting from the implementation of Alternative A would be approximately the same as the impacts that would occur with the Proposed Action. SO_2 impacts resulting from the implementation of Alternative A are not predicted to exceed the ambient air quality standards.

Alternative A – Potential Ozone Impacts

Potential increases in ozone concentrations that may occur should Alternative A be implemented are estimated at 58 µg/m^3. The predicted ozone concentrations would be less than the ambient air quality standard as shown in Table 4.4-16.

Table 4.4-16. Alternative A – Near-Field Predicted Ozone Impacts.

Pollutant	Averaging Time	Maximum Predicted Impact (µg/m^3)	Background Concentration (µg/m^3)	Background Plus Impact (µg/m^3)	WAAQS NAAQS Standard (µg/m^3)	Impact Percentage of WAAQS/ NAAQS
O_3	1-hour	58	169	227	235	97%

Alternative A – Potential Hazardous Air Pollutant Impacts

The HAP concentrations that could occur if Alternative A were approved are summarized in Table 4.4-17. All maximum HAP concentrations are predicted to occur at the fence line of the central compression and treatment facilities. To assess acute health effects, maximum one-hour average concentrations are compared to the HAP-specific REL (reference exposure level). Chronic health effects are assessed by comparing the maximum predicted annual average concentrations to the HAP-specific RfC (reference concentration for continuous inhalation exposure). As summarized in Table 4.4-17, maximum acute and chronic HAP concentrations are not predicted to exceed the RELs or RfCs. Therefore, no adverse non-carcinogenic human health effects would be expected should Alternative A be implemented.

Table 4.4-17. Alternative A – Near-Field Non-Carcinogenic Acute RELs and RfCs.

Hazardous Air Pollutant	Predicted Maximum 1-Hour Impact (µg/m^3)	REL (µg/m^3)	Impact Percentage of REL	Predicted Maximum Annual Impact (µg/m^3)	RfC[3] (µg/m^3)	Impact Percentage of RfC
Benzene	300	1,300[1]	23%	5.8	30	19.3%
Toluene	0.97	37,000[1]	Less Than 1%	0.03	400	Less Than 1%
Ethylbenzene	0.04	350,000[2]	Less Than 1%	0.002	1,000	Less Than 1%
Xylenes	0.36	22,000[1]	Less Than 1%	0.02	100	Less Than 1%
n-Hexane	7.67	390,000[2]	Less Than 1%	0.22	200	Less Than 1%
Formaldehyde	44.7	94[1]	34%	0.99	9.8	10.1%

[1] EPA Air Toxics Database, Table 2 (EPA, 2002)
[2] Immediately Dangerous to Life or Health (IDLH)/10, EPA Air Toxics Database, Table 2 (EPA, 2002) since no available REL
[3] EPA Air Toxics Database, Table 1 (EPA, 2003)

The potential incremental cancer risks that may occur should Alternative A be approved are summarized in Table 4.4-18. As indicated, predicted formaldehyde incremental cancer risks are less than, or equal to, the one incident per million exposures threshold. However, predicted benzene incremental cancer risks range from 1 to 2 incidents per million exposures. Actual incremental cancer risks resulting from Alternative A would be less than predicted if the public were not continuously exposed to the maximum predicted concentrations for the duration of the assumed exposure scenarios. Predicted HAP concentrations decrease rapidly with distance and can vary dramatically within several hundred feet. Therefore it is unlikely that individuals would be constantly exposed to maximum HAP concentrations for periods of 20 to 40 years.

Table 4.4-18. Alternative A – Near-Field Incremental Cancer Risks.

Hazardous Air Pollutant	Maximum Predicted Annual Concentration ($\mu g/m^3$)	Exposure Scenario	Incremental Cancer Risk (Incidents per Million Exposures)
Benzene	0.5	Most Likely Exposure	1 per million
		Maximally Exposed Individual	2 per million
Formaldehyde	0.4	Most Likely Exposure	0.0006 per million or 6 per ten billion
		Maximally Exposed Individual	0.001 per million or 1 per billion

4.4.2.2 Alternative B (233 wells) – Direct and Indirect Impacts

Alternative B – Potential Particulate Matter Impacts

The annual development rate of Alternative B and the Proposed Action are identical at 38 wells per year. Therefore, potential short-term PM_{10} emission rates and associated ambient air quality impacts for the Proposed Action and Alternative B would also be identical. PM_{10} impacts resulting from the implementation of Alternative B are not predicted to exceed the ambient air quality standards

Alternative B – Potential Nitrogen Dioxide and Carbon Monoxide Impacts

Maximum predicted NO_2 and CO concentrations that could occur as a result of the implementation of Alternative B are summarized and compared with the most stringent Wyoming and National ambient air quality standards and the PSD Class II increments in Tables 4.4-19 and 4.4-20. As shown, predicted impacts for Alternative B would be slightly less than the impacts predicted for the Proposed Action. With the implementation of Alternative B, increases in pollutant concentrations are predicted to occur at levels below the ambient standards and PSD Class II increments.

Table 4.4-19. Alternative B – Near-Field NO_2 and CO Impact Comparison to Ambient Standards.

Pollutant	Averaging Time	Maximum Predicted Impact (µg/m^3)	Maximum Impact Location (UTM)	Background Concentration (µg/m^3)	Background Plus Impact (µg/m^3)	WAAQS NAAQS Standard (µg/m^3)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	9.7	Muddy Ridge Field 695,590 mE 4,802,571 mN	3.4	13.1	100	13%
CO	1-hour	1,070	Muddy Ridge Field 697,929 mE 4,795,013 mN	3,336	4,406	40,000	11%
	8-hour	344	Pavillion Field 699,471 mE 4,792,137 mN	1,381	1,725	10,000	17%

Table 4.4-20. Alternative B – Near-Field NO_2 Impact Comparison to PSD Class II Increment.

Pollutant	Averaging Time	Maximum Predicted Impact (µg/m^3)	PSD Class II Increment	Impact Percentage of PSD Increment
NO_2	Annual	9.7	25	39%

Alternative B – Potential Sulfur Dioxide Impacts

The annual development rate of Alternative B and the Proposed Action are identical at 38 wells per year. Potential SO_2 impacts resulting from the implementation of Alternative A would be identical to the impacts that would result from the Proposed Action. SO_2 impacts resulting from the implementation of Alternative B are not predicted to exceed the ambient air quality standards.

Alternative B – Potential Ozone Impacts

Potential increases in ozone concentrations that may occur should Alternative B be implemented are estimated at 43 µg/m^3. The predicted ozone concentrations would be less than the ambient air quality standard as shown in Table 4.4-21.

Table 4.4-21. Alternative B – Near-Field Predicted Ozone Impacts.

Pollutant	Averaging Time	Maximum Predicted Impact (µg/m^3)	Background Concentration (µg/m^3)	Background Plus Impact (µg/m^3)	WAAQS NAAQS Standard (µg/m^3)	Impact Percentage of WAAQS/ NAAQS
O_3	1-hour	43	169	212	235	90%

Alternative B – Potential Hazardous Air Pollutant Impacts

The HAP concentrations that could occur if Alternative B were approved are summarized in Table 4.4-22. All maximum HAP concentrations are predicted to occur at the fence line of the central compression and treatment facilities. As summarized in Table 4.4-22, maximum acute and chronic HAP concentrations are not predicted to exceed the RELs or RfCs. Therefore, no adverse non-carcinogenic human health effects would be expected should Alternative B be implemented.

Table 4.4-22. Alternative B – Near-Field Non-Carcinogenic Acute RELs and RfCs.

Hazardous Air Pollutant	Predicted Maximum 1-Hour Impact ($\mu g/m^3$)	REL ($\mu g/m^3$)	Impact Percentage of REL	Predicted Maximum Annual Impact ($\mu g/m^3$)	RfC[3] ($\mu g/m^3$)	Impact Percentage of RfC
Benzene	127	1,300[1]	9.7%	2.5	30	8.2%
Toluene	0.96	37,000[1]	Less Than1%	0.03	400	Less Than 1%
Ethylbenzene	0.04	350,000[2]	Less Than1%	0.001	1,000	Less Than 1%
Xylenes	0.36	22,000[1]	Less Than1%	0.01	100	Less Than 1%
n-Hexane	6.1	390,000[2]	Less Than1%	0.18	200	Less Than 1%
Formaldehyde	22	94[1]	24%	0.49	9.8	5.0%

[1] EPA Air Toxics Database, Table 2 (EPA, 2002)
[2] Immediately Dangerous to Life or Health (IDLH)/10, EPA Air Toxics Database, Table 2 (EPA, 2002) since no available REL
[3] EPA Air Toxics Database, Table 1 (EPA, 2003)

The potential incremental cancer risks that may occur should Alternative B be approved are summarized in Table 4.4-23. As indicated, predicted incremental cancer risks are less than the one incident per million exposure threshold.

Table 4.4-23. Alternative B – Near-Field Incremental Cancer Risks.

Hazardous Air Pollutant	Maximum Predicted Annual Concentration ($\mu g/m^3$)	Exposure Scenario	Incremental Cancer Risk (Incidents per Million Exposures)
Benzene	0.2	Most Likely Exposure	0.4 per million or 4 per ten million
		Maximally Exposed Individual	0.9 per million or 9 per ten million
Formaldehyde	0.2	Most Likely Exposure	0.0003 per million or 3 per ten billion
		Maximally Exposed Individual	0.006 per million or 6 per ten billion

4.4.2.4 Alternative C (No Action), 100 wells) – Direct and Indirect Impacts

Alternative C – Potential Particulate Matter Impacts

The annual development rate of Alternative C is estimated at 14 wells per year, significantly less than the 38 wells per year projected for the Proposed Action. Short term (24 hour average) PM_{10} emissions resulting from Alternative C would be similar to the impacts predicted for the Proposed Action. However, long term (annual average) PM_{10} impacts would be less than the Proposed Action. With the implementation of Alternative C, PM_{10} impacts would be localized near the construction activities occurring within the Pavillion area.

Alternative C – Potential Nitrogen Dioxide and Carbon Monoxide Impacts

Maximum predicted NO_2 and CO concentrations that could occur as a result of the implementation of Alternative C are summarized and compared with the most stringent Wyoming and National ambient air quality standards and the PSD Class II increments in Tables 4.4-24 and 4.4-25. With the implementation of Alternative C, potential NO_2 and CO impacts would be minimized. Increases in pollutant concentrations are predicted to occur at levels below the ambient standards and PSD Class II increments.

Table 4.4-24. Alternative C – Near-Field NO_2 and CO Impact Comparison to Ambient Standards.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location (UTM)	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	5.3	Pavillion Field 696,646 mE 4,790,590 mN	3.4	8.7	100	9%
CO	1-hour	312	Pavillion Field 696,646 mE 4,790,590 mN	3,336	3,648	40,000	9%
	8-hour	119	Pavillion Field 696,640 mE 4,790,512 mN	1,381	1,500	10,000	15%

Table 4.4-25. Alternative C – Near-Field NO_2 Impact Comparison to PSD Class II Increment.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	PSD Class II Increment	Impact Percentage of PSD Increment
NO_2	Annual	5.3	25	21%

Alternative C – Potential Sulfur Dioxide Impacts

The annual development rate of Alternative C is estimated at 14 wells per year, significantly less than the 38 wells per year projected for the Proposed Action. Short term (3-hr and 24-hr average) SO_2 impacts would be similar to the short term impacts that would occur with the implementation of the Proposed Action. However, long term (annual average) SO_2 impacts resulting from Alternative C would be less than the Proposed Action and would occur only within the Pavillion field.

Alternative C – Potential Ozone Impacts

Potential increases in ozone concentrations that may occur should Alternative C be implemented are estimated at 31 $\mu g/m^3$. The predicted ozone concentrations would be less than the ambient air quality standard as shown in Table 4.4-26.

Table 4.4-26. Alternative C – Near-Field Predicted Ozone Impacts.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
O_3	1-hour	31	169	200	235	85%

Alternative C – Potential Hazardous Air Pollutant Impacts

The HAP concentrations that could occur if Alternative C were implemented are summarized in Table 4.4-27. All maximum HAP concentrations are predicted to occur at the fence line of the central compression and treatment facilities. As summarized, in Table 4.4-27, maximum acute and chronic HAP concentrations are not predicted to exceed the RELs or RfCs. Therefore, no adverse non-carcinogenic human health effects would be expected should Alternative C be implemented.

Table 4.4-27. Alternative C – Near-Field Non-Carcinogenic Acute RELs and RfCs.

Hazardous Air Pollutant	Predicted Maximum 1-Hour Impact ($\mu g/m^3$)	REL ($\mu g/m^3$)	Impact Percentage of REL	Predicted Maximum Annual Impact ($\mu g/m^3$)	RfC[3] ($\mu g/m^3$)	Impact Percentage of RfC
Benzene	0.64	1,300[1]	Less Than 1%	0.22	30	Less Than 1%
Toluene	0.96	37,000[1]	Less Than 1%	0.02	400	Less Than 1%
Ethylbenzene	0.03	350,000[2]	Less Than 1%	0.0009	1,000	Less Than 1%
Xylenes	0.36	22,000[1]	Less Than 1%	0.01	100	Less Than 1%
n-Hexane	3.6	390,000[2]	Less Than 1%	0.08	200	Less Than 1%
Formaldehyde	6.5	94[1]	6.9%	0.15	9.8	1.5%

[1] EPA Air Toxics Database, Table 2 (EPA, 2002)
[2] Immediately Dangerous to Life or Health (IDLH)/10, EPA Air Toxics Database, Table 2 (EPA, 2002) since no available REL
[3] EPA Air Toxics Database, Table 1 (EPA, 2003)

The potential incremental cancer risks that may occur should Alternative C be approved are summarized in Table 4.4-28. As indicated, predicted incremental cancer risks are less than the one incident per million exposure threshold.

Table 4.4-28. Alternative C – Near-Field Incremental Cancer Risks.

Hazardous Air Pollutant	Maximum Predicted Annual Concentration ($\mu g/m^3$)	Exposure Scenario	Incremental Cancer Risk (Incidents per Million Exposures)
Benzene	0.02	Most Likely Exposure	0.04 per million or 4 per hundred million
		Maximally Exposed Individual	0.09 per million or 9 per hundred million
Formaldehyde	0.05	Most Likely Exposure	0.00008 per million or 8 per hundred billion
		Maximally Exposed Individual	0.0002 per million or 2 per ten billion

4.4.2.5 Summary of Near-Field Impacts

As a result of the implementation of the Proposed Action or Alternatives, increases in air pollutant concentrations would occur. For the majority of the emitted pollutants, the magnitude of the potential impacts would vary in proportion with the scale of the alternative. The greatest impacts would occur with the implementation of Alternative A. Lower impacts would occur with the implementation of the Proposed Action or Alternative B. Air quality impacts would be minimized with the implementation of Alternative C.

Potential Particulate Matter Impacts

The Proposed Action and Alternatives would cause minor increases in particulate matter concentrations. The impacts would be short term, occurring primarily during the development phase of the project as a result of construction activities and increased vehicle traffic on unpaved roads. Particulate matter impacts would be essentially equivalent for all project alternatives and are not predicted to exceed the ambient air quality standards. With the implementation of the Proposed Action, or Alternatives A and B, increases in PM_{10} concentrations would occur in all five development areas; Pavillion, Muddy Ridge, Sand Mesa, Sand Mesa South and Coastal Extension. However, with the implementation of Alternative C, PM_{10} impacts would occur primarily within the Pavillion development area only.

Potential Nitrogen Dioxide, Carbon Monoxide and Ozone Impacts

Project activities would result in minor increases in pollutant concentrations. The impacts would be long-term, lasting the duration of the project. Maximum NO_2, CO and O_3 impacts would occur with the implementation of Alternative A. Impacts resulting from the Proposed Action and Alternative B and C would be less. Resulting increases in NO_2, CO and O_3 concentrations would not exceed the applicable ambient air quality standards or PSD Class II increments. Table 4.4-29 summarizes the predicted NO_2, CO and O_3 impacts for each alternative.

Table 4.4-29. Summary of Predicted Near-Field NO_2 and CO Impacts.

Alternative	Maximum NO_2 Annual Average Impact ($\mu g/m^3$)	Maximum CO 1-hour Average Impact ($\mu g/m^3$)	Maximum CO 8-hour Average Impact ($\mu g/m^3$)	Maximum O_3 1-hour Average Impact ($\mu g/m^3$)
Proposed Action	12.1	1,553	497	50
Alternative A	16.5	2,174	695	58
Alternative B	9.7	1,070	344	43
Alternative C	5.3	312	119	31

Potential Sulfur Dioxide Impacts

The Proposed Action and Alternatives would cause minor increases in SO_2 concentrations. The impacts would be localized and short term, resulting primarily from drilling operation. Sulfur dioxide impacts would be essentially equivalent for all project alternatives and are not predicted to exceed the ambient air quality standards. With the implementation of the Proposed Action, or Alternatives A and B, increases in SO_2 concentrations would occur in all five development areas; Pavillion, Muddy Ridge, Sand Mesa, Sand Mesa South and Coastal Extension. However, with the implementation of Alternative C, SO_2 impacts would occur primarily within the Pavillion development area only.

Potential Hazardous Air Pollutant Impacts

Implementation of the Proposed Action or Alternatives would cause incremental increases in hazardous air pollutant concentrations. The increased concentration would be long term, lasting the life of the project. Maximum HAP impacts would occur with the implementation of Alternative A. Impacts resulting from the Proposed Action and Alternatives B and C would be less. For all Project alternatives, the acute and chronic non-cancerous health effects would be negligible, as predicted concentrations would be less than the REL and RfC thresholds. With the implementation of the Proposed Action or Alternative A, minor increases in cancer risk are predicted to occur. The predicted incremental cancer risks would range from 1 to 2 incidents per million exposures. However, the predicted incremental cancer risks would occur only within relatively small areas. Should Alternatives B or C be implemented, the incremental cancer risk would be negligible.

4.4.3 Far-Field Air Quality

The far-field air quality analysis focused upon project related and cumulative impacts that could occur within areas of special concern (i.e., Federal designated Class I areas and areas identified as important to the Tribes and the USFS). Figure 4.4-1 and Table 4.4-30 present the areas of special concern and the associated high elevation lakes evaluated for the Far-Field analysis. The Absaroka Beartooth Wilderness was omitted from the far-field analysis due to its great distance from the project area. However, at the request of the Forest Service, two lakes within the Absaroka Beartooth Wilderness were analyzed for impacts; Stepping Stone Lake and Twin Island Lake.

Table 4.4-30. Areas of Special Concern.

Area of Special Concern	PSD Classification	Analyzed Lakes of Special Concern	Land Management Agency
Bridger Wilderness	Class I	Black Joe Lake Deep Lake Hobbs Lake Upper Frozen Lake	Forest Service
Cloud Peak Wilderness	Class II	Emerald Lake Florence Lake	Forest Service
Fitzpatrick Wilderness	Class I	Ross Lake	Forest Service
Grand Teton National Park	Class I	None	National Park Service
North Absaroka Wilderness	Class I	None	Forest Service
Owl Creek Range	Class II	None	BIA / Tribes
Popo Agie Wilderness	Class II	Lower Saddlebag Lake	BIA / Tribes
Phlox Mountain	Class II	None	BIA / Tribes
Teton Wilderness	Class I	None	Forest Service
Washakie Wilderness	Class I	None	Forest Service
Wind River Canyon	Class II	None	BIA / Tribes
Wind River Roadless Area	Class II	None	BIA / Tribes
Yellowstone National Park	Class I	None	National Park Service

To assess potential far-field impacts, the CALPUFF set of dispersion models were applied. The CALPUFF set of models (CALMET, CALPUFF, CALPOST, and associated utilities) were designed specifically to assess ambient air quality impacts at significant distances from the source and therefore long pollutant travel times. The predicted pollutant concentrations were compared to the most stringent of the State of Wyoming and National Air Quality Standards (WAAQS, NAAQS) and, for informational purposes only, the Prevention of Significant Deterioration (PSD) Class I and II increments. In addition, the predicted concentration and deposition results were processed to evaluate potential visibility and acid deposition impacts for comparison with the Federal Land Manager (FLM) Limits of Acceptable Change (LAC).

Potential impacts were predicted for the Proposed Action and each of the alternatives based upon estimated emission rates presented in the Emissions Inventory report (Buys 2004). The analysis applied predicted emission rates for production activities assuming full development of each alternative plus emissions that would occur as a result of construction activities. A Proposed Action Post-Construction scenario, which considered only production emissions with no construction activity contribution, was also analyzed in order to predict potential long-term impacts that would occur from production activities following the completion of construction activities.

Throughout this analysis, all comparisons with PSD increments are intended only to evaluate a level of concern and do not represent a regulatory PSD increment consumption analysis. PSD Increment consumption analyses are applied to large industrial sources and are solely the responsibility of the State and the Environmental Protection Agency.

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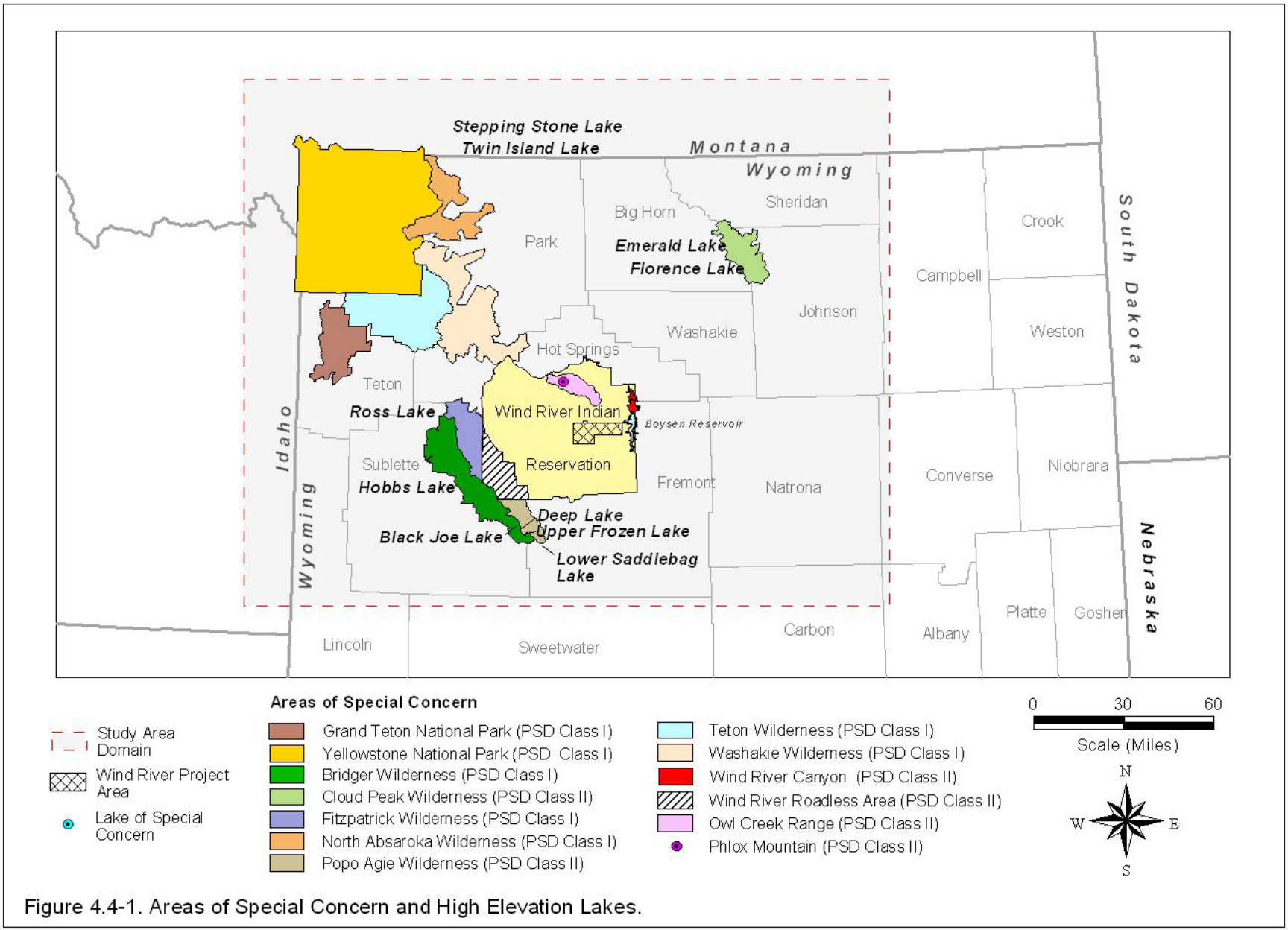

Figure 4.4-1. Areas of Special Concern and High Elevation Lakes.

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4.4.3.1 Proposed Action (325 wells) - Direct and Indirect Impacts

If the Proposed Action were approved, incremental increases in pollutant concentrations would occur. Potential impacts resulting from the implementation of the Proposed Action are discussed below.

Ambient Air Quality Standards

Predicted maximum pollutant concentrations that could occur as a result of the implementation of the Proposed Action are summarized in Table 4.4-31 and compared with the most stringent Wyoming and National ambient air quality standards. As demonstrated, increases in pollutant concentrations are predicted to occur at levels below the ambient standards.

Table 4.4-31. Proposed Action – Far-Field Ambient Air Quality Standards Comparison.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	0.21	Wind River Canyon	3.4	3.61	100	3.6%
SO_2	3-hour	0.05	Wind River Canyon	132	132.05	1300	10.2%
	24-hour	0.02	Wind River Canyon	43	43.02	260	16.6%
	Annual	0.00	Wind River Canyon	9	9.00	60	15.0%
PM_{10}	24-hour	1.51	Wind River Canyon	61	62.51	150	41.7%
	Annual	0.13	Wind River Canyon	22	22.13	50	44.3%

PSD Increments

The maximum predicted pollutant concentrations are compared with the PSD Class I and Class II Increments in Tables 4.4-32 and 4.4-33. As demonstrated, increases in pollutant concentrations are not predicted to exceed the Increments.

Table 4.4-32 . Proposed Action – Far-Field PSD Class I Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class I Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class I Increment
NO_2	Annual	0.002	Bridger Wilderness	2.5	0.09%
SO_2	3-hour	0.002	Fitzpatrick Wilderness	25	0.01%
	24-hour	0.001	Fitzpatrick Wilderness	5	0.01%
	Annual	0.000	Bridger Wilderness	2	0.00%
PM_{10}	24-hour	0.068	Fitzpatrick Wilderness	8	0.85%
	Annual	0.001	Bridger Wilderness	4	0.04%

Table 4.4-33. Proposed Action – Far-Field PSD Class II Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class II Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class II Increment
NO_2	Annual	0.21	Wind River Canyon	25	0.84%
SO_2	3-hour	0.05	Wind River Canyon	512	0.01%
	24-hour	0.02	Wind River Canyon	91	0.02%
	Annual	0.00	Wind River Canyon	20	0.01%
PM_{10}	24-hour	1.51	Wind River Canyon	30	0.84%
	Annual	0.13	Wind River Canyon	17	0.01%

Terrestrial Acid Deposition

Results of the nitrogen and sulfur atmospheric deposition analysis are illustrated in Table 4.4-34. Incremental increases in nitrogen deposition are predicted to exceed the DAT in two areas of special concern; the Wind River Canyon and the Owl Creek Range. Predicted increases in sulfur deposition are much less than the DAT.

Table 4.4-34. Proposed Action – Far-Field Incremental Nitrogen and Sulfur Deposition DAT Comparison

Area of Special Concern	Nitrogen (N) Deposition (kg/ha/yr)	Sulfur (S) Deposition (kg/ha/yr)	Deposition Analysis Threshold (DAT) (kg/ha/yr)	Nitrogen (N) Percent of DAT	Sulfur (S) Percent of DAT
Bridger Wilderness	0.00199	0.00001	0.005	39.7%	0.2%
Cloud Peak Wilderness	0.00256	0.00002	0.005	51.2%	0.3%
Fitzpatrick Wilderness	0.00095	0.00001	0.005	19.0%	0.1%
North Absaroka Wilderness	0.00026	0.00000	0.005	5.3%	0.0%
Owl Creek Range	0.00833	0.00009	0.005	166.5%	1.9%
Popo Agie Wilderness	0.00289	0.00002	0.005	57.8%	0.4%
Phlox Mountain	0.00165	0.00001	0.005	33.0%	0.2%
Grand Teton NP	0.00020	0.00000	0.005	4.0%	0.0%
Teton Wilderness	0.00028	0.00000	0.005	5.6%	0.0%
Washakie Wilderness	0.00076	0.00000	0.005	15.1%	0.1%
Wind River Canyon	0.03150	0.00039	0.005	630.0%	7.9%
Wind River Roadless Area	0.00240	0.00001	0.005	48.0%	0.3%
Yellowstone NP	0.00022	0.00000	0.005	4.3%	0.0%
Maximum	**0.03150**	**0.00039**	**0.005**	**630.0%**	**7.9%**

Aquatic Acid Deposition

Implementation of the Proposed Action is not predicted to cause ANC impacts greater than the LACs. All predicted impacts, as summarized in Table 4.4-35, are less than 1 µeq/l or a10 percent change in ANC.

Table 4.4-35. Proposed Action – Far-Field Predicted ANC Impacts

High Elevation Lake	Baseline 10%Lowest ANC (µeq/l)	Level of Acceptable Change [1]	Predicted Change in ANC (µeq/l)	Percentage Change In ANC
Black Joe Lake	67.0	10% or 6.7 µeq/l	0.02	0.03%
Deep Lake	59.9	10% or 6.0 µeq/l	0.02	0.03%
Emerald Lake	69.8	10% or 7.0 µeq/l	0.03	0.04%
Florence Lake	33.0	10% or 3.3 µeq/l	0.03	0.09%
Hobbs Lake	69.9	10% or 7.0 µeq/l	0.01	0.01%
Lower Saddlebag	55.5	10% or 5.6 µeq/l	0.02	0.04%
Ross Lake	53.5	10% or 5.4 µeq/l	0.01	0.01%
Stepping Stone Lake	19.9	1 µeq/l	0.00	0.00%
Twin Island Lake	17.6	1 µeq/l	0.00	0.01%
Upper Frozen Lake	5.0	1 µeq/l	0.02	0.35%
Maximum			**0.03**	**0.35%**

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC

Visibility Impairment

The Proposed Action is predicted to cause a total of three days of visibility impairment greater than 1.0 deciviews. As presented in Table 4.4-36, one day of impairment is predicted to occur at the Owl Creek Range, and two days of impairment are predicted at Wind River Canyon.

Table 4.4-36. Proposed Action – Far-Field Predicted Visibility Impairment

Area of Special Concern	Number of Days with Δ dv Greater Than 1.0	Greatest Predicted Δ dv
Bridger Wilderness	0	0.18
Cloud Peak Wilderness	0	0.19
Fitzpatrick Wilderness	0	0.11
North Absaroka Wilderness	0	0.05
Owl Creek Range	1	1.07
Popo Agie Wilderness	0	0.22
Phlox Mountain	0	0.20
Grand Teton NP	0	0.02
Teton Wilderness	0	0.04
Washakie Wilderness	0	0.09
Wind River Canyon	2	1.96
Wind River Roadless Area	0	0.17
Yellowstone NP	0	0.05
Total Days / Max Δ dV	**3**	**1.96**

4.4.3.2 Proposed Action Post-Construction - Direct and Indirect Impacts

Following the construction phase of the Proposed Action, emissions to the atmosphere and related air quality impacts would be reduced to the levels predicted below for the remainder of the project.

Ambient Air Quality Standards

Post-Construction maximum pollutant concentrations that could occur as a result of the implementation of the Proposed Action are summarized in the following table and compared with the most stringent Wyoming and National ambient air quality standards. As demonstrated in Table 4.4-37, increases in pollutant concentrations are predicted to occur at levels below the ambient standards.

Table 4.4-37. Proposed Action Post-Construction – Far-Field Ambient Air Quality Standards Comparison.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	0.13	Wind River Canyon	3.4	3.53	100	3.5%
SO_2	3-hour	0.00	Wind River Canyon	132	132.00	1300	10.2%
	24-hour	0.00	Wind River Canyon	43	43.00	260	16.5%
	Annual	0.00	Wind River Canyon	9	9.00	60	15.0%
PM_{10}	24-hour	0.10	Wind River Canyon	61	61.10	150	40.7%
	Annual	0.01	Wind River Canyon	22	22.01	50	44.0%

PSD Increments

The following tables compare the maximum predicted pollutant concentrations with the PSD Class I and Class II Increments. As demonstrated in Tables 4.4-38 4.4-39, increases in pollutant concentrations are not predicted to exceed the Increments.

Table 4.4-38. Proposed Action Post-Construction – Far-Field PSD Class I Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class I Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class I Increment
NO_2	Annual	0.002	Bridger Wilderness	2.5	0.06%
SO_2	3-hour	0.000	Bridger Wilderness	25	0.00%
	24-hour	0.000	Bridger Wilderness	5	0.00%
	Annual	0.000	Bridger Wilderness	2	0.00%
PM_{10}	24-hour	0.003	Bridger Wilderness	8	0.03%
	Annual	0.000	Bridger Wilderness	4	0.00%

Table 4.4-39. Proposed Action Post-Construction – Far-Field PSD Class II Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class II Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class II Increment
NO_2	Annual	0.13	Wind River Canyon	25	0.51%
SO_2	3-hour	0.00	Wind River Canyon	512	0.00%
	24-hour	0.00	Wind River Canyon	91	0.00%
	Annual	0.00	Wind River Canyon	20	0.00%
PM_{10}	24-hour	0.10	Wind River Canyon	30	0.33%
	Annual	0.01	Wind River Canyon	17	0.04%

Terrestrial Acid Deposition

Results of the atmospheric nitrogen and sulfur atmospheric deposition are summarized in Table 4.4-40. Proposed Action incremental nitrogen deposition rates would be reduced following the completion of the construction phase of the project. However, impacts are still predicted to equal or exceed the DAT in two areas of special concern; the Wind River Canyon and the Owl Creek Range.

Table 4.4-40. Proposed Action Post-Construction – Far-Field Incremental Nitrogen and Sulfur Deposition DAT Comparison.

Area of Special Concern	Nitrogen (N) Deposition (kg/ha/yr)	Sulfur (S) Deposition (kg/ha/yr)	Deposition Analysis Threshold (DAT) (kg/ha/yr)	Nitrogen (N) Percent of DAT	Sulfur (S) Percent of DAT
Bridger Wilderness	0.00135	0.00000	0.005	27.1%	0.0%
Cloud Peak Wilderness	0.00175	0.00000	0.005	35.0%	0.0%
Fitzpatrick Wilderness	0.00061	0.00000	0.005	12.1%	0.0%
North Absaroka Wilderness	0.00018	0.00000	0.005	3.6%	0.0%
Owl Creek Range	0.00501	0.00000	0.005	100.2%	0.0%
Popo Agie Wilderness	0.00195	0.00000	0.005	39.0%	0.0%
Phlox Mountain	0.00108	0.00000	0.005	21.5%	0.0%
Grand Teton NP	0.00013	0.00000	0.005	2.6%	0.0%
Teton Wilderness	0.00019	0.00000	0.005	3.9%	0.0%
Washakie Wilderness	0.00051	0.00000	0.005	10.2%	0.0%
Wind River Canyon	0.02130	0.00000	0.005	426.0%	0.1%
Wind River Roadless Area	0.00158	0.00000	0.005	31.6%	0.0%
Yellowstone NP	0.00014	0.00000	0.005	2.9%	0.0%
Maximum	**0.02130**	**0.00000**	**0.005**	**426.0%**	**0.1%**

Aquatic Acid Deposition

Following the completion of the construction phase of the Proposed Action, impacts to lakes would be reduced. Predicted impacts at all lakes are less than 1 µeq/l or a 10 percent change in ANC as summarized in Table 4.4-41.

Table 4.4-41. Proposed Action Post-Construction – Far-Field Predicted ANC Impacts

High Elevation Lake	Baseline 10%Lowest ANC (µeq/l)	Level of Acceptable Change [1]	Predicted Change in ANC (µeq/l)	Percentage Change In ANC
Black Joe Lake	67.0	10% or 6.7 µeq/l	0.01	0.02%
Deep Lake	59.9	10% or 6.0 µeq/l	0.01	0.02%
Emerald Lake	69.8	10% or 7.0 µeq/l	0.02	0.02%
Florence Lake	33.0	10% or 3.3 µeq/l	0.02	0.06%
Hobbs Lake	69.9	10% or 7.0 µeq/l	0.00	0.01%
Lower Saddlebag	55.5	10% or 5.6 µeq/l	0.01	0.03%
Ross Lake	53.5	10% or 5.4 µeq/l	0.00	0.01%
Stepping Stone Lake	19.9	1 µeq/l	0.00	0.00%
Twin Island Lake	17.6	1 µeq/l	0.00	0.00%
Upper Frozen Lake	5.0	1 µeq/l	0.01	0.24%
Maximum			**0.02**	**0.24%**

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC

Visibility Impairment

The Proposed Action is predicted to cause a total of three days of visibility impairment greater than 1.0 deciviews. However, following the completion of construction activities, visibility impacts would be reduced and no days greater than the 1.0 change in deciviews threshold are predicted to occur. Table 4.4-42 summarizes visibility impacts that may occur following the development of the Proposed Action. The maximum visibility impacts are predicted to be reduced from 1.96 to 0.775 deciviews following the completion of construction activities.

Table 4.4-42. Proposed Action Post-Construction – Far-Field Predicted Visibility Impairment.

Area of Special Concern	Number of Days with Δ dv Greater Than 1.0	Greatest Predicted Δ dv
Bridger Wilderness	0	0.11
Cloud Peak Wilderness	0	0.11
Fitzpatrick Wilderness	0	0.06
North Absaroka Wilderness	0	0.04
Owl Creek Range	0	0.76
Popo Agie Wilderness	0	0.12
Phlox Mountain	0	0.12
Grand Teton NP	0	0.01
Teton Wilderness	0	0.02
Washakie Wilderness	0	0.06
Wind River Canyon	0	0.78
Wind River Roadless Area	0	0.10
Yellowstone NP	0	0.03
Total Days / Max Δ dV	**0**	**0.78**

4.4.3.3 Alternative A (485 wells) - Direct and Indirect Impacts

If Alternative A were to be approved, the emission of pollutant to the atmosphere and related air quality impacts would be greater than the emissions and resulting impacts predicted for the Proposed Action. Potential impacts resulting from the implementation of Alternative A are discussed below.

Ambient Air Quality Standards

Predicted maximum pollutant concentrations that could occur as a result of the implementation of the Alternative A as summarized in table 4.4-43 and compared with the most stringent Wyoming and National Ambient Air Quality Standards. As demonstrated, increases in pollutant concentrations are predicted to occur at levels below the ambient standards.

Table 4.4-43. Alternative A – Far-Field Ambient Air Quality Standards Comparison.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	0.27	Wind River Canyon	3.4	3.67	100	3.7%
SO_2	3-hour	0.05	Wind River Canyon	132	132.05	1300	10.2%
	24-hour	0.02	Wind River Canyon	43	43.02	260	16.6%
	Annual	0.00	Wind River Canyon	9	9.00	60	15.0%
PM_{10}	24-hour	1.63	Wind River Canyon	61	62.63	150	41.8%
	Annual	0.14	Wind River Canyon	22	22.14	50	44.3%

PSD Increments

Tables 4.4-44 and 4.4-45 compare the maximum predicted pollutant concentrations with the PSD Class I and Class II Increments. As demonstrated, increases in pollutant concentrations are not predicted to exceed the Increments.

Table 4.4-44. Alternative A – Far-Field PSD Class I Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class I Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class I Increment
NO_2	Annual	0.003	Bridger Wilderness	2.5	0.12%
SO_2	3-hour	0.002	Fitzpatrick Wilderness	25	0.01%
	24-hour	0.001	Fitzpatrick Wilderness	5	0.01%
	Annual	0.000	Bridger Wilderness	2	0.00%
PM_{10}	24-hour	0.071	Fitzpatrick Wilderness	8	0.89%
	Annual	0.001	Bridger Wilderness	4	0.04%

Table 4.4-45. Alternative A – Far-Field PSD Class II Increment Comparison.

Pollutant	Averaging Time	Maximum Impact (µg/m^3)	Maximum Impact Location	PSD Class II Increment (µg/m^3)	Impact Percentage Of PSD Class II Increment
NO_2	Annual	0.27	Wind River Canyon	25	1.06%
SO_2	3-hour	0.05	Wind River Canyon	512	0.01%
	24-hour	0.02	Wind River Canyon	91	0.02%
	Annual	0.00	Wind River Canyon	20	0.01%
PM_{10}	24-hour	1.63	Wind River Canyon	30	5.44%
	Annual	0.14	Wind River Canyon	17	0.82%

Terrestrial Acid Deposition

Results of the nitrogen and sulfur atmospheric deposition analysis are illustrated in table 4.4-46. Incremental increases in nitrogen deposition are predicted to exceed the DAT in two areas of special concern; the Wind River Canyon and the Owl Creek Range.

Table 4.4-46. Alternative A – Far-Field Incremental Nitrogen and Sulfur Deposition DAT Comparison.

Area of Special Concern	Nitrogen (N) Deposition (kg/ha/yr)	Sulfur (S) Deposition (kg/ha/yr)	Deposition Analysis Threshold (DAT) (kg/ha/yr)	Nitrogen (N) Percent of DAT	Sulfur (S) Percent of DAT
Bridger Wilderness	0.00256	0.00001	0.005	51.3%	0.2%
Cloud Peak Wilderness	0.00332	0.00002	0.005	66.4%	0.4%
Fitzpatrick Wilderness	0.00122	0.00001	0.005	24.4%	0.1%
North Absaroka Wilderness	0.00034	0.00000	0.005	6.9%	0.0%
Owl Creek Range	0.01059	0.00010	0.005	211.8%	2.0%
Popo Agie Wilderness	0.00372	0.00002	0.005	74.4%	0.4%
Phlox Mountain	0.00212	0.00001	0.005	42.4%	0.2%
Grand Teton NP	0.00026	0.00000	0.005	5.2%	0.0%
Teton Wilderness	0.00037	0.00000	0.005	7.3%	0.0%
Washakie Wilderness	0.00098	0.00000	0.005	19.6%	0.1%
Wind River Canyon	0.04063	0.00042	0.005	812.6%	8.3%
Wind River Roadless Area	0.00308	0.00001	0.005	61.7%	0.3%
Yellowstone NP	0.00028	0.00000	0.005	5.6%	0.0%
Maximum	**0.04063**	**0.00042**	**0.005**	**812.6%**	**8.3%**

Aquatic Acid Deposition

Implementation Alternative A is not predicted to cause ANC impacts greater than the LACs. All predicted impacts as summarized in table 4.4-47 are less than 1 µeq/l or a 10 percent change in ANC.

Table 4.4-47. Alternative A – Far-Field Predicted ANC Impacts.

High Elevation Lake	Baseline 10%Lowest ANC (µeq/l)	Level of Acceptable Change [1]	Predicted Change in ANC (µeq/l)	Percentage Change In ANC
Black Joe Lake	67.0	10% or 6.7 µeq/l	0.02	0.03%
Deep Lake	59.9	10% or 6.0 µeq/l	0.02	0.04%
Emerald Lake	69.8	10% or 7.0 µeq/l	0.03	0.05%
Florence Lake	33.0	10% or 3.3 µeq/l	0.04	0.11%
Hobbs Lake	69.9	10% or 7.0 µeq/l	0.01	0.01%
Lower Saddlebag	55.5	10% or 5.6 µeq/l	0.03	0.05%
Ross Lake	53.5	10% or 5.4 µeq/l	0.01	0.01%
Stepping Stone Lake	19.9	1 µeq/l	0.00	0.01%
Twin Island Lake	17.6	1 µeq/l	0.00	0.01%
Upper Frozen Lake	5.0	1 µeq/l	0.02	0.45%
Maximum			**0.04**	**0.45%**

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC

Visibility Impairment

The Proposed Action is predicted to cause a total of six days of visibility impairment greater than 1.0 deciviews. As presented in table 4.4-48, two days of impairment are predicted to occur at the Owl Creek Range, and four days of impairment are predicted at the Wind River Canyon.

Table 4.4-48. Alternative A – Far-Field Predicted Visibility Impairment

Area of Special Concern	Number of Days with Δ dv Greater Than 1.0	Greatest Predicted Δ dv
Bridger Wilderness	0	0.23
Cloud Peak Wilderness	0	0.24
Fitzpatrick Wilderness	0	0.13
North Absaroka Wilderness	0	0.07
Owl Creek Range	2	1.25
Popo Agie Wilderness	0	0.27
Phlox Mountain	0	0.25
Grand Teton NP	0	0.03
Teton Wilderness	0	0.05
Washakie Wilderness	0	0.12
Wind River Canyon	4	2.22
Wind River Roadless Area	0	0.22
Yellowstone NP	0	0.06
Total Days / Max Δ dV	**6**	**2.22**

4.4.3.4 Alternative B (233 wells) - Direct and Indirect Impacts

If Alternative B were to be approved, the emission of pollutants to the atmosphere and related air quality impacts would be less than the emissions and resulting impacts predicted for the Proposed Action and Alternative A. Potential impacts resulting from the implementation of Alternative B are discussed below.

Ambient Air Quality Standards

Predicted maximum pollutant concentrations that could occur as a result of the implementation of Alternative B are summarized in the following table and compared with the most stringent Wyoming and National ambient air quality standards. As demonstrated in table 4.4-49, increases in pollutant concentrations are predicted to occur at levels below the ambient standards.

Table 4.4-49. Alternative B – Far-Field Ambient Air Quality Standards Comparison.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	0.17	Wind River Canyon	3.4	3.57	100	3.6%
SO_2	3-hour	0.05	Wind River Canyon	132	132.05	1300	10.2%
	24-hour	0.02	Wind River Canyon	43	43.02	260	16.6%
	Annual	0.00	Wind River Canyon	9	9.00	60	15.0%
PM_{10}	24-hour	1.48	Wind River Canyon	61	62.48	150	41.7%
	Annual	0.13	Wind River Canyon	22	22.13	50	44.3%

PSD Increments

Tables 4.4-50 and 4.4-51 compare the maximum predicted pollutant concentrations with the PSD Class I and Class II Increments. As demonstrated, increases in pollutant concentrations are not predicted to exceed the Increments.

Table 4.4-50. Alternative B – Far-Field PSD Class I Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class I Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class I Increment
NO_2	Annual	0.002	Bridger Wilderness	2.5	0.07%
SO_2	3-hour	0.002	Fitzpatrick	25	0.01%
	24-hour	0.001	Fitzpatrick	5	0.01%
	Annual	0.000	Bridger Wilderness	2	0.00%
PM_{10}	24-hour	0.067	Fitzpatrick	8	0.84%
	Annual	0.001	Bridger Wilderness	4	0.03%

Table 4.4-51. Alternative B – Far-Field PSD Class II Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class II Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class II Increment
NO_2	Annual	0.172	Wind River Canyon	25	0.69%
SO_2	3-hour	0.049	Wind River Canyon	512	0.01%
	24-hour	0.020	Wind River Canyon	91	0.02%
	Annual	0.001	Wind River Canyon	20	0.01%
PM_{10}	24-hour	1.476	Wind River Canyon	30	4.92%
	Annual	0.128	Wind River Canyon	17	0.75%

Terrestrial Acid Deposition

Results of the nitrogen and sulfur atmospheric deposition analysis are illustrated in Table 4.4-52. Incremental increases in nitrogen deposition are predicted to exceed the DAT in two areas of special concern; the Wind River Canyon and the Owl Creek Range.

Table 4.4-52. Alternative B – Far-Field Incremental Nitrogen and Sulfur Deposition DAT Comparison.

Area of Special Concern	Nitrogen (N) Deposition (kg/ha/yr)	Sulfur (S) Deposition (kg/ha/yr)	Deposition Analysis Threshold (DAT) (kg/ha/yr)	Nitrogen (N) Percent of DAT	Sulfur (S) Percent of DAT
Bridger Wilderness	0.00157	0.00001	0.005	31.3%	0.2%
Cloud Peak Wilderness	0.00202	0.00002	0.005	40.4%	0.3%
Fitzpatrick Wilderness	0.00076	0.00001	0.005	15.2%	0.1%
North Absaroka Wilderness	0.00021	0.00000	0.005	4.1%	0.0%
Owl Creek Range	0.00678	0.00009	0.005	135.6%	1.9%
Popo Agie Wilderness	0.00228	0.00002	0.005	45.7%	0.4%
Phlox Mountain	0.00131	0.00001	0.005	26.3%	0.2%
Grand Teton NP	0.00016	0.00000	0.005	3.2%	0.0%
Teton Wilderness	0.00022	0.00000	0.005	4.4%	0.0%
Washakie Wilderness	0.00060	0.00000	0.005	11.9%	0.1%
Wind River Canyon	0.02511	0.00039	0.005	502.2%	7.9%
Wind River Roadless Area	0.00191	0.00001	0.005	38.2%	0.3%
Yellowstone NP	0.00017	0.00000	0.005	3.4%	0.0%
Maximum	**0.02511**	**0.00039**	**0.005**	**502.2%**	**7.9%**

Aquatic Acid Deposition

Implementation of Alternative B is not predicted to cause ANC impacts greater than the LACs. All predicted impacts as summarized in Table 4.4-53 are less than 1 µeq/l or a 10 percent change in ANC.

Table 4.4-53. Alternative B – Far-Field Predicted ANC Impacts.

High Elevation Lake	Baseline 10%Lowest ANC (µeq/l)	Level of Acceptable Change [1]	Predicted Change in ANC (µeq/l)	Percentage Change In ANC
Black Joe Lake	67.0	10% or 6.7 µeq/l	0.01	0.02%
Deep Lake	59.9	10% or 6.0 µeq/l	0.01	0.02%
Emerald Lake	69.8	10% or 7.0 µeq/l	0.02	0.03%
Florence Lake	33.0	10% or 3.3 µeq/l	0.02	0.07%
Hobbs Lake	69.9	10% or 7.0 µeq/l	0.01	0.01%
Lower Saddlebag	55.5	10% or 5.6 µeq/l	0.02	0.03%
Ross Lake	53.5	10% or 5.4 µeq/l	0.00	0.01%
Stepping Stone Lake	19.9	1 µeq/l	0.00	0.00%
Twin Island Lake	17.6	1 µeq/l	0.00	0.00%
Upper Frozen Lake	5.0	1 µeq/l	0.01	0.28%
Maximum			**0.02**	**0.28%**

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC

Visibility Impairment

Alternative B is predicted to cause one day of visibility impairment greater than 1.0 deciviews. As presented in Table 4.4-54, one day of impairment is predicted to occur at Wind River Canyon.

Table 4.4-54. Alternative B – Far-Field Predicted Visibility Impairment.

Area of Special Concern	Number of Days with Δ dv Greater Than 1.0	Greatest Predicted Δ dv
Bridger Wilderness	0	0.14
Cloud Peak Wilderness	0	0.16
Fitzpatrick Wilderness	0	0.10
North Absaroka Wilderness	0	0.04
Owl Creek Range	0	0.92
Popo Agie Wilderness	0	0.19
Phlox Mountain	0	0.16
Grand Teton NP	0	0.02
Teton Wilderness	0	0.03
Washakie Wilderness	0	0.08
Wind River Canyon	1	1.78
Wind River Roadless Area	0	0.16
Yellowstone NP	0	0.04
Total Days / Max Δ dV	**1**	**1.78**

4.4.3.5 Alternative C (No Action – 100 wells) – Direct and Indirect Impacts

If Alternative C were to be implemented, the emission of pollutants to the atmosphere and related air quality impacts would be minimized. Potential impacts resulting from the implementation of Alternative C are discussed below.

Ambient Air Quality Standards

Predicted maximum pollutant concentrations that could occur as a result of the implementation of the No Action Alternative are summarized in Table 4.4-55 and compared with the most stringent Wyoming and National ambient air quality standards. As demonstrated, increases in pollutant concentrations are predicted to occur at levels below the ambient standards.

Table 4.4-55. Alternative C – Far-Field Ambient Air Quality Standards Comparison.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	0.01	Wind River Canyon	3.4	3.41	100	3.4%
SO_2	3-hour	0.00	Wind River Canyon	132	132.00	1300	10.2%
	24-hour	0.00	Wind River Canyon	43	43.00	260	16.5%
	Annual	0.00	Wind River Canyon	9	9.00	60	15.0%
PM_{10}	24-hour	0.22	Wind River Canyon	61	61.22	150	40.8%
	Annual	0.01	Wind River Canyon	22	22.01	50	44.0%

PSD Increments

Tables 4.4-56 and 4.4-57 compare the maximum predicted pollutant concentrations with the PSD Class I Increments. As demonstrated, increases in pollutant concentrations are not predicted to exceed the Increments.

Table 4.4-56. Alternative C – Far-Field PSD Class I Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class I Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class I Increment
NO_2	Annual	0.0003	Bridger Wilderness	2.5	0.01%
SO_2	3-hour	0.0004	Bridger Wilderness	25	0.00%
	24-hour	0.0001	Bridger Wilderness	5	0.00%
	Annual	0.0000	Bridger Wilderness	2	0.00%
PM_{10}	24-hour	0.0196	Bridger Wilderness	8	0.25%
	Annual	0.0004	Bridger Wilderness	4	0.01%

Table 4.4-57. Alternative C – Far-Field PSD Class II Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class II Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class II Increment
NO_2	Annual	0.01	Wind River Canyon	25	0.03%
SO_2	3-hour	0.00	Wind River Canyon	512	0.00%
	24-hour	0.00	Wind River Canyon	91	0.00%
	Annual	0.00	Wind River Canyon	20	0.00%
PM_{10}	24-hour	0.22	Wind River Canyon	30	0.72%
	Annual	0.01	Wind River Canyon	17	0.07%

Terrestrial Acid Deposition

Results of the nitrogen and sulfur atmospheric deposition analysis are illustrated in Table 4.4-58. With implementation of the No Action Alternative, Incremental increases in nitrogen and sulfur deposition are predicted to occur. However, the increases in nitrogen and sulfur deposition are not predicted to exceed the DATs.

Table 4.4-58. Alternative C – Far-Field Incremental Nitrogen and Sulfur Deposition DAT Comparison.

Area of Special Concern	Nitrogen (N) Deposition (kg/ha/yr)	Sulfur (S) Deposition (kg/ha/yr)	Deposition Analysis Threshold (DAT) (kg/ha/yr)	Nitrogen (N) Percent of DAT	Sulfur (S) Percent of DAT
Bridger Wilderness	0.00022	0.00000	0.005	4.3%	0.0%
Cloud Peak Wilderness	0.00021	0.00000	0.005	4.1%	0.0%
Fitzpatrick Wilderness	0.00009	0.00000	0.005	1.8%	0.0%
North Absaroka Wilderness	0.00002	0.00000	0.005	0.4%	0.0%
Owl Creek Range	0.00063	0.00000	0.005	12.6%	0.1%
Popo Agie Wilderness	0.00032	0.00000	0.005	6.5%	0.0%
Phlox Mountain	0.00015	0.00000	0.005	3.1%	0.0%
Grand Teton NP	0.00002	0.00000	0.005	0.3%	0.0%
Teton Wilderness	0.00002	0.00000	0.005	0.5%	0.0%
Washakie Wilderness	0.00006	0.00000	0.005	1.3%	0.0%
Wind River Canyon	0.00149	0.00001	0.005	29.8%	0.2%
Wind River Roadless Area	0.00025	0.00000	0.005	5.0%	0.0%
Yellowstone NP	0.00002	0.00000	0.005	0.3%	0.0%
Maximum	**0.00149**	**0.00001**	**0.005**	**29.8%**	**0.2%**

Aquatic Acid Deposition

Implementation of the Proposed Action is not predicted to cause ANC impacts greater than the LACs. All predicted impacts, as summarized in Table 4.4-59, are less than 1 µeq/l or a 10 percent change in ANC.

Table 4.4-59. Alternative C – Far-Field Predicted ANC Impacts.

High Elevation Lake	Baseline 10%Lowest ANC (µeq/l)	Level of Acceptable Change [1]	Predicted Change in ANC (µeq/l)	Percentage Change In ANC
Black Joe Lake	67.0	10% or 6.7 µeq/l	0.002	0.00%
Deep Lake	59.9	10% or 6.0 µeq/l	0.002	0.00%
Emerald Lake	69.8	10% or 7.0 µeq/l	0.002	0.00%
Florence Lake	33.0	10% or 3.3 µeq/l	0.002	0.01%
Hobbs Lake	69.9	10% or 7.0 µeq/l	0.001	0.00%
Lower Saddlebag	55.5	10% or 5.6 µeq/l	0.002	0.00%
Ross Lake	53.5	10% or 5.4 µeq/l	0.000	0.00%
Stepping Stone Lake	19.9	1 µeq/l	0.000	0.00%
Twin Island Lake	17.6	1 µeq/l	0.000	0.00%
Upper Frozen Lake	5.0	1 µeq/l	0.002	0.04%
Maximum			**0.002**	**0.04%**

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC

Visibility Impairment

Visibility impacts resulting form the implementation of the No Action Alternative are not predicted to exceed the 1.0 deciview threshold. As presented in Table 4.4-60, a maximum visibility impact of 0.14 deciviews is predicted to occur at Wind River Canyon.

Table 4.4-60. Alternative C – Far-Field Predicted Visibility Impairment.

Area of Special Concern	Number of Days with Δ dv Greater Than 1.0	Greatest Predicted Δ dv
Bridger Wilderness	0	0.03
Cloud Peak Wilderness	0	0.02
Fitzpatrick Wilderness	0	0.02
North Absaroka Wilderness	0	0.01
Owl Creek Range	0	0.07
Popo Agie Wilderness	0	0.04
Phlox Mountain	0	0.02
Grand Teton NP	0	0.00
Teton Wilderness	0	0.01
Washakie Wilderness	0	0.01
Wind River Canyon	0	0.14
Wind River Roadless Area	0	0.02
Yellowstone NP	0	0.01
Total Days / Max Δ dV	**0**	**0.14**

4.4.3.6 Far-Field Impacts Summary

As a result of the implementation of the Proposed Action or Alternatives, increases in air pollutant concentrations would occur. The magnitude of the potential impacts would vary in proportion with the scale of the alternative. The greatest impacts would occur with the implementation of Alternative A. Lower impacts would occur with the implementation of the Proposed Action or Alternative B. Air quality impacts would be minimized with the implementation of Alternative C.

Ambient Air Quality Standards and PSD Increments

Predicted maximum pollutant concentrations are summarized in Table 4.4-61 for each of the alternatives. As illustrated, minor increases in PM_{10} concentrations would occur upon implementation of the Proposed Action or Alternatives A or B. PM_{10} impacts would be short term, lasting the duration of the development activities. Negligible PM_{10} impacts would occur with the implementation of Alternative C. Predicted NO_2 and SO_2 impacts would be negligible for all Project Alternatives.

Table 4.4-61. Proposed Action – Far-Field Ambient Air Quality Standards Comparison.

Pollutant	Averaging Time	Proposed Action Maximum Predicted Impact ($\mu g/m^3$)	Proposed Action Post-Construction Maximum Predicted Impact ($\mu g/m^3$)	Alternative A Maximum Predicted Impact ($\mu g/m^3$)	Alternative B Maximum Predicted Impact ($\mu g/m^3$)	Alternative C Maximum Predicted Impact ($\mu g/m^3$)
NO_2	Annual	0.21	0.13	0.27	0.17	0.01
SO_2	3-hour	0.05	0.00	0.05	0.05	0.00
	24-hour	0.02	0.00	0.02	0.02	0.00
	Annual	0.00	0.00	0.00	0.00	0.00
PM_{10}	24-hour	1.51	0.10	1.63	1.48	0.22
	Annual	0.13	0.01	0.14	0.13	0.01

Terrestrial Acid Deposition

Results of the nitrogen and sulfur atmospheric deposition analysis are illustrated in Table 4.4-62. With the implementation of the Proposed Action or Alternatives A or B, minor long-term increases in nitrogen deposition are predicted to occur. The nitrogen impacts would exceed the DAT in two areas of special concern; Wind River Canyon and the Owl Creek Range. No sulfur deposition impacts are predicted to occur as a result of the implementation of the Proposed Action or Alternatives. For all Project Alternatives, increases in sulfur deposition would be considerably less than the DAT.

Table 4.4-62. Far-Field Incremental Nitrogen DAT Summary.

Area of Special Concern	Proposed Action Nitrogen (N) Percent of DAT	Proposed Action Post-Construction Nitrogen (N) Percent of DAT	Alternative A Nitrogen (N) Percent of DAT	Alternative B Nitrogen (N) Percent of DAT	Alternative C Nitrogen (N) Percent of DAT
Bridger Wilderness	39.7%	27.1%	51.3%	31.3%	4.3%
Cloud Peak Wilderness	51.2%	35.0%	66.4%	40.4%	4.1%
Fitzpatrick Wilderness	19.0%	12.1%	24.4%	15.2%	1.8%
North Absaroka Wilderness	5.3%	3.6%	6.9%	4.1%	0.4%
Owl Creek Range	166.5%	100.2%	211.8%	135.6%	12.6%
Popo Agie Wilderness	57.8%	39.0%	74.4%	45.7%	6.5%
Phlox Mountain	33.0%	21.5%	42.4%	26.3%	3.1%
Grand Teton NP	4.0%	2.6%	5.2%	3.2%	0.3%
Teton Wilderness	5.6%	3.9%	7.3%	4.4%	0.5%
Washakie Wilderness	15.1%	10.2%	19.6%	11.9%	1.3%
Wind River Canyon	630.0%	426.0%	812.6%	502.2%	29.8%
Wind River Roadless Area	48.0%	31.6%	61.7%	38.2%	5.0%
Yellowstone NP	4.3%	2.9%	5.6%	3.4%	0.3%
Maximum	**630.0%**	**426.0%**	**812.6%**	**502.2%**	**29.8%**

Aquatic Acid Deposition

Upon implementation of the Proposed Action or Alternatives, no impacts to lake ANC are predicted to occur. As summarized in Table 4.4-63, predicted ANC impacts are substantially less than the LACs.

Table 4.4-63. Summary of Predicted Far-Field ANC Impacts

High Elevation Lake	Level of Acceptable Change [1]	Proposed Action Predicted Change in ANC (µeq/l)	Proposed Action Post-Construction Predicted Change in ANC (µeq/l)	Alternative A Predicted Change in ANC (µeq/l)	Alternative B Predicted Change in ANC (µeq/l)	Alternative C Predicted Change in ANC (µeq/l)
Black Joe Lake	6.7 µeq/l	0.02	0.01	0.02	0.01	0.002
Deep Lake	6.0 µeq/l	0.02	0.01	0.02	0.01	0.002
Emerald Lake	7.0 µeq/l	0.03	0.02	0.03	0.02	0.002
Florence Lake	3.3 µeq/l	0.03	0.02	0.04	0.02	0.002
Hobbs Lake	7.0 µeq/l	0.01	0.00	0.01	0.01	0.001
Lower Saddlebag	5.6 µeq/l	0.02	0.01	0.03	0.02	0.002
Ross Lake	5.4 µeq/l	0.01	0.00	0.01	0.00	0.000
Stepping Stone Lake	1 µeq/l	0.00	0.00	0.00	0.00	0.000
Twin Island Lake	1 µeq/l	0.00	0.00	0.00	0.00	0.000
Upper Frozen Lake	1 µeq/l	0.02	0.01	0.02	0.01	0.002
Maximum		**0.03**	**0.02**	**0.04**	**0.02**	**0.002**

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC

Visibility Impairment

Predicted changes in visibility and number of days exceeding the 1.0 Δdv threshold are summarized in Tables 4.4-64 and 4.4-65. With the implementation of the Proposed Action or Alternative A, moderate visibility impacts are predicted to occur at the Wind River Canyon and the Owl Creek Range. These impacts would be short term, existing for the duration of the Project construction activities. Upon the completion of the development phase of the Project, visibility impacts at Wind River Canyon and Owl Creek Range would be reduced to minor levels. Minor short-term visibility impacts are predicted to occur at Wind River Canyon and the Owl Creek range upon implementation of Alternative B. No discernable visibility impacts would occur with the implementation of Alternative C.

Table 4.4-64. Summary of Predicted Far-Field Visibility Impairment.

Area of Special Concern	Proposed Action Greatest Predicted Δ dv	Proposed Action Post-Construction Greatest Predicted Δ dv	Alternative A Greatest Predicted Δ dv	Alternative B Greatest Predicted Δ dv	Alternative C Greatest Predicted Δ dv
Bridger Wilderness	0.177	0.108	0.225	0.144	0.027
Cloud Peak Wilderness	0.193	0.114	0.243	0.158	0.019
Fitzpatrick Wilderness	0.114	0.057	0.132	0.104	0.015
North Absaroka Wilderness	0.052	0.036	0.067	0.041	0.005
Owl Creek Range	1.071	0.758	1.252	0.923	0.074
Popo Agie Wilderness	0.219	0.116	0.270	0.185	0.037
Phlox Mountain	0.197	0.116	0.248	0.162	0.023
Grand Teton NP	0.021	0.014	0.027	0.016	0.002
Teton Wilderness	0.037	0.024	0.048	0.030	0.005
Washakie Wilderness	0.094	0.062	0.120	0.075	0.011
Wind River Canyon	1.960	0.775	2.218	1.780	0.137
Wind River Roadless Area	0.173	0.101	0.217	0.156	0.021
Yellowstone NP	0.046	0.032	0.059	0.036	0.005
Maximum Δ dv	**1.960**	**0.775**	**2.218**	**1.780**	**0.137**

Table 4.4-65. Summary of Predicted Far-Field Visibility Impairment Days

Area of Special Concern	Proposed Action Number of Days with Δ dv Greater Than 1.0	Proposed Action Post-Construction Number of Days with Δ dv Greater Than 1.0	Alternative A Number of Days with Δ dv Greater Than 1.0	Alternative B Number of Days with Δ dv Greater Than 1.0	Alternative C Number of Days with Δ dv Greater Than 1.0
Bridger Wilderness	0	0	0	0	0
Cloud Peak Wilderness	0	0	0	0	0
Fitzpatrick Wilderness	0	0	0	0	0
North Absaroka Wilderness	0	0	0	0	0
Owl Creek Range	1	0	2	0	0
Popo Agie Wilderness	0	0	0	0	0
Phlox Mountain	0	0	0	0	0
Grand Teton NP	0	0	0	0	0
Teton Wilderness	0	0	0	0	0
Washakie Wilderness	0	0	0	0	0
Wind River Canyon	2	0	4	1	0
Wind River Roadless Area	0	0	0	0	0
Yellowstone NP	0	0	0	0	0
Total Days	**3**	**0**	**6**	**1**	**0**

4.4.3.7 Additional Mitigation Measures

Air quality related impacts would result primarily from NO_X emitted from compressor and drill rig engines in conjunction with particulate matter generated from construction activities and vehicle travel on unpaved roads. Table 4.4-66 summarizes mitigation measures that may reduce potential impacts

4.4.3.8 Residual Impacts

Implementation of the Proposed Action or Alternatives would cause increased levels of pollutants in the ambient air. With the implementation of one or more of the previously described additional mitigation measures, the emission of air pollutants and related impacts to air quality related values may potentially be reduced.

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Table 4.4-66. Air Quality Additional Mitigation Measures.

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
NO_X and CO Mitigation Measures				
Utilize selective catalytic reduction on compressors.	Relatively expensive as compared to non-selective catalysts. Typical costs are $125/horsepower (EPA Cost Control Manual, January 2002).	Requires the use and storage of ammonia, which presents health and safety issues. Results in increased ammonia emissions which may contribute to the formation of ammonium sulfates and increased visibility degradation	NO_X emission rate reduced to 0.1 g/hp-hr. Reduced ammonium nitrate formation and resulting visibility impacts	Not applicable for 2-ccstroke engines.
Application of non-selective catalytic reduction.	$5,000 to $25,000 per unit.	Regeneration / disposal costs for catalysts	As a result of the BACT process, average NO_X emission rates for	Not applicable for Lean-burn or 2-stroke engines

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
			Wyoming engines 100 hp or greater is 1.0 g/hp-hr. The application of non-selective catalysts may reduce the NO_X emission rate to 0.7 g/hp-hr for some types of engines	
Utilize compressors driven by electrical motors.	Capital costs equal 40% of gas turbine costs. Operating cost dependent upon the location of high voltage power lines.	Displaced air emissions from compressor units to electrical power plant.	May potentially relocate emissions away from sensitive Class I areas.	Requires high voltage power lines.
Increased diameter	With larger diameter	Slightly more surface	Lower pipeline	

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
of sales pipelines.	sales pipelines, capital costs increase while operating costs decrease.	disturbance.	pressures resulting in lower compression hp requirements.	
Utilize wind generated electricity to power compressors.	Capital costs are very large.	Visual impacts from generation equipment. Increased mortality of birds including raptors.	Reduced use of fossil fuels and associated emissions.	Location of wind generation facilities is critical. Requires consistent strong winds for economic operation. Also requires high voltage transmission lines between generation facility and compressor stations.
Increased	Unknown.	None.	Improved data for	The monitoring of

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
Monitoring.			estimating impacts.	emission sources does not reduce the magnitude of the impacts.
Utilize compressors driven by electrical motors.	Capital costs equal 40% of gas turbine costs. Operating cost dependent upon the location of high voltage power lines.	Displaced air emissions from compressor units to electrical power plant.	May potentially relocate emissions away from sensitive Class I areas.	Requires high voltage power lines.
Increased diameter of sales pipelines.	With larger diameter sales pipelines, capital costs increase while operating costs decrease.	Slightly more surface disturbance.	Lower pipeline pressures resulting in lower compression hp requirements.	
Utilize wind	Capital costs are very	Visual impacts from	Reduced use of fossil	Location of wind

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
generated electricity to power compressors.	large	generation equipment. Increased mortality of birds including raptors.	fuels and associated emissions.	generation facilities is critical. Requires consistent strong winds for economic operation. Also requires high voltage transmission lines between generation facility and compressor stations.
Increased Monitoring.	Unknown.	None.	Improved data for estimating impacts.	The monitoring of emission sources does not reduce the magnitude of the impacts.
Phased	Short term loss of	Emissions generated	Peak emissions and	Administration /

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
development.	State and Federal royalties.	at a lower rate over a longer period.	associated impacts reduced.	jurisdiction limitations - The WDEQ-AQD and EPA are the regulatory authorities for air quality within the State of Wyoming. Therefore, the BIA cannot limit or otherwise restrict development based upon potential air quality impacts. Economic limitations - A minimum production rate is required to cost effectively develop the

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
				resource while maintaining the processing and transportation infrastructure.
Particulate Matter Mitigation Measures				
Increase water application rate to achieve greater than 50% fugitive dust control.	Varies with the source of the water and the trucking distance.	None	Can achieve fugitive dust control rates up to 95%.	Diminishing returns per gallon of water applied. Water must be applied at much greater rates to achieve control efficiencies >75%.
Unpaved Road Dust Suppressant Treatments.	$2,400 to $50,000 per mile.	Treatment chemicals have the potential to negatively impact	Estimated 20% to 100% reduction in fugitive dust	Jurisdictional limitation – The County controls many of the main

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
		water quality.	emissions.	roads within the WRPA and retains responsibility for road maintenance and dust control.
Administrative control of speed limits	Relatively low costs for installation of signs and enforcement.	None	Slower speeds may provide 20% to 50% reduction in dust emissions.	Jurisdictional limitation – The County controls many of the main roads within the WRPA and retains authority for determining speed limits.
Installation of remote telemetry.	Approximately $13,000 per well.	None	Reduction in vehicle miles traveled and associated vehicle	Effective only for the production phase of the operations. Would

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
			emissions during production operations. No benefit for construction operations which generate the greatest amount of PM.	have no impact upon construction activities which generate the greatest amount of particulate matter.
Gravel roads.	Approximately $9,000 per mile.	None	Estimated 30% reduction in fugitive road dust.	Jurisdictional limitation – The County controls many of the main roads within the WRPA and retains responsibility road maintenance.
Pave roads.	Approximately	None	Estimated 90%	Jurisdictional limitation

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
	$11,000 to $60,000 per mile		reduction in fugitive road dust.	– The County controls many of the main roads within the WRPA and retains responsibility for road construction and maintenance.
Phased development.	Short term loss of State and Federal royalties.	Emissions generated at a lower rate over a longer period.	Peak emissions and associated impacts reduced.	Administration / jurisdiction limitations - The WDEQ-AQD and EPA are the regulatory authorities for air quality within the State of Wyoming. Therefore, the BIA cannot limit or

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
				otherwise restrict development based upon potential air quality impacts. Economic limitations - A minimum production rate is required to cost effectively develop the resource while maintaining the processing and transportation infrastructure.
VOC and HAP Mitigation Measures				
Use of condenser controls on	$1,000 to $10,000 for	Larger units may require electrical	VOC/HAP emission reductions ranging	The effectiveness of passive condensers is

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
dehydrator still vents.	capital equipment.	power.	from 1% to 50%.	dependent upon ambient air temperatures. Control efficiency decreases with increasing temperatures.
Use of condenser controls on dehydrator still vents.	$1,000 to $10,000 for capital equipment.	Larger units may require electrical power.	VOC/HAP emission reductions ranging from 1% to 50%.	The effectiveness of passive condensers is dependent upon ambient air temperatures. Control efficiency decreases with increasing temperatures.
Use of combination condenser /	$5,000 to $25,000 for capital equipment	Larger units may require electrical	VOC/HAP control rates ranging from	May require continuous electrical

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
combustion controls on dehydrator still vents.	plus increased maintenance costs.	power. Increased NO_X and CO emissions.	95% to better than 99%.	power source for larger units.
Minimize dehydrator glycol circulation rates.	Minimal costs associated with increased monitoring and maintenance.	None.	May reduce VOC and HAP emissions by 1% to 50%.	Glycol circulation rates may only be reduced to the point where gas quality still meets pipeline specifications.
Use of oxidation catalysts on compressor engines.	$5,000 to $10,000 capital costs.	Disposal of spent catalysts.	Typically reduces formaldehyde emissions by 50%. Reductions of up to 90% may be achieved. Also reduces CO	Not applicable for 2-stroke or rich-burn engines.

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
			emissions by similar percentages.	
Use of flares or smokeless combustion units to control vapors from condensate storage tanks	$5,000 to $20,000 per well	Increased NO_X and CO emissions. May contribute to light pollution	Reduction in tank emissions of 95% or better.	
Use of activated carbon filters on condensate tanks	$1,000 initial capital costs. High maintenance costs.	High energy costs for replacement/regeneration of carbon filters	Estimated 50% to 80% reduction in VOC and HAP emissions.	
Green completion / flowback unit.	Capital costs range from $1,000 to $10,000. Operating costs estimated at	Potential for reduced gas production.	Potentially reduces completion flaring/venting emissions by 70% to	

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
	$1,000 per year.		90%.	
Phased development.	Short term loss of State and Federal royalties.	Emissions generated at a lower rate over a longer period.	Peak emissions and associated impacts reduced.	Administration / jurisdiction limitations - The WDEQ-AQD and EPA are the regulatory authorities for air quality within the State of Wyoming. Therefore, the BIA cannot limit or otherwise restrict development based upon potential air quality impacts. Economic limitations - A minimum production

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
				rate is required to cost effectively develop the resource while maintaining the processing and transportation infrastructure.

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4.5 WATER RESOURCES

4.5.1.1 Surface Water

p. 4.5-3, paragraph 3 through Figure 4.5-2, replace with the following text:

Figure 4.5-2 illustrates sediment yield (soil loss) rates by watershed for the Proposed Action over the life of the project. Table 4.5-3 presents basic statistics on soil loss over a 14-year period. This time period was selected because erosion rates stabilize about five years after construction, drilling, and completion. Over a 16-year period from the initiation of the Proposed Action, considerable soil loss could potentially occur. As presented in Table 4.5-3, project-related soil loss could be up to four times higher than the natural soil loss rates that would occur without the Proposed Action (486 tons/year occurring naturally compared to 2,120 tons/year associated with the Proposed Action).

The direct impacts on water quality in Fivemile, Muddy and Cottonwood Creeks are dependent on the percent of sediment that actually reaches these steams. The sediment delivery ratio (SDR) is a function of drainage area. Boyce (1975) calculated that the SDR would be about five percent of the soil loss in watersheds with an area of 300 square miles, a size typical of the watersheds within the WRPA. Vegetative trapping effects, deposition of sediment on land and in the streams, and the degree of channelization (Haan and Barfield 1979) also influence the SDR. In addition, construction Best Management Practices (BMP) (i.e., containment berms, sediment control structures, and other engineered stormwater control structures) and the Operator's commitment not to construct well pads within 500 feet of streams, would greatly reduce the amount of sediment reaching the streams.

Table 4.5-3 also shows the yearly estimates of sediment loading into streams in the WRPA. As illustrated in Figure 4.5-2, sediment loading into streams would gradually increase to year 11 then decrease as disturbed areas are reclaimed. Long-term sediment loading is highest for the Fivemile Creek watershed, with an average load of 47.8 tons per year. Sediment loading for Muddy and Cottonwood Creeks would be about 43.4 and 14.8 tons of sediment per year, respectively. Predicted sediment loadings would increase over naturally occurring rates by an average of 82 tons per year over the 14-year period.

Table 4.5-2: Soil Loss Parameters by Soil Type for WRPA

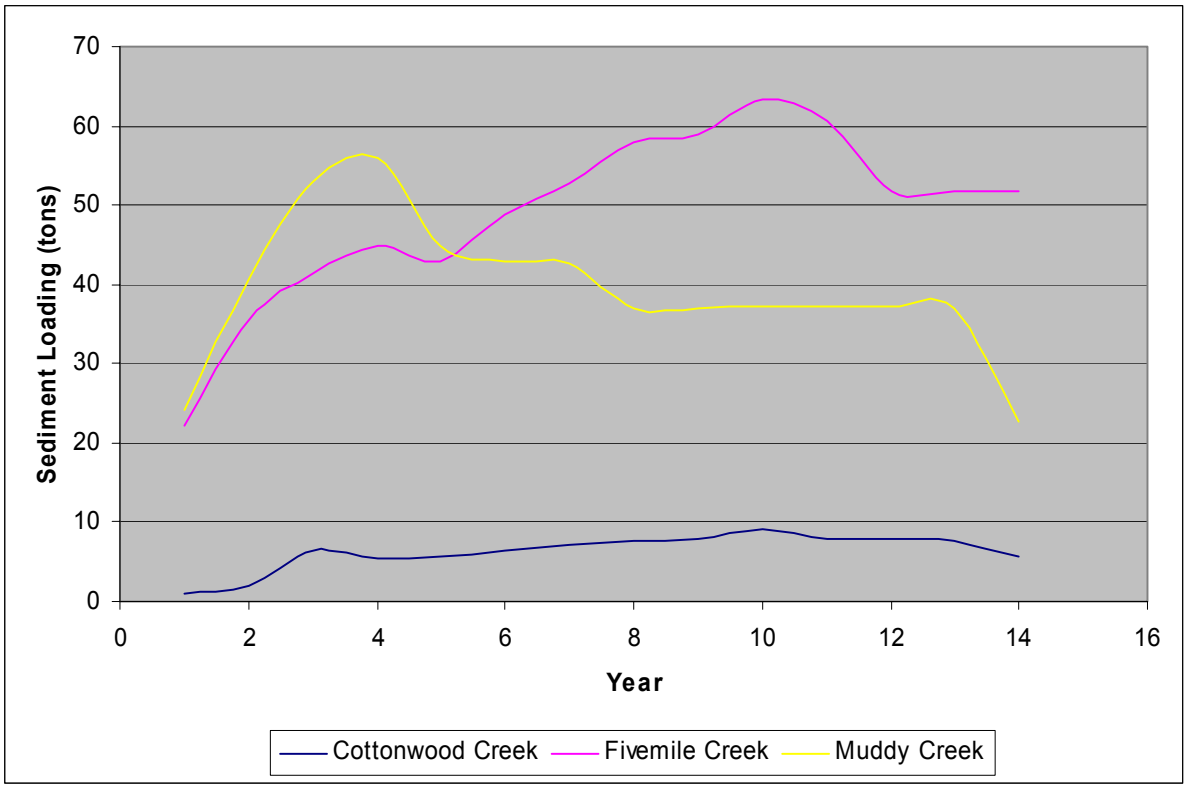
Development Area	Predominant Soil Types	Slope	Soil Loss (tons/acre/year)		
			Construction Disturbance[1]	Reclaimed	Undisturbed
Pavillion	Sandy-clay loam to sandy loam clay (est. 50% each)	0 – 5%	8.300	1.800	0.700
Muddy Ridge	Clayey loam to sandy clay loam (est. 50% each)	0 – 5%	7.250	1.550	0.650
Sand Mesa	Sandy loam	0 – 1% (nearly level)	6.600	0.033	0.014
Sand Mesa South	Sandy loam	0 – 1% (nearly level)	6.600	0.033	0.014
Coastal Extension	Sandy loam	0 – 5%	6.600	2.200	0.083

[1]Construction disturbance assumes a 20% slope of berms, topsoil stockpiles, and banks.

Table 4.5-3: Estimated Soil Loss and Sediment Loading by Watershed for the Proposed Action – 14 Years from Start of Project

Watershed	Soil Loss (tons/yr)			14-Year Total (tons)
	Min	Max	Average	
Cottonwood Creek	12.3	472	297	4,155
Muddy Creek	317	1,352	867	12,139
Fivemile Creek	263	1,263	956	13,867
WRPA Total	**592**	**3,087**	**2,120**	**30,161**
Natural Conditions			486	7,936
	Sediment Loading (tons/yr)			
Cottonwood Creek	0.6	23.6	14.8	208
Muddy Creek	15.9	67.6	43.4	607
Fivemile Creek	13.1	63.1	47.8	669
WRPA Total	**29.6**	**154.3**	**106**	**1,484**
Natural Conditions			24	397

Figure 4.5-2: Calculated Sediment Loading from the WRPA to Nearby Streams



4.5.2 Alternative A (485 wells) – Direct and Indirect Impacts

p. 4.5-10 through 12, replace entire section with the following:

Under Alternative A, the number of wells would increase from 325 to 485 wells. The increase in activity would lead to increased sediment loading into each nearby creek. Using the same methodology previously described for the Proposed Action, Table 4.5-5 presents estimated sediment loadings over natural levels for Alternative A. Predicted sediment loadings under Alternative A would increase over natural rates by an average of 83 tons per year over the 18-year period. This is an annual average increase in sediment loading of 25 tons per year over the Proposed Action.

Table 4.5-5: Estimated Soil Loss and Sediment Loading by Watershed for Alternative A – 18 years from Start of Project

Watershed	Soil Loss (tons/yr)			Total (tons)
	Min	Max	Average	
Cottonwood Creek	18	424	279	5031
Fivemile Creek	475	1515	1145	20608
Muddy Creek	481	1171	942	16957
Alternative A Total	**975**	**2909**	**2366**	**42596**
Natural			698	11,168
	Sediment Loading			
Cottonwood Creek	1	21	14	252
Muddy Creek	24	76	57	1030
Fivemile Creek	24	59	47	848
Alternative A Total	**49**	**145**	**118**	**2130**
Natural			35	558

By increasing the number of wells from 325 to 485, water used for drilling, well development and other purposes would also increase. Table 4.5-6 summarizes estimated water usage requirements for drilling and construction activities. Estimated water requirements for drilling and construction for Alternative A would be 250.4 ac-ft. Assuming a one time testing program, an additional 5 ac-ft of water would be required for a total of 255.4 ac-ft, or a 60 percent increase over the Proposed Action. However, the impacts to ground water resources would remain negligible.

Table 4.5-6: Alternative A: Estimated Water Requirements for Drilling and Construction Activities

Field Name	No. of Wells	Drilling Water Usage (ac-ft)	Total Disturbance (acres)	Construction Water Usage (ac-ft)
Pavillion	206	26.8	619.8	1.86
Muddy Ridge	66	50.8	506.8	1.52
Sand Mesa	133	102.4	974.4	2.92
South Sand Mesa	48	37.0	402.6	1.21
Coastal Extension	32	24.6	315.0	0.95
Total	**485**	**241.6**	**2,818.7**	**8.46**

4.5.3 Alternative B (233 wells) – Direct and Indirect Impacts

p. 4.5-12 through 13, replace entire section with:

Under Alternative B, 233 wells would be drilled. The decrease in disturbed acreage would lead to decreased sediment loading into each nearby creek. This loading would be less than the Proposed Action and Alternative A. Table 4.5-7 presents calculated increased loadings over natural levels for Alternative B. Predicted sediment loadings under Alternative B would increase over natural rates by an average of 76.9 tons per year over the 10-year period. This is an annual average increase in sediment loading (77 tons/yr vs. 82 tons/yr) comparable to the Proposed Action.

Table 4.5-7: Estimated Soil Loss and Sediment Loading by Watershed for Alternative B – 10 years from Start of Project

Watershed	Soil Loss (tons/yr)			Total (tons)
	Min	Max	Average	
Cottonwood Creek	12.0	456	275	2,751
Fivemile Creek	305	985	779	7,791
Muddy Creek	320	1,388	902	9,024
Alternative B Total	**637**	**2,829**	**1,956**	**19,566**
Natural			413	6,608
	Sediment Loading (tons/yr)			
Cottonwood Creek	0.6	22.8	13.8	138
Fivemile Creek	15.3	49.3	39.0	390
Muddy Creek	16.0	69.4	45.1	451
Alternative B Total	**31.9**	**141.5**	**97.9**	**979**
Natural			21	330

By decreasing the number of wells from 325 to 233, Alternative B would require less water for drilling, well development, and other purposes than under the Proposed Action and Alternative A. Table 4.5-8 summarizes estimated water usage requirements for drilling and construction activities for the well development areas based on based on 1,000 gallons per acre (0.003 ac-ft) of disturbance and well drilling assuming 42,000 gallons per acre (0.13 ac-ft) for shallow wells and 252,000 gallons per acre (0.77 ac-ft) for deeper wells on Muddy Ridge. Estimated water requirements for drilling and construction would be 122.3 ac-ft. Assuming a one-time testing program, an additional 2 ac-ft of water would be required for a total of 124 ac-ft, or a 22 percent decrease over the Proposed Action. Overall, the surface and groundwater impacts from alternative B would range from negligible to minor.

Table 4.5-8: Alternative B: Estimated Water Requirements for Drilling and Construction Activities

Field Name	No. of Wells	Drilling Water Usage (ac-ft)	Total Disturbance (acres)	Construction Water Usage (ac-ft)
Pavillion	96	12.5	307.2	0.92
Muddy Ridge	40	30.8	352.8	1.06
Sand Mesa	80	61.6	635.9	1.91
South Sand Mesa	10	7.7	159.4	0.48
Coastal Extension	7	5.4	154.4	0.46
Total	**233**	**117.5**	**1609.7**	**4.83**

4.5.4 Alternative C (No Action, 100 wells) – Direct and Indirect Impacts

p. 4.5-13, last paragraph through Table 4.5-9, replace with the following:

Under the No Action Alternative, the impacts to water resources would be similar to the levels of the existing operation in the Pavillion Field. Wells would be drilled only in the Pavillion Well and the Fivemile Creek watershed. Table 4.5-9 estimates sediment loading into Fivemile Creek and Boysen Reservoir over natural levels for Alternative C over an 8 year development period.

Table 4.5-9: Estimated Soil Loss and Sediment Loading by Watershed for Alternative C (No Action) – 8 Years from Start of Project

Watershed	Soil Loss (tons/yr)			
	Min	Max	Average	Total
Cottonwood Creek	0	0	0	0
Fivemile Creek	175	840	571	4,569
Muddy Creek	0	0	0	0
Total	**175**	**840**	**571**	**4,569**
Natural			152	1,520
Sediment Loading				
Cottonwood Creek	0	0	0	0
Fivemile Creek	8.7	42.0	28.6	228
Muddy Creek	0	0	0	0
Boysen Reservoir	**8.7**	**42.0**	**28.6**	**228**
Natural			8	76

4.5.6 Additional Mitigation Measures

p. 4.5-15, first bulleted item, revise as shown:

- "To provide additional protection to water resources within the WRPA, TBI has an agreement with the Midvale Irrigation District to limit drilling operations or other surface disturbances ~~should be limited~~ from within ~~1,000~~ 500 ft of Fivemile Creek and Midvale's main irrigation canal. ~~flowing streams or surface water bodies including Fivemile Creek, Muddy Creek, Cottonwood Drain, and Boysen Reservoir.~~ Exceptions to this limitation would include pipelines and roads and their stream crossings or other activities specifically approved in writing by the BIA."

4.6 VEGETATION AND WETLANDS

p. 4.6-1, replace entire section with the following text:

4.6.1 Introduction

The determination of direct and indirect impacts to upland and wetland vegetation from the Wind River Gas Field Development Project is based on the definitions of impacts described in Section 4.1 of this chapter. The duration of impacts is based on the disturbances from a single well during its construction and development, since the development within the WRPA would be phased during the life of the project (LOP). Native mixed-grass prairie, greasewood fans and flats, saltbush fans and flats, and riparian shrub interspersed with larger expanses of sparsely populated big Wyoming sagebrush and desert-shrub vegetation are spread throughout the WRPA (see Figure 3.6-1 in Section 3.6). Fragmentation of this native vegetation cover has occurred through localized conversion to crops, roads, or some degree of degradation from overgrazing by domestic livestock. These past vegetative disturbances have encouraged the spread of invasive grasses and noxious weeds throughout the area (see Figure 3.6-4 in Section 3.6). Irrigation diversions, storage structures, and drains within the WRPA have also affected the riparian areas. The combined effects of agriculture, livestock grazing, fire, and oil/gas production, have altered the structure and composition of vegetation within the WRPA. Fragmented landscapes such as these contain fewer intact ecosystems (Noss 1987).

The following analysis addresses the direct and indirect effects of proposed oil/gas exploration and production activities on six native cover-types, which include riparian areas and wetlands associated with ephemeral or inundated areas adjacent to wetlands, stream channels, or open water bodies.

Primary steps for assessing impacts include identifying:

- Vegetative communities found in areas likely to be affected by the proposed oil/gas development.
- Disturbance or loss of vegetation caused by the oil/gas development.
- The vegetative communities' potential to be affected by these disturbances and their ability to recover.

4.6.2 Geographic Area Evaluated for Direct and Indirect Impacts

The area analyzed for possible impacts on sagebrush, desert-shrub, mixed-grass prairie, greasewood fans and flats, and saltbush fans and flats consists of:

- Potential oil/gas exploration and development areas, access roads, and pipelines that may affect these cover-types within the boundaries of the WRPA (see Figure 1-2 in Chapter 1 of the DEIS).
- Riparian-shrub and wetlands along the Muddy, Fivemile, and Cottonwood Creeks, Middle Depression Reservoir, which are part of the Sand Mesa Wildlife Habitat Management Area (WHMA) (see Figure 3.10-1 in Section 3.10).
- Terrestrial semi-arid lands extending from the riparian stream channels and open water bodies that are considered the zone of direct interaction between terrestrial and aquatic ecosystems (Cox 1996)

4.6.3 Proposed Action (325 wells) – Direct and Indirect Impacts

4.6.3.1 Vegetation

The Proposed Action, in which 325 new wells would be drilled in the WRPA, would result in new disturbance of about 1,982 acres or 2.15 percent of vegetation in the WRPA (see Table 2-2, in Chapter 2 of the DEIS). Out of this total, about 422.7 acres (approximately 0.46 percent of WRPA) of vegetation will be permanently removed (see Table 2-2). More cropland would be affected by proportionately more development in the Pavillion fields. In Muddy Ridge and Sand Mesa, more native vegetation would be affected. At any time during development, smaller amounts of desert-shrub, sagebrush, and mixed-grass prairie would be removed and others reclaimed as development proceeds (see Chapter 2, Sections 2.3 & 2.9), thereby minimizing overall impacts to native vegetation.

The exploration and development activity in the WRPA involves vegetation removal to construct new well pads, new roads, new facilities and production pipelines, or to upgrade existing roads. This would result in disturbance to native vegetation lasting up to 20-years or more (LOP). Well pads of dry holes and abandoned wells would be revegetated immediately upon abandonment in accordance with the Reclamation Plan (see Appendix D in this FEIS). Pipelines would be backfilled, restored to grade, and revegetated after construction has been completed.

Preliminary Exploration Impacts

Preliminary exploration investigations often require off-road vehicle travel and construction of access roads resulting in removal of vegetation, nutrient rich topsoil, and soil crusts. Microbiotic soil crusts are a primary contributor of nitrogen for plant growth in arid and semiarid regions. Destruction of nitrogen-fixing bacteria and lichens could result in degradation of the plant community (Evans and Ebleringer 1993).

Exploration and Development Impacts

Exploratory drilling activities involve use of heavy equipment and vehicles. Soil displacement, resulting from heavy equipment and vehicle travel along the road and localized wind, would generate dust that interferes with plant growth and reproduction. This would result in direct, adverse effects to vegetation. On the other hand, heavy equipment and vehicle passage would distribute loose gravel and dirt along the road edge, and may encourage growth of plants. Gas development, including removal of vegetation for the construction of roads, well pads and ancillary facilities or pipelines, removes portions of plant communities. New road construction may fragment habitats, indirectly affecting adjoining plant communities. Clearing of vegetation and topsoil reduces biomass, affecting nutrient cycling and plant productivity. Well drilling equipment would damage vegetation in some areas, due to trampling and compaction, and result in loss of nutrients indirectly caused by surface erosion, and sedimentation. Use of non-native soil for well pads may introduce invasive plant species that compete with the native plant species and reduce dispersal and propagation of the native species.

Non-native plants are sometimes used to control erosion. Some non-native species can spread aggressively, reducing habitat for native species. Invasive annual grasses often overtake native perennial bunchgrass in sagebrush communities. When non-native grasses are predominant, they change the fire regime from a 50 to 100-year interval to a five to 10-year interval (Kenworthy 1999). The increased frequency of fire results in changes in species composition within the Wyoming and Big Basin sagebrush cover-types (West 1983). When fire intervals are

short, perennial grasses and shrubs are eliminated and non-native annual grasses dominate. Short-lived resprouting shrubs, such as rabbit brush (*Chrysothamnus* spp.*)* or Nuttall's horsebrush (*Tetradymia* spp.), begin to dominate under these fire intervals (Reid et al. 2002).

In order to control or minimize the spread of weeds along county roads, the BIA works closely with the Fremont County Weed and Pest Control Division. The BIA also works closely with the Bureau of Reclamation on BOR surface to reclaim vegetation impacted by the Proposed Action and control the spread of noxious and invasive plants.

Production Impacts

Production operations require long-term use and maintenance of access roads within the WRPA, exposing some vegetation within the road corridor to fugitive dust, and other portions to trampling or compaction. Eroded road surfaces and road banks along some sections of the existing access roads provide little to no soil rooting or nutrients to support plant growth. Surface disturbance for road upgrades and maintenance would be contained within the road right-of-way. Small amounts of shrubs and herbaceous plants would be removed when road banks are stabilized. Increased runoff from unstabilized, disturbed soils may result in reduced soil productivity and affect revegetation. Use of gravel for road fill would potentially increase non-native species and exotics along road corridors as non-native weed seeds are often mixed with the gravel. Exotic plant and weed growth would be minimized through revegetation efforts and weed control, described in Appendix D (Reclamation Plan). Stabilizing road banks would reduce erosion and sedimentation; slow the loss of soil helping to stabilize the adjacent drainage channel; and encourage plant growth, thereby minimizing adverse effects to vegetation.

Hydrocarbon Spills

Water produced from construction and drilling operations is not discharged into the environment, but stored in a tank and reinjected into a formation. However, occasionally spills will occur. Spills of oil, gas condensate or produced water may occur from rupture of pipelines or storage tanks. The effects of spills of these substances are discussed below. During exploration and development, produced water, which may have high dissolved salt content, metals, some minerals, and hydrocarbons, may accidentally be spilled on the soil surface. Salt can interfere with the ability of plants to absorb water and nutrients, and it disrupts the transport of air and water to the root system by altering the mechanical structure of the soil, causing salt-scaring. In sagebrush communities, salt-scaring from spilled produced water may expose bare soils and introduce microclimatic changes and competition from plant species adapted to open conditions. Plants adapted to open conditions include invasive non-native annual grasses such as cheatgrass (*Bromus tectorum)* or Japanese brome (*Bromus japonicus*), and weeds such as Russian knapweed (*Centaurea repens)* or diffuse knapweed (*Centaurea diffusa)*. Increasing annual grasses and weeds may increase fire frequency within these areas (Hironaka et al. 1983). These adverse effects could reduce species diversity in the Wyoming big sagebrush community.

Fuel storage tank spills may be caused by accidental equipment failure or operator error and may discharge directly onto surrounding native vegetation or deposit onto plants in the form of airborne particulates. Uptake rates of polycyclic aromatic hydrocarbons (PAHs) are dependent on the amount of existing PAHs in the environment, the plant species, and the nature of the substrate (Edward 1983). Degree of toxicity of PAHs to natural and cultivated plants is not well known, but concentrations of PAHs in vegetation are generally much less than concentrations in

the soil (Nagpal 1993). Cropland yields however may be reduced if subject to long-term exposure to PAHs (Wagner and Wagner-Hering 1971).

Oil contamination results in hydrophobic soils and reduces water availability to plant roots (McCown et. al. 1972). Hydrophobic organic residues coat soil particles and prevent water entry into the soil. Hydrocarbons and metals may persist longer in soils than salt, because salt migrates through soil more rapidly than oil (Canadian Petroleum Association 1987). When soil cannot store and supply water, plant growth is reduced or eliminated, resulting in an indirect, minor long-term moderate adverse effect on native vegetation.

4.6.3.2 Wetlands and Riparian Areas

The key characteristic of the riparian system is the availability of water throughout the year or during the growing season. During periods of extensive oil/gas drilling, pathways by which the surface waters reach the wetlands may be altered. A high level of upland oil/gas development changes the flow of surface water runoff and sometimes decreases groundwater recharge.

Palustrine wetlands are intermittently distributed along low-lying areas adjacent to streams and reservoirs in the WRPA, such as the Middle Depression Reservoir and other wildlife habitat management ponds. Few well pads or facilities are located in wetland or riparian areas. The adverse impact to riparian and wetland habitats would be avoided and minimized, since there would be a minimum of a 500 foot setback from streams for oil/gas activities under Operator-committed mitigation measures.

4.6.3.3 Soil Impacts

Accidental discharge of produced water from rupture of storage tanks may desiccate palustrine wetlands and riparian vegetation. Soils at produced water spill sites often include high exchangeable sodium concentrations (after precipitation), suspended and dissolved hydrocarbons, and heavy metals (Reis 1992; Dunn et. al. 1994). High sodium concentrations impact soil permeability, increase water salinity, and are toxic to most freshwater riparian vegetation. However, direct effects from produced water spills would be minor and short term.

Estimated soil loss and sediment loadings from oil/gas activities indicate that high levels of long-term sediment loading would occur within the Fivemile Creek watershed followed by much lower levels in Cottonwood and Muddy Creeks (see Table 4.5-6 in Section 4.5). Certain pollutants from oil/gas operations are transported primarily in association with fine-grained sediments. Removal of sediment and nutrients from cropland runoff by surrounding upland vegetation suggest that vegetated uplands are effective filters if surface flow is shallow, uniformly distributed, and the surface is free of sediment deposits (Dillaha 1989). Localized soil composition, topography, and upland vegetation control these nutrients and sediments, and reduce the effects of oil/gas activities on riparian areas.

4.6.3.4 Impacts to Streams

Recontouring of drainage channels, installing drainage culverts, and placing riprap at the inlet and outlet at stream crossings would remove individual riparian vegetation growing on the streambank. Installation of new road culverts and placement of riprap at inlets and outlets at stream crossings would also remove small amounts of vegetation along the road. Construction on steep slopes would increase erosion and sedimentation in riparian areas. Road maintenance along roads adjacent to drainage channels and riparian areas would remove

individual shrubs and herbaceous plants. Widening roads with backfill and site grading adjacent to wetlands and riparian areas would remove some individual shrubs growing along the drainage channels. Riparian vegetation would not naturally regenerate along newly widened roads. However, road edges would be reclaimed in accordance with the provisions of the Reclamation Plan (Appendix D).

Permits for stream crossings would be authorized by the U.S. Army Corps of Engineers (COE) under the Nationwide Permit (NWP) program. Activities authorized using a NWP are defined by the COE as having minimal individual and cumulative effects on the environment. These streams and adjacent wetlands would continue to provide aquatic habitat and wetland functions.

4.6.3.5 Vegetation Restoration

Approximately 2.15 percent, or 1,982 acres of initial vegetation disturbance would take place during construction (see Table 2-2). After construction, soils would be graded and stabilized and 79 percent of all vegetation removed within these development areas would be restored. This would leave 422.7 acres (0.46 percent of WRPA) of residual vegetation disturbance (see Table 2-2).

Site restoration and revegetation would be in accordance with BLM and Bureau of Reclamation (BOR) specifications on BOR surface and in accordance with the BIA specifications on tribal surface. Revegetation on private surface would be determined by the landowner. Vegetation restoration would mitigate most adverse effects to native vegetation and cropland from oil/gas operations. Cut and fill slopes and stockpiling areas associated with each production well site would be reclaimed and revegetated. After reclamation, the average size of the remaining well pad would range from 1 – 1.7 ac in most development areas, except for the irrigated portion of the Pavillion field, in which case it would be 0.002 acre (see Table 2-6 or Section 2.7.2.2 for further details).

All pipeline rights-of-way would be reclaimed, representing an approximate revegetation of 1,559 acres of the total 1,982 acres initially disturbed. Approximately 80% percent of the vegetation restoration would occur in the Sand Mesa and Muddy Ridge fields where desert-shrub and Wyoming big sagebrush are predominant (see Appendix C, Table C-2 in the DEIS).

Sagebrush communities, however, may take decades to recover because of their slow growth and average annual rainfall of only 7.8 inches in the area (see Table 3.4-1 in the DEIS). Studies on Wyoming big sagebrush (*Artemisia tridentata* spp*. Wyomingensis*) and big basin sagebrush (*Artemisia tridentata* spp.) habitat indicate that the condition of the microbiotic soil crusts affect plant germination. Studies showed that three grasses, needle-and-thread (*Stipa comata),* Thurber needlegrass *(Stipa thurberiana),* and downy chess (*Bromus tectorum)* produced more seedlings in plots where the microbiotic crusts had been removed, crumbled, then reapplied, than in plots where the crusts were either left intact or the first 2 cm of the soil was removed (Kaltenecker and Wicklow-Howard 1994).

Where disturbance to wetlands and waters of the U.S. cannot be avoided, mitigation would be required. Depending on site conditions such as hydrology, substrate, and disturbance level, selection of appropriate species to enhance revegetation and restoration would mitigate impacts to wetlands and riparian areas.

4.6.4 Alternative A (485 wells) – Direct and Indirect Impacts

4.6.4.1 Vegetation

Alternative A, in which 485 new wells would be drilled, would result in the disturbance of approximately 3.06 percent or 2818.7 acres of vegetation within the WRPA (see Table 2-2 in the DEIS). Of that acreage, 611.9 acres (0.67 percent of WRPA) will be permanently removed (see Table 2-2 in the DEIS). This is an increase of 189.2 acres of residual vegetation disturbance over the Proposed Action (increasing the residual disturbance percentage 0.21 percent).

Alternative A, would result in the removal of more vegetation at any one time in each of the five development areas. More cropland would be affected by proportionately more development in the Pavillion fields, but smaller amounts of desert-shrub, sagebrush, and mixed-grass prairie would be removed from this field. There would be a moderate, short-term increase in erosion due to the loss of vegetation. Revegetation in accordance with the Reclamation Plan (Appendix D) would reduce the erosion potential.

Many of the new well pads would occur in the Pavillion and Sand Mesa fields, where large expanses of Wyoming big sagebrush and mixed-grass prairie vegetation occur (see Figure 3.6-1 in Section 3.6). Compared to the Proposed Action, 52.4 more acres of vegetation would be permanently removed to construct new access roads (see Table 2-2 in the DEIS). Shrubs and perennial grasses would be removed when new roads are constructed and during placement of riprap protection on road banks. Overall, impacts to vegetation under Alternative A would result in a greater loss of vegetation, a reduction in vegetation species diversity, an increase in bare ground, and an increase in noxious weeds and nuisance species.

4.6.4.2 Wetlands and Riparian Areas

Under Alternative A, impacts to wetlands/riparian areas are expected to be greater than the Proposed Action. There would be localized hydrological effects on wetland functions as a result of potential increase in contaminants. Although increased well development will influence the potential levels of pollutants, the minor changes to infiltration would not cause any direct perceptible long-term loss or change of wetland or riparian communities.

Grading drainage crossings and road banks to construct culverts for new roads would remove a somewhat higher amount of vegetation than the Proposed Action. Installation of culverts modifies the stream channel often increasing flow and changing peak flows during storm events. Erosion from vegetation loss could undermine and displace vegetation. Overall, there would be direct long-term moderate adverse effects to riparian vegetation and wetlands. However, the impacts would be avoided or minimized by the 500-foot setback from Muddy and Fivemile Creeks and Wyoming Canal for oil/gas activities through the Operator-committed mitigation measures.

4.6.4.3 Vegetation Restoration

Approximately 2,818.7 acres, representing 3.06 percent of the WRPA would be restored following construction. Access roads, well pads, and production facilities would be partially reclaimed resulting in residual disturbance of 611.9 acres (0.67 percent of WRPA). Vegetation restoration would be in accordance with the Reclamation Plan (Appendix D in this FEIS), the requirements of the BOR and BLM in the Bureau of Reclamation Withdrawal Area, the BIA on tribal surface, and the landowner on private surface.

4.6.5 Alternative B – Direct and Indirect Impacts

4.6.5.1 Vegetation

Alternative B, in which 233 new wells would be drilled, would result in initial disturbance of 1,609.6 acres or about 1.75 percent of the vegetation within the WRPA (see Table 2-2 in the DEIS). Following construction and reclamation, residual disturbance will be 325.1 acres (0.35 percent of WRPA). As compared to the Proposed Action, Alternative B would permanently remove 97.6 acres less vegetation over the life of the project. Proportionately smaller amounts of the native vegetation would be removed under Alternative B, as compared to the Proposed Action or Alternative A.

Impacts to vegetation in the Pavillion, Muddy Ridge, Sand Mesa, Sand Mesa South and Coastal Extension fields would be less than the Proposed Action. Efforts would be made to restore natural contours and upgrade existing roads to minimize surface disturbances. Overall, the direct impacts to vegetation from Alternative B would be minor.

4.6.5.2 Wetlands and Riparian Areas

The potential impacts to riparian and wetland vegetation as a result of the reduced number of wells developed would be minor and long term, since there would be a minimum 500-foot setback for oil/gas drilling activities. A decrease in sediment loading (485 tons/yr, see Table 4.5-9 in Section 4.5 of the DEIS) under Alternative B would reduce pollutant loads compared to the Proposed Action. Maintaining infiltration capacity throughout adjacent uplands would minimize impacts to wetland vegetation over the long-term.

4.6.5.3 Vegetation Restoration

Of the 1609.6 acres initial disturbance a total of 1284.5 acres would be restored following construction. This equates to 325.1 acres of residual disturbance (0.35 percent of WRPA) (see Table 2-2). As new wells are drilled, other areas would be reclaimed thereby minimizing the impacts to vegetation within oil/gas development areas throughout the life of the project. Vegetation would be restored in accordance with the Reclamation Plan (Appendix D) the requirements of the surface owners (BIA for the Tribes, BOR, or private landowners.

4.6.6 Alternative C (No Action-100 wells) – Direct and Indirect Impacts

4.6.6.1 Vegetation

The No Action Alternative, in which up to 100 new wells may be drilled, would permanently remove a total of 79.3 acres (0.09 percent of the WRPA) (see Table 2-2). Approximately 318.6 acres of vegetation (0.34 percent of the WRPA) would be initially removed to construct roads, well pads, one compressor station, and production facilities within Pavillion field (see Table 2-2 of the DEIS). Vegetation would not be removed or disturbed in the Muddy Ridge, Sand Mesa, Sand Mesa South, or Coastal Extension fields, since there would be no drilling in these development areas.

Under Alternative C, wells would be developed on private minerals, and on tribal minerals to offset drainage of the resource. As a result of the denial of the Operators' development proposal, there would be higher potential for fragmenting the natural landscape and increasing fragmentation of the remaining native vegetation within the Pavillion Field.

The vegetation within Pavillion field is dominated by irrigated cropland. Native vegetation is sparse or absent where existing well pads, oil/gas facilities, cattle grazing areas, and cultivated development areas are located. Soil compaction by heavy drilling equipment may limit revegetation in localized areas resulting in long-term adverse impacts to vegetation.

Non-vegetated naturally eroded and exposed rock, sandstone, and clay exist along several access roads throughout the Pavillion field. Periodic road maintenance, conducted to remove the washboards and surface irregularities caused by normal weathering and vehicle passage, would not disturb vegetation adjacent to the road, but material brought in to resurface the road may introduce exotic plants into the area. Vehicle travel and wind along access roads could generate dust that in severe cases would interfere with plant growth and reproduction by clogging pores in the leaves. Occasional buildup of loose dirt along the drainages adjacent to the roads would encourage growth of vegetation. Road and pipeline construction disturbance per well site associated with the No Action Alternative would be similar to the Proposed Action. Overall, loss of upland vegetation would result in minor impacts, varying from short- to long-term depending on the species.

4.6.6.2 Wetlands and Riparian Areas

Severe rainstorms and wind would erode road banks and increase the undercutting of stream banks. Sloughing or eroding road banks would expose and dry out plant roots, and would eventually dislodge or kill vegetation. Hydrographs for ephemeral streams in areas similar to the WRPA show that peak flows correlate with high intensity, short duration thunderstorms during the summer (see Section 3.5.2.2). Severe rainstorms would scour the streambeds and remove newly established plants, particularly where rocky substrate is present. Vegetation on the drainages and road banks would continue to prevent erosion of the roads during normal rainstorms. The No Action Alternative would not interfere with the natural growth and distribution of vegetation along the stream channels, since the Operators have agreed to avoid placing wells within 500 feet of a stream. Therefore, impacts to wetlands would be minor and short-term.

During intense rainstorms, high stream flows would erode the stream banks, undercut portions of the roadbed, and dislodge some culverts thereby widening the drainage channels and dislodging some riparian shrubs and vegetation. Under the No Action Alternative, the effects from construction of new wells to riparian vegetation would be less than effects in the Pavillion Field from the Proposed Action. Overall, the effects to wetland and riparian vegetation would be minor and long term.

4.6.6.3 Vegetation Restoration

As new wells are drilled, well pads for dry holes and pipeline rights-of-way would be reclaimed. Vegetation would be restored in accordance with the Reclamation Plan (Appendix D of this FEIS) and the requirements of the surface owners (BIA for the Tribes, BOR, or private landowners).

4.6.7 Impacts Summary

4.6.7.1 Proposed Action

Implementation of the Proposed Action (325 new wells) would produce direct, minor, long-term adverse effects on the sagebrush, desert-shrub and riparian vegetation within the WRPA.

Efforts would be made to minimize surface disturbances and maintain the natural contours of the well pads and ancillary facilities, pipelines, and roads. Long-term loss of native vegetation would result from construction of permanent well pads and culvert crossings at streams, but non-productive well sites would be rehabilitated and would be able to support native vegetation in the future.

Total residual disturbance to vegetation is 422.7 acres (0.46 percent of WRPA). This includes short-term impacts to grasses and crops and long-term disturbances to the native sagebrush and desert-shrub community within the WRPA. With the implementation of reclamation and weed control, effects to vegetation from the Proposed Action would be minor, localized, and short-term to long-term.

4.6.7.2 Alternative A

Implementation of Alternative A (485 new wells) would produce direct, moderate, long-term adverse effects on the native sagebrush and desert-shrub vegetation within the WRPA. Impacts to grasses and croplands would be short term. Impacts to riparian habitat would be minor and long term, since no wells would be placed within 500 feet of perennial streams. Efforts would be made to minimize surface disturbances and maintain the natural contours of the land when constructing new well pads, ancillary facilities, pipelines, and access roads. Cut and fill sites and riprap stabilization would result in long-term loss of some vegetation. Site grading for road culverts would also remove vegetation. Total residual disturbance to vegetation under Alternative A is 611.9 acres (0.67 percent of WRPA) (see Table 2-2). With the implementation of reclamation and weed control, Alternative A would result in minor to moderate, short- to long-term impacts on the plant communities within the WRPA.

4.6.7.3 Alternative B

The implementation of reclamation and weed control, Alternative B would produce direct, minor, long-term impacts on the sagebrush, desert-shrub and riparian vegetation within the WRPA. Impacts to grasses and crops would be minor and short-term. Total initial disturbance to vegetation is 1,609.6 acres (1.75 percent of WRPA), but estimated acres of residual vegetation disturbance following construction total 325.1 acres (0.35 percent of WRPA) (see Table 2-2). Efforts would be made to minimize surface disturbances and maintain the natural contours of the well pads and ancillary facilities, pipelines, and roads.

4.6.7.4 Alternative C

Under the No Action Alternative development would only occur in the Pavillion Field on private minerals; and on tribal minerals to offset the drainage of the resource. No construction or drilling would occur in Muddy Ridge, Sand Mesa, Sand Mesa South or Coastal Extension. The No Action Alternative would produce long-term negligible to minor, adverse effects on vegetation resources in the Pavillion Field. Under Alternative C, initial disturbance is 316.6 acres in the Pavillion Field and residual disturbance would be 79.3 acres (0.09 percent of WRPA) (see Table 2-2 in the DEIS). However, minimal disturbance would occur from routine repair and maintenance of the roads, well pads, and facilities.

4.6.8 Additional Mitigation Measures

If the mitigation measures described in Appendix B of this FEIS are implemented, no additional mitigation measures would be necessary.

4.6.9 Residual Impacts

Vegetation would be completely restored along pipeline right-of-ways and well pads would be reduced to 8x8 feet in irrigated fields. However, vegetation removed to construct well pads, facilities and access roads would not be restored until the end of the life of the field.

The WGFD has reported that the extremely dry conditions and sandy soils in the Sand Mesa Wildlife Habitat Management Area make re-vegetation of disturbed sagebrush communities difficult, with a high potential for noxious weed invasion (WGFD 2004).

4.8 WILDLIFE

p. 4.8-1, replace entire section with the following text:

4.8.1 Introduction

The determination of direct and indirect impacts to wildlife species from the Wind River Gas Field Development Project is based on the definitions of impacts described in Chapter 4, Section 4.1 of the DEIS. The duration of impacts is based on the disturbances from a single well during its construction and development, since the development within the WRPA would be phased during the life of the project (LOP) (see Chapter 2, Section 2.3 in the DEIS).

The focus of wildlife and wildlife habitat impact analysis is on wildlife species and habitats that are considered most likely to be exposed to potential effects from oil/gas exploration and development activities in the analysis area. Using technical reports from the published literature that describe the most susceptible aspects of species life cycle and/or habitat requirements as a guide, quantitative and qualitative information was gathered regarding the presence and status of wildlife resources within the WRPA. Ecologists from the U.S. Fish and Wildlife Service, Wyoming Game and Fish Department, and Wyoming Natural Diversity Database staff were contacted for professional judgments regarding the status of wildlife species and habitats, and potential oil/gas development effects on these species and habitats. Concerns over wildlife resources identified during public scoping (not including federally listed species) include big game habitat (mule deer, white-tailed deer, elk, and pronghorn antelope) and raptors.

Wildlife habitats directly affected by the proposed project, include areas which would be affected by the construction of wells, roads, pipelines, and production facilities. Indirect impacts include species avoidance of habitats adjacent to directly impacted habitats, and disturbance during construction and production activity, which would produce noise sufficient to displace or preclude wildlife use of these areas.

Potential direct and indirect wildlife impacts likely to be associated with the Proposed Action or alternatives include:

- Direct loss of wildlife habitat;
- Temporary displacement of some wildlife species;
- Potential for collisions between wildlife and motor vehicles;
- Increased public access contributing to the potential death or harassment of wildlife;
- Increased habitat fragmentation and edge effects;
- Exposure to contaminants; and
- Changes in wildlife behavior such as, avoidance or predation patterns, or decreased reproduction.

This analysis was made in an effort to determine potential direct and indirect wildlife impacts from the proposed development within the WRPA, so that the Operators could take these potential impacts into account when planning and selecting well locations. Cumulative impacts are discussed in Chapter 5. Mitigation measures that correspond to the various types of wildlife impacts are presented in Chapter 2, Section 2.8 of the DEIS.

4.8.2 Geographic Area Evaluated For Direct and Indirect Impacts

The area analyzed for possible impacts on wildlife and wildlife habitats consists of all potential oil/gas exploration and development fields, access roads, and pipelines that may affect these wildlife and wildlife habitat types within the boundaries of the WRPA (see Figures 3.8-1 through 3.8-6 in Section 3.8). All surface waters in the WRPA, including, but not limited to, the Muddy, Fivemile, and Cottonwood Creeks, as well as Middle Depression Reservoir within the Sand Mesa Wildlife Habitat Management Area (WHMA) are also evaluated for direct or indirect impacts to wildlife.

4.8.3 Proposed Action (325 wells) – Direct and Indirect Impacts

Under the Proposed Action, oil/gas developments within the WRPA would mostly be concentrated within or near existing fields rather that in outlying areas where development currently does not exist. Because specific well placement within the WRPA is not known at this time, it was assumed that any part of the Pavillion, Muddy Ridge, Coastal Extension, Sand Mesa, and Sand Mesa South fields might be potentially developed.

Several potential impacts on wildlife and wildlife habitats have been associated with oil/gas development. These include habitat disturbance; human disturbances (i.e. noise, construction activity, access roads and traffic); and accidental spills of petroleum hydrocarbon constituents accidentally released during operations. The impacts that may result from the Proposed Action are described below.

Habitat disturbance from oil/gas development would include direct loss of vegetation through surface disturbance of approximately 1,982 acres of wildlife habitat, habitat fragmentation, and increased edge habitat resulting from construction of new well pads, access roads, ancillary facilities and pipelines.

Human disturbances and noise from construction, oil/gas exploration, and production, and motorized vehicle traffic are associated with the operations. Noise intensities, durations and frequencies change dramatically throughout the WRPA as a function of several variables, including number of engines, engine size, distance between the wildlife receptor and the source of noise, topographic features that may shield potential receptors from noise sources, and the level of noise habituation of the wildlife receptor. Motorized equipment exposes wildlife receptors to a wide range of noise conditions. Noise intensity and duration tend to be higher and most persistent near the well pads and compressor stations. The accidental spill of petroleum hydrocarbons during operations releases contaminants into the soil and water. Aquatic and terrestrial wildlife species may inadvertently ingest or absorb some of these contaminants during feeding or other activities. The severity of both short and long-term impacts would depend on factors such as the sensitivity of the species, seasonal use patterns, type and timing of project activity, and physical parameters of the surrounding environment such as topography, vegetation cover, food type, and season.

Wildlife resources and habitats of concern within the WRPA include big game ranges (mule deer, white-tailed deer, pronghorn antelope); sage grouse leks and nesting habitat; raptor nesting habitat; mountain plover habitat; and white-tailed prairie dog colonies. These resources are not distributed uniformly across the WRPA, and individual wildlife populations may be more concentrated in certain areas. Areas containing several key wildlife species and areas supporting large populations of a single species are more sensitive to disturbance than other areas in the WRPA. An evaluation of the distribution and overlap of key species of interest shows an overlap of up to five of these species within the WRPA (Figure 4.8-1). Muddy Ridge and Coastal Extension contain proportionately more key species (3 to 5 species) than other fields. The southwestern and south central portion of the WRPA and all of Sand Mesa South tend to have fewer key species.

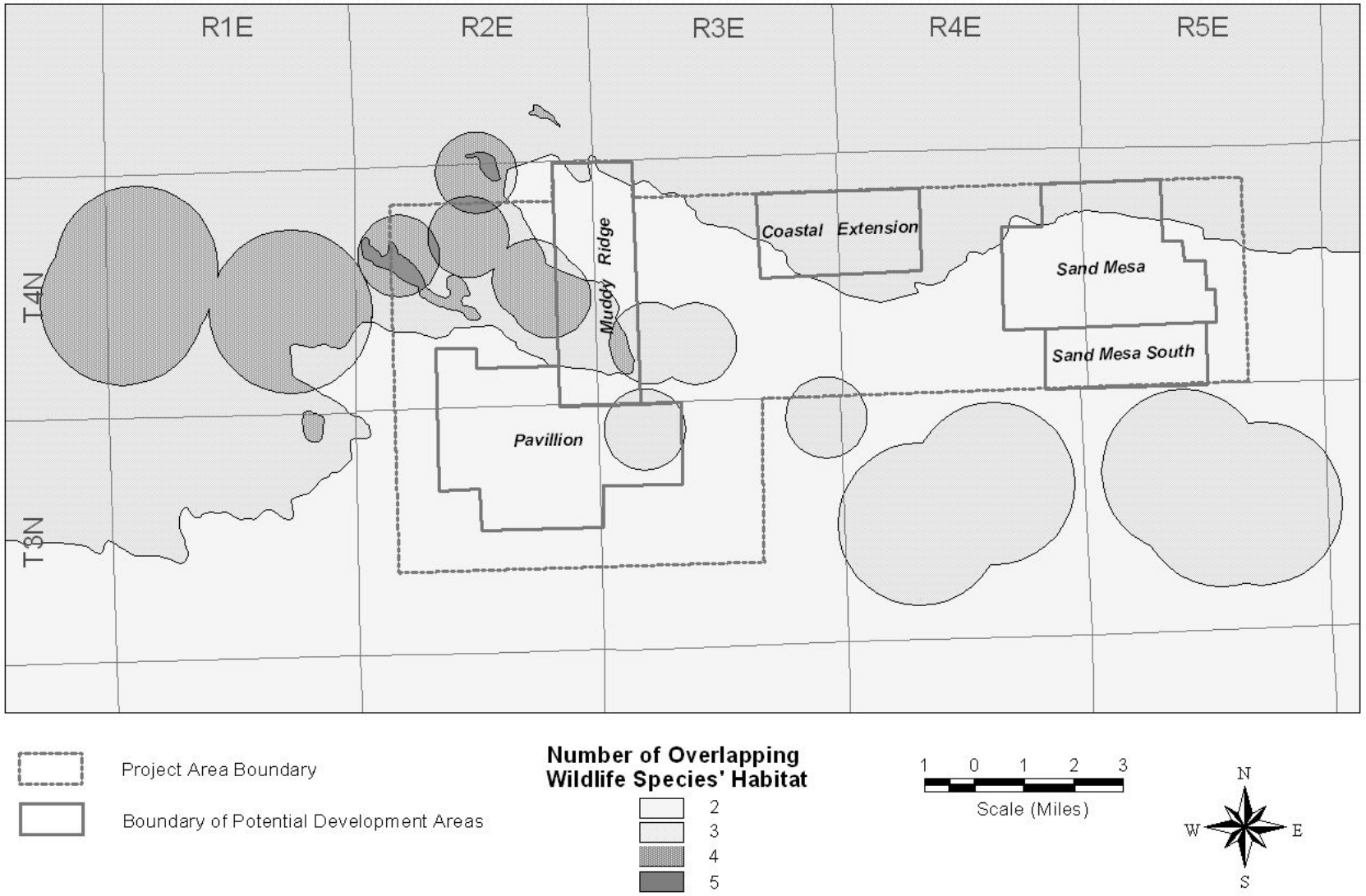


Figure 4.8-1. Distribution and Overlap of Wildlife Habitat. [1]

[1] Physical distribution and overlap of species habitat is depicted by levels of shading. Species habitat mapped include: elk; mule deer; pronghorn antelope; and white-tailed deer ranges; sage grouse leks (observed) and sage grouse nesting habitat (2-mile buffer); mountain plover (observed, 1-mile buffer), raptor nests (observed, 1-mile buffer); and surveyed white-tailed prairie dog colonies.

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4.8.3.1 Mammals

Habitats

Large and small game species forage on vegetation, such as sagebrush, native grasses, and crops (e.g., alfalfa). Removal of sagebrush, mixed-grass prairie, and desert-shrub habitat due to construction of well pads, ancillary facilities, new access roads and pipelines within the WRPA represents a direct loss of forage and shelter habitat, resulting in adverse effects on large and small mammals and their habitats. The excavation, grading and recontouring associated with well pad construction, road construction, bank stabilization, and stream crossing modifications would be such that only localized areas would be affected at any one time.

Recovery of sagebrush vegetation after disturbance has been shown to take many years. The WGFD attempted to re-vegetate areas within the Sand Mesa Wildlife Habitat Management Area and found that the extremely dry conditions and sandy soils in this area make re-vegetation difficult and the potential for noxious weed invasion high (WGFD 2004). On the other hand, grasses and irrigated crops recover rapidly. The disturbed habitat is reclaimed upon the completion of a well using the seed mixes and performance standards described in the Reclamation Plan (Appendix D in this FEIS) and the specifications of the BIA for tribal surface, and BLM and BOR for BOR surface. On private property disturbed lands are reclaimed in accordance with the landowner's requirements. In addition, the BIA works closely with the Fremont County Weed and Pest Control District, BLM and BOR to control noxious and invasive weeds (see Section 3.6.6 in Chapter 3 of the DEIS), because of the potential for invasion of noxious weed species in disturbed habitats.

With the implementation of the Operator-committed mitigation, and the mitigation measures identified in Chapter 2, Section 2.8 of the DEIS, the impacts to wildlife habitats from the Proposed Action would be minor and short- to long term depending on the wildlife species.

Human Disturbances

Noise

Mule deer and pronghorn antelope have been shown to be adaptable to disturbance from noise and may adjust to non-threatening, predictable human activity (Irby et al. 1988, Gusey 1986). During a three-year study of the responses of pronghorn antelope and mule deer to petroleum development on crucial winter ranges in central Wyoming, Easterly et al. (1991) found that mule deer "did not avoid oil fields" and that "deer did not move significant distances from the well site after the start of drilling activity." Pronghorn antelope were found to habituate to repetitive heavy machinery traffic and inhabit surface mining sites in Wyoming (Segerstrom 1982, Deblinger 1988, Reeve 1984). Similarly, in an assessment of the effects of winter 3-D seismic operations on mule deer in western Wyoming, Hayden-Wing Associates (1994) found that, although the deer avoided areas of major seismic activities, they quickly moved back into such areas following completion of work. Furthermore, the deer were not displaced long distances and remained immediately adjacent to active seismic operations. Most deer responses consisted of temporary avoidance of areas near to the operations. They were observed to carry out normal activities of feeding and resting within one-eighth to one-half of a mile from most active seismic operations (Hayden-Wing Associates 1994).

Krausman et al (1996) studied the effects of simulated, low-flying aircraft noise (92 to 112 decibels) on mule deer and desert bighorn sheep, and concluded that animals habituated

rapidly to noise and probably did not view the stimuli as a threat. Noise levels produced by oil/gas equipment would be substantially lower than those of aircraft, ranging from 65-78 decibels and decreasing with increasing distance from the point source. Similar responses to noise would be expected by mammals in the vicinity of the well development or production sites under the Proposed Action.

Elk are sensitive to noise, and they may be displaced from well construction areas approximately 0.75 – 2 miles (Brekke 1988, Gusey 1986, Hiatt and Baker 1981). Displacement would be reduced in areas with topographic barriers (Edge and Marcum 1991). Elk would likely habituate to the physical presence of gas wells and predictable, non-threatening traffic movement associated with well maintenance (Ward et al 1973, Ward 1976, Hiatt and Baker 1981, Perry and Overly 1976). However, elk are not likely to be impacted by the Proposed Action, since the presence of elk within the WRPA is sporadic (T. Ryder, WGFD, personal communication, October 6, 2004).

With implementation of the Operator-committed and agency-required mitigation measures, noise from the Proposed Action would result in minor to moderate, short- to long-term impacts, depending on the species.

Road Traffic

The effects of access roads on wildlife, include mortality from collisions with vehicles; restricted movement; and introduction of exotic plants and noxious weeds, which could affect wildlife habitat; habitat fragmentation, and increased human access to wildlife habitats (Findlay and Bourdages 2000, Forman 2000, Forman and Alexander 1998). Utilization of habitats adjacent to access roads and pipelines by game species would be lowest during the construction phase of operations. However, many animals would likely become accustomed to equipment and facilities and once again resume using habitats immediately adjacent to these areas. Construction of new roads may also lead to an increased potential for poaching of big game animals. The mere presence of the road may inhibit some rodent species from crossing the road, even though it is relatively narrow and unpaved (Trombulak and Frissell 2000). Studies have reported that roads generally reduce the overall habitat value for mule deer for distances from 0.06 mile to 0.5 mile from the road, depending on the types of traffic and adjacent habitat types (Rost and Bailey 1979).

The disturbance and potential displacement from small areas of habitat that result from excavation, grading and recontouring or maintenance conducted adjacent to roads, along road embankments, or at stream crossings, would be short-lived. For example, there is evidence that wildlife would use culverts as a passageway under roadways. Yanes (et al. 1995) found that the intensity of animal movement was influenced by various factors, such as the culvert dimensions, road width, height of boundary fence, the diversity of the vegetation along the route, and the presence of detritus pits at the entrance of culverts. The author concluded that adequately designed culverts could aid in the conservation of wildlife populations. The impacts of traffic on access, county and other roads to wildlife would be greatest during construction and drilling operations and would result in short-term and minor impacts.

Accidental Spills

Studies have shown that large-scale accidental spills of oil condensate or produced water may affect wildlife populations (Efroymson et al. 2003). During their study of the effects of simulated oil or produced water spills on the prairie vole (*Microtus ochrogaster*) and the American badger

(*Taxidea taxus*), the authors suggested that the potential for exposure to contaminants is determined by contaminant bioavailability and animal behavior. Small amounts of spilled oil throughout the landscape may affect animal movement, food and shelter availability, or the availability of refuge from predators (Efroymson et al 2003). The likelihood of accidential spills is low, so that impacts to wildlife from accidental spills would be negligible and short term.

4.8.3.2 Birds

The bird species included in the evaluation of impacts from the Proposed Action are raptors, migratory birds, upland game birds and waterfowl. The potential direct and indirect effects of oil/gas-related activities on birds include habitat loss; changes in use of habitats altered during construction and drilling operations, behavioral changes from human activities; and injury, mortality, and reduced reproductive success.

Habitats

Several years of drought, ongoing oil and gas production, recreation, and livestock grazing in sagebrush and grassland habitats in Wyoming have resulted in reduced forage and degraded habitat quality (USGS 1998, WGFD 2003c). Increased inter- and intra-specific competition could result when displaced birds move into adjacent habitats, which may be less suitable, possibly resulting in mortality of some individuals.

The mixed-grass prairie within the Pavillion and Sand Mesa fields contains more plant species than any other prairie type (see Figure 3.6-1). Ecotonal mixing of short to intermediate warm-season grass species and the taller cool season grasses found in mixed-grass prairies exceeds that in other prairie habitats (Bragg and Steuter 1996). The species composition of these bird habitats is influenced by localized drought (Wiens 1974), with grazing (Hobbs and Huenneke 1992) and wildfire (Zimmerman 1992) playing secondary roles (USGS 1998). Drought in the area has reduced forage quality and quantity, which may increase the impacts associated with displacement. Over time degradation of bird habitat may increase, thereby contributing to bird population declines. In order to maintain adequate breeding areas for migratory waterfowl species, such as the mallard, blue-winged teal, and northern pintail, the proportion of native mixed-grasslands, wetlands, and riparian areas should be maintained. These areas are essential for slowing declines in duck numbers(USFWS 1994a).

Increasing sharp edge habitat, such as between wetlands and sagebrush or dessert-shrub vegetation, creates wildlife corridors and openings for predators. Predation on waterfowl eggs and hatchlings by foxes, skunks, raccoons, and other species substantially reduces the abundance of ducks (Ball et al. 1995).

Habitat disturbance during the breeding and nesting season would result in nest abandonment, direct mortality, reproductive failure, displacement of birds, and destruction of nests. Ground nesting birds would be particularly susceptible to nest destruction. Shrub nesting birds may also be affected due to destruction of some vegetation along well sites.

Many migratory birds and upland game species forage on vegetation, such as sagebrush, native grasses, and crops (e.g., alfalfa). Removal of sagebrush, mixed-grass prairie, and desert-shrub habitat due to construction of well pads, ancillary facilities, new access roads and pipelines within the WRPA represents a direct loss of forage and shelter habitat, resulting in adverse effects on a variety of bird species and their habitats. Recovery of sagebrush vegetation after disturbance has been shown to take many years. The WGFD attempted to re-

vegetate areas within the Sand Mesa Wildlife Habitat Management Area within the WRPA and found that the extremely dry conditions and sandy soils in this area make re-vegetation difficult and the potential for noxious weed invasion high (WGFD 2004). On the other hand, grasses and irrigated crops recover rapidly.

Indirect impacts to raptors would result from decreased numbers of prey species. These impacts would be reduced when the numbers of prey species returned to pre-disturbance levels following reclamation of disturbed areas. Once reclaimed, these areas could result in an increased density and biomass of small mammals that would be comparable to those of undisturbed areas (Hingtgen and Clark 1984).

The habitat disturbed by the construction and drilling activities would be reclaimed upon the completion of a well using the seed mixes and performance standards described in the Reclamation Plan (Appendix D in this FEIS) and the specifications of the BIA for tribal surface, and BLM/BOR for BOR surface. On private property disturbed lands are reclaimed in accordance with the landowner's requirements. In order to control the invasion of noxious weeds that may grow in disturbed areas, the BIA would work closely with the Fremont County Weed and Pest Control District, BLM and BOR to control noxious and invasive weeds (see Section 3.6.6 in Chapter 3 of the DEIS).

With the implementation of Operator-committed mitigation and other mitigation measured identified in Chapter 2, Section 2.8 in the DEIS, the direct and indirect impacts of the Proposed Action would be minor and short- to long term, depending on the species.

Human Disturbances

Impacts to migratory birds from drilling operations in the WRPA would be dependent upon the season in which drilling activity occurs. The disturbance from drilling would be short term at any particular location.

Increased vehicle traffic along roads during construction and drilling operations would cause short-term, local disturbance (e.g., temporary displacement of birds). The disturbance and potential displacement of small areas of habitat that result from excavation, grading and recontouring or maintenance conducted adjacent to roads, along road embankments, or at stream crossings, would be short-lived.

Construction of new access roads would increase public access to the WRPA and increase the potential for avian mortality by vehicle collision, illegal shooting, and disturbance to nests and foraging areas. Most birds killed by vehicle collisions are passerines; although raptors, particularly owls, are also killed (Erickson et al 2001). The potential for collisions with vehicles is correlated with the volume of traffic. Project-related traffic would be greatest during the construction phase and diminish during the production and reclamation/abandonment phases. Overall, the impacts to birds from increased human activity as a result of the Proposed Action would be short-term and minor.

Accidental Spills

Oil/gas spills can injure or kill birds from exposure to toxic substances or by destroying the insulating capacity of feathers (USGAO 2003). Small amounts of oil applied externally to aquatic bird eggs have been shown to affect bird embryos (Leepen 1976, Szaro 1979). Female aquatic birds returning to their nests with oil on their feathers may transfer the oil to their eggs

and cause embryo mortality (King and LeFever 1979).

Large spills cause petroleum hydrocarbons to accumulate in soil or sediment immediately downstream of the spill. Water birds, such as herons, gulls, and ducks, feed on aquatic and benthic invertebrates and ingest sediments in the process. This may result in bioaccumulation of the hydrocarbons by the waterbirds. Polycyclic aromatic hydrocarbons (PAHs), trace metals, and radionuclides accumulate in the sediments and food chain and, thus, present a source of exposure to aquatic birds (Ramirez 1993, Rattner et al. 1995). Aquatic birds ingesting sublethal doses of theses substances may experience impaired reproduction (Grau et al. 1977).

In semi-arid areas, such as Wyoming, birds may fly into oil field waste pits, containing water, and become oiled. The oil constituents coating their feathers causes a loss of insulation and loss of buoyancy, which can result in drowning. Between 1997 and 2000, USFWS personnel found waterfowl, herons, raptors, songbirds, and other animals in uncovered oil pits and tanks in Wyoming (Ramirez 2002, Esmoil and Anderson 1995). Table 4.8-1 documents the number of dead birds found in oil pits located in four counties in Wyoming during the fall migration over a three-year period.

Table 4.8-1 Migratory Waterfowl Mortality In Wyoming During Fall Migration.

Location	Date	Number of Birds
Washakie County	1995	62
Johnson County	1996	46
Crook County	1998	17
Fremont County	1998	81

Source: Ramirez 2002

4.8.3.3 Reptiles and Amphibians

Reptiles mainly occur in upland habitats, whereas amphibians are exclusively found in riparian and aquatic habitats. Reptiles and amphibians may be indirectly affected by the Proposed Action through loss of habitat, habitat degradation, and diminished food sources. Indirect effects to reptiles and amphibians are caused by reductions in available sources of food or having to utilize less productive habitats. Increased sedimentation would degrade amphibian habitats. Studies of food habits, movements, and habitat selection show that reptiles and amphibians spend longer time feeding, or travel longer distances as a result of degradation of foraging habitat (USGS 1998). Therefore, oil/gas activities may affect the amount of time spent foraging and resting, the distances traveled to foraging areas, and home range size.

Accidental spills of gas condensate, produced water, or oil from the rupture of storage tanks could adversely affect reptiles and amphibians. Oily residues and cleanup activities could degrade important habitats for reptiles and amphibians. Habitat degradation occurs from the oil constituents that eventually sink, contaminating soil and sediments, and benthic habitats, resulting in direct mortality to preferred food items. Little data are available on the effects of hydrocarbons on reptiles and amphibians. Hall and Henry (1992) found that it was not possible to extrapolate study results from other vertebrate classes (mostly fish) for reaching conclusions on the relative toxicity of chemicals to reptiles and amphibians.

Embryonic development is affected by the quantity and duration of exposure of reptiles to petroleum hydrocarbons. Studies conducted on the effects of oil on turtle eggs and hatchlings indicate that there are higher numbers of unhatched eggs when fresh crude oil was on ground surfaces during the last quarter of incubation (Fritts and McGehee 1982; Vargo et al. 1986). When oil coats the surface of the nest during the peak period of oxygen consumption of the embryos, lighter oil fractions displace oxygen, affecting hatchling survival. However, no drilling operations would be conducted within 500 feet of streams or other water bodies, so accidental spills would not be likely to affect wetlands or riparian areas.

Reptiles and amphibians may be directly affected by condensate absorbed through skin of adults and eggs, and ingestion of oil and oiled food. The long-term effects of petroleum hydrocarbons on these species are unknown and would be difficult to distinguish from other widely used agricultural chemicals (Pence 1979). Studies have indicated that degradation products of certain herbicides persist in the environment and are concentrated in certain vertebrate species, such as turtles (Harris 1978). Agricultural pesticides may also negatively affect toads, but conclusive evidence is lacking (USGS 1998). These indirect effects of petroleum hydrocarbons in combination with agricultural chemicals and environmental factors would potentially contribute to short-term fluctuations in reptile and amphibian population levels.

With the implementation of Operator-committed mitigation and agency-required mitigation measures identified in Chapter 2, Section 2.8 of the DEIS, the impacts from the Proposed Action to reptiles and amphibians would be minor and short term.

4.8.3.4 Fish and Aquatic Invertebrates

Fish

Direct impacts on fish would be associated with disturbance of the aquatic habitat. Road culverts and drainage ditches that are poorly designed can also affect streams by reducing, and then accelerating water flow, which results in the erosion of downstream banks and scouring of the streambed. Roadside drainage ditches may change surface water runoff, influencing stream flows and sediment entering the streams. Roadways constructed parallel to waterways for long distances are sources of sediment. Shrub removal or thinning can improve or damage fish habitat. In some cases removal may increase rearing habitat for some fish species. However, shrub root systems hold stream banks together and reduce erosion. When riparian vegetation is removed, large woody debris, which holds sediment in place, controls flow, and provides fish cover, is adversely affected (Mayhood 1998).

Many fish species rely on gravel for spawning, egg incubation and rearing habitat. Fishes are sensitive to damage from sediment particles smaller than 4-6 mm in diameter (such as clay) (Platts et al. 1983, Shepard et al. 1984). Other species rely on crevices between large cobbles and boulders for shelter or over-wintering habitat. Displacement of coarser bedloads attributed to stream crossings, particularly during the winter, can directly affect the amount of over-wintering habitat. Coarse particle sediment may fill in these cobble beds within deep pools and reduce the quality and quantity of habitat for fishes.

Research conducted by the National Oceanic and Atmospheric Administration (NOAA) in pink salmon spawning areas indicate that eggs incubated in oiled gravel showed a higher rate of mortality, and at certain exposure levels, a 40 percent reduction in survival to maturity (USGAO 2003). Increased deformities, including extra fins, delayed growth, irregular metabolism, less effective feeding, increased predation, and a lower percentage of returning adults, were also

observed (Rice 2002). Biocides used in drilling operations could be released to the environment if spills occurred. Certain biocides are categorized as highly toxic to freshwater fish and aquatic invertebrates (EPA 2001).

Aquatic Invertebrates

Aquatic invertebrates are a food source for numerous species of birds and fish. Decreases in aquatic invertebrate populations from the effects of drilling operations, such as increased turbidity and scouring of the stream bed, could result in decreased fish populations. Most aquatic invertebrates (mussels, clams, insects, zooplankton) are found in and on sediment, which provides protection for these species. Placement of road culverts at stream crossings would remove sediment and could increase downstream scouring.

Direct toxic effects of PAHs or gas condensate to aquatic invertebrates include increased oxygen consumption, reduced ingestion rates, immobilization, and mortality. Unless high concentrations of contaminants and repetitive spills occurred, aquatic invertebrates that are found in and on bottom substrates would not be at high risk for contamination. When exposed to high concentrations of oil or condensate (such as in an accidental spill), benthic invertebrate ecosystems would be adversely affected. Large amounts of oil constituents entering aquatic environments sink and settle in the sand and mud. Bioassays conducted for one, seven, or 31 days after oiling, suggest that toxicity of oil to sediment-dwelling species, such as chironomids, is much higher than for water column species (i.e., water fleas) (Klerks and Nyman 1999).

Gas condensate, produced water, oil, biocides, and other constituents associated with accidental spills during oil/gas operations are known to be acutely toxic to crayfish, fish, and mussels (Indiana Geological Survey 2001). For example, salt concentrations exceeding 3,500 mg/l may kill caddisfly and midges, while lower levels reduced productivity of these species (Williams and Feltmate 1992). Certain biocides are categorized as highly toxic to aquatic invertebrates (EPA 2001).

With the implementation of Operator-committed and agency-required mitigation measures, the impacts to fish and aquatic invertebrates resulting from the Proposed Action, would be minor and short-term.

4.8.3.5 Wildlife Habitat Reclamation

Reclamation of disturbed habitats would commence immediately after the completion of construction, drilling and completion activities, and continue throughout the 13-year drilling period. Habitat reclamation under the Proposed Action would reduce initial impacts from 1,982 acres, or 2.15 percent of WRPA, by 1,559.3 acres to 422.7 acres of residual disturbances (see Table 2-2),

Disturbed areas along pipelines, rights-of-way, and unused portions of well pads would be re-vegetated, resulting in the re-establishment of wildlife habitat within the WRPA, Details regarding reclamation practices, procedures, guidelines, and goals are described in Appendix D in this FEIS. Although the extremely dry, sandy habitats within the WRPA would increase the length to time needed for vegetation recovery, impacts from the Proposed Action to wildlife habitats would be minimized by the Operator-committed and agency-required mitigation measures. Therefore, the impacts from the Proposed Action would be minor and short- to long term, depending on the species.

4.8.4 Alternative A (485 wells) – Direct and Indirect Impacts

Development under Alternative A would initially impact approximately 2,818.7 acres (3.06 percent of WRPA) of wildlife habitat over the next twenty years. Of these 2,818.7 acres, a total of 611.9 acres (0.67 percent of WRPA) of disturbance would remain for an indefinite period of time. Since location of wells within the WRPA is not known at this time, it is assumed that any area within the Pavillion, Muddy Ridge, Coastal Extension, Sand Mesa, and Sand Mesa South fields may potentially be developed.

The potential for adverse effects to wildlife and wildlife habitats is greater under Alternative A than the Proposed Action with an additional 189.2 acres of wildlife habitat that would be permanently removed. Impacts to wildlife populations due to mortality, habitat loss, and displacement would be similar to the Proposed Action. Other effects on wildlife habitats would be similar to the Proposed Action, except there may be more habitat fragmentation resulting from the increased disturbance. Fragmentation of large areas of native vegetation into small parcels typically degrade wildlife habitat. Proportionately higher oil/gas development within the Sand Mesa, Sand Mesa South, and Coastal Extension fields under this alternative would reduce habitat for pronghorn antelope, mule deer, white-tailed deer, and other wildlife species.

Specific effects of habitat disturbance for mammals, birds, reptiles and amphibians, and fish and aquatic invertebrates are described in further detail below.

4.8.4.1 Mammals

Larger areas of pronghorn antelope, mule deer, and white-tailed deer yearlong habitat, and other wildlife habitat would be lost under Alternative A. The increased disturbance would fragment and disturb more wildlife habitats within the Coastal Extension, Sand Mesa, and Sand Mesa South fields than the Proposed Action. Changes in the habitat mosaic throughout the WRPA (Figure 4.8-1) may ultimately support fewer species and limit populations to smaller, more isolated patches of habitat.

Oil/gas production within the Sand Mesa, Sand Mesa South, and Coastal Extension fields under this alternative would reduce pronghorn antelope, mule deer, white-tailed deer and other habitat available to both large and small mammals. With the implementation of Operator-committed mitigation and agency-required mitigation measures, impacts on large and small mammals and habitats due to Alternative A would be moderate and short- to long term, depending on the species.

4.8.4.2. Birds

Adverse effects to birds resulting from Alternative A would increase as more bird habitat is lost within the Sand Mesa and Pavillion fields. Endemic prairie grassland bird species have shown more consistent, widespread, and steeper declines in population than any other group of North American bird species (Knopf 1992, 1996). Populations of some species of sparrows and the mountain plover are declining throughout their ranges. It is thought that this decline is directly attributed to the decline in native grassland habitat throughout the prairie region. Estimated loss of native mixed-grass prairie exceeds 30 percent (USGS 1998). Increased disturbance to native mixed-grass prairie and sagebrush habitat would fragment and disturb more bird habitat within Coastal Extension, Sand Mesa, and Sand Mesa South fields than under the Proposed Action. With the implementation of Operator-committed mitigation and agency-required mitigation measures, impacts to birds from Alternative A would be moderate and short- to long

term, depending on the species.

4.8.4.3 Reptiles and Amphibians

Disturbance to upland habitats would be increased under Alternative A resulting in potentially greater impacts to reptiles. Some riparian areas and wetlands would be disturbed by road and pipeline crossings. A sufficient mix of upland areas, small ponds, wetlands and riparian areas would remain for use by reptiles and amphibians within the WRPA. Therefore, there would be negligible, short-term adverse effects on reptiles and amphibians from implementation of Alternative A.

4.8.4.4 Fish and Aquatic Invertebrates

Impacts on fish and aquatic invertebrates from Alternative A would be similar to the Proposed Action, and would be associated with stream crossings for pipelines. However, no wells would be drilled within 500 feet, in accordance with Operator-committed mitigation. Therefore, any adverse effects would be short-term and negligible.

4.8.4.5 Wildlife Habitat Reclamation

Reclamation of disturbed habitats would commence immediately after the completion of construction, drilling and completion activities, and continue throughout the 20-year drilling period. Habitat reclamation under Alternative A would reduce initial impacts from 2,818.7 acres, or 3.1 percent of WRPA, to 611.9 acres of residual disturbances (see Table 2-2 of the DEIS). Disturbed areas along pipelines, rights-of-way, and unused portions of well pads would be re-vegetated, resulting in the re-establishment of wildlife habitat within the WRPA, Details regarding reclamation practices, procedures, guidelines, and goals are described in Appendix D in this FEIS. Although the extremely dry, sandy habitats within the WRPA would increase the length to time needed for vegetation recovery, impacts from Alternative A to wildlife habitats would be minimized by the Operator-committed and agency required mitigation measures. Therefore, the impacts from Alternative A would be minor and short- to long term, depending on the species.

4.8.5 Alternative B (233 wells) – Direct and Indirect Impacts

Alternative B would involve less disturbance to wildlife and wildlife habitats than the Proposed Action. The fewer well locations (233 vs. 325) and reduced residual habitat disturbance of 325.1 vs 422.7 acres would reduce the effects on wildlife (see Table 2-2 in Chapter 2 of the DEIS). The impacts to wildlife populations from direct mortality, habitat loss, and displacement would be less than the Proposed Action. Effects of disturbance on fish and wildlife species and their supporting habitats from oil/gas development under Alternative B would be reduced. With the implementation of mitigation measures, effects from Alternative B would be minor and short- to long term, depending on the species.

Under Alternative B, wildlife habitat reclamation would reduce residual impacts by 97.6 acres, when compared to the Proposed Action. The majority of the reclaimed habitat would be within the Muddy Ridge and Sand Mesa fields (see Appendix C, Table C-4 in the DEIS).

4.8.6 Alternative C (100 wells) – Direct and Indirect Impacts

Under the No Action Alternative, further drilling would be allowed on private minerals, which are located in the Pavillion Field. Drilling would also take place on tribal minerals to offset drainage of the tribal resource in the WRPA. Individual APD's would be approved on a case-by-case basis. No construction and drilling activities would occur in the other four development areas.

Although, Alternative C would involve substantially less direct disturbance to wildlife and wildlife habitats than the Proposed Action, all impacts would occur in the Pavillion Field. The reduced number of wells (100 vs. 325) with a decrease of 1,665.4 acres of initial disturbance and a decrease of residual disturbance to 79.3 acres vs. 422.7 acres under the Proposed Action, would substantially reduce the effects on wildlife (see Table 2-2 in Chapter 2 of the DEIS).

Alternative C would result in less wildlife displacement and mortality than the Proposed Action. However, there would be a potential of additional adverse impacts from the No Action Alternative, since the overall field development would not occur in a well-planned manner. With the implementation of mitigation measures, the impacts to wildlife and wildlife habitat would be minor and short- to long term, depending on the species.

4.8.7 Impacts Summary

The implementation of the Proposed Action, Alternative A, Alternative B, and Alternative C would result in the direct loss of wildlife habitat and possible mortality from surface disturbances associated with the construction of well sites, access roads, and pipelines. Additional roads would increase potential for poaching, collisions with motor vehicles, and overall traffic in the WRPA. In addition, some wildlife species would be indirectly impacted by temporary displacement from habitats in the vicinity of human activity associated with the construction and operation of wells. The severity of these impacts would be expected to decrease with the completion of construction and the initiation of reclamation efforts in many of the disturbed areas. Comparison of the initial and residual wildlife habitat disturbance under each of the four alternatives is provided in Table 4.8-2.

Table 4.8-2 Comparisons of Wildlife Habitat Disturbance under the Proposed Action and Alternatives A, B, and C.[1]

Alternative	Initial (ac)	Residual (ac)
Proposed Action	1,982.0	422.7
Alternative A	2,818.7	611.9
Alternative B	1,609.6	325.1
Alternative C	316.6	79.3

[1]From Table 2-2

4.8.7.1 Proposed Action

Implementation of the Proposed Action (325 new wells) would result in direct and indirect adverse effects on large and small game species, raptors, migratory birds and fish in the WRPA (Table 4.8-3). With the implementation of Operator-committed mitigation and agency-required mitigation measures listed in Chapter 2, Section 2.8 of the DEIS, impacts would be minor, short- to long term. The long-term losses would be associated with wildlife species that utilize sagebrush habitat for forage, nesting, and shelter.

4.8.7.2 Alternative A

Implementation of Alternative A (485 new wells) would result in direct and indirect adverse effects on large and small game species, raptors, migratory birds, and fish within the WRPA (Table 4.8-3). With the implementation of Operator-committed and agency-required mitigation measures listed in Chapter 2, Section 2.8 of the DEIS, Alternative A would result in minor to moderate, short- to long-term impacts on the fish and wildlife species within the WRPA. The long-term losses would be associated with wildlife species that utilize sagebrush habitat for forage, nesting, and shelter.

4.8.7.3 Alternative B

The implementation of Alternative B (233 new wells) would result in direct and indirect adverse effects on large and small game species, raptors, migratory birds and fish in the WRPA (Table 4.8-3). With the implementation of Operator-committed mitigation and agency-required mitigation measures listed in Chapter 2, Section 2.8 of the DEIS, impacts would be minor, short- to long term. The long-term losses would be associated with wildlife species that utilize sagebrush habitat for forage, nesting, and shelter.

4.8.7.4 Alternative C

Under the No Action Alternative, development would only occur in the Pavillion Field on private minerals and tribal minerals, to offset the drainage of the resource. No construction or drilling would occur in Muddy Ridge, Sand Mesa, Sand Mesa South or Coastal Extension. The No Action Alternative would produce adverse effects on fish and wildlife species in the Pavillion Field. With the implementation of mitigation measures included in APD for each well, impacts to fish and wildlife would be negligible to minor, short- to long term. The long-term losses would be associated with wildlife species that utilize sagebrush habitat for forage, nesting, and shelter.

Table 4.8-3. Direct and Indirect Impacts to Fish and Wildlife Species from the Proposed Development in the WRPA.

	MAGNITUDE AND DURATION[1,2]			
DESCRIPTION OF POTENTIAL IMPACT	**Proposed Action (325 Wells)**	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)[3]**
Impacts to fish and wildlife populations	Minor, Short- to long term	Moderate, Short- to long term	Minor, Short- to long term	Minor, Short- to long term
Loss of habitat	Minor, Short- to long term	Moderate, Short- to long term	Minor, Short- to long term	Minor, Short- to long term
Displacement of wildlife	Minor to moderate, Short- to long term	Moderate, Short- to long term	Minor, Short- to long term	Minor, Short- to long term
Habitat fragmentation	Minor, Long term	Moderate, Long term	Minor, Long term	Minor, Long term
Reduction in prey species	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
Increased predation	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
Mortality from vehicles	Minor, Short term	Minor, Short term	Minor, Short term	Minor, Short term
Exposure to contaminants	Negligible, Short term	Minor, Short- to long term	Negligible, Short term	Negligible, Short term
Noise from human activities and equipment	Minor to moderate, Short term	Moderate, Short term	Minor, Short term	Minor, Short term
Changes in wildlife behavior	Minor to moderate, Short to long term	Moderate, Short- to long term	Minor, Short- to long term	Minor, Short- to long term

[1]**Definitions:**
Negligible impacts – Changes in resource condition are lightly above level of detection.
Minor Impacts – Changes in resource condition are measurable, but small and localized.
Moderate Impacts – Changes in resource condition are measurable and result in consequences that are relatively localized.
Major Impacts – Changes in resource condition are measurable and have substantial consequences at a regional level.
Short-term Impacts – Effects of short duration, that would occur during construction, drilling, completion and reclamation of a well.
Long-term Impacts – Effects of long duration, that would persist beyond the construction, drilling and reclamation phases, or continue for the life of the project.
[2] Magnitude and duration of impacts vary by species.
[3] Drilling in Pavillion Field only.

4.8.8 Additional Mitigation Measures

If the mitigation measures described in Appendix B of this FEIS are implemented, no additional mitigation measures would be necessary.

4.8.9 Residual Impacts

Although wildlife habitat would be restored along pipeline right-of-ways, portions of well pads, facilities and access roads would not be reclaimed until the end of the life of the field (20-40 years). The WGFD has reported that the extremely dry conditions and sandy soils in the Sand Mesa Wildlife Habitat Management Area make reclamation of disturbed sagebrush communities difficult, with a high potential for noxious weed invasion (WGFD 2004). Many wildlife species utilize sagebrush for forage, shelter, and nesting habitat.

4.9 THREATENED, ENDANGERED, AND SENSITIVE SPECIES

p. 4.9-1, replace entire section with the following text:

4.9.1 Introduction

The same oil/gas exploration and development issues described for wildlife and wildlife habitats pertain to species designated as endangered, threatened, or state sensitive species. Key differences are that endangered or threatened species generally are much less abundant, have more limited range distributions, may have less tolerance to habitat alterations, and are regulated by laws and regulations. Endangered, threatened, and state-sensitive species issues involve noise, human disturbance, toxicity from oil/gas compounds, and habitat loss from degradation and fragmentation. In addition, endangered or threatened species require consideration in accordance with the Endangered Species Act, which requires that the effects of oil/gas development not jeopardize the continued existence of a listed species or its critical habitat. According to the US FWS, there are no threatened or endangered plant species within the Wind River Project Area (USFWS 2002).

Five species of threatened or endangered species have been identified by the USFWS as potentially occurring within the WRPA. They include the bald eagle (*Haliaeetus leucocephalus*), black-footed ferret (*Mustela nigripes*), Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupus*), and grizzly bear (*Ursus arctos horribilis*). In addition, two species present within the WRPA [greater sage-grouse (*Centrocercus urophasianus*) and mountain plover (*Charadrius montanus*)] have been identified as species of concern by both the USFWS and WGFD. These seven species will be discussed in this section.

In accordance with Section 7 of the Endangered Species Act, the impact to threatened and endangered species will be characterized as “likely to adversely affect;” “not likely to adversely affect;” or “no effect.”

4.9.2 Geographic Area Evaluated for Direct and Indirect Impacts

The area being analyzed for possible impacts on threatened, and endangered species, and species of special concern consists of all potential oil/gas exploration and development areas, access roads, and pipelines within the WRPA that may affect these species, and a 2-mile buffer zone surrounding the outer boundary of the WRPA. Surface waters evaluated for impacts include Muddy, Fivemile, and Cottonwood Creeks, and their associated tributaries, as well as Middle Depression Reservoir and Sand Mesa Wildlife Habitat Management Area (WHMA) within the boundaries of the WRPA.

4.9.3 Proposed Action (325 wells) – Direct and Indirect Impacts

Under the Proposed Action, a total of 325 new wells would be drilled within the WRPA. The potential impacts of the Proposed Action to these threatened, endangered and sensitive species are discussed below.

4.9.3.1 Bald Eagle

Bald eagles have been reported to winter in the vicinity of the WRPA. No bald eagle nests are known within the WRPA, and communications with USFWS biologists (Hnilicka, P., USFWS, personal communication, June 2003) indicate that the area may occasionally be used by this

species during winter months (November through March). Bald eagles have been observed to roost within the Ocean Lake WHMA, one mile south of the WRPA (Hnilicka, P., USFWS, personal communication June 2003a) and a golden eagle was observed on a rocky ledge in the Muddy Ridge Field in April 2003 (B&A 2003a).

Habitats

Direct impacts, resulting from displacement from winter roosting habitat in the WRPA, would occur as heavy equipment and vehicles move throughout the area. The extent of the displacement would depend on the duration and intensity of the activity and on the sensitivity and habituation to disturbance of individual eagles. Construction may result in displacement from affected habitats during the entire construction phase, while production may result in displacement only during well visits.

The Proposed Action is not expected to produce any appreciable long-term negative changes to the prey base of the bald eagle within the WRPA. Once reclaimed, sagebrush and mixed-grass prairies would likely promote an increased density and biomass of small mammals that are comparable to those of undisturbed areas (Hingtgen and Clark 1984). Eagles concentrate in areas that have abundant food resources, but even under normal environmental conditions these riparian habitats change annually and affect the quantity and quality of riparian and wetland habitat upon which wintering eagles rely. Creek morphology and flow conditions vary and influence the availability of fish. Provided adequate hydrology is maintained, the small changes to riparian habitats and wetlands at road and pipeline crossings would not require a substantial amount of reclamation. Wells and facilities may create multiple, perching structures throughout the WRPA. The availability of perch or nest sites on these facilities may bring bald eagles into areas where they do not normally occur and subject them to increased mortality from attraction to vehicle-killed carrion and increased vehicle collisions (USFWS 2004c). Therefore, if bald eagles are observed on these facilities, their use would be discouraged by installing anti-perch structures. This would eliminate potential increased mortality due to increased human interaction.

Human Disturbances

During winter there would be some potential for mortality from vehicular collisions. Because bald eagles commonly feed on carrion, particularly during the winter months, the presence of road-killed big game carcasses on and adjacent to the access roads is an attractant. Eagle feeding on these carcasses are in danger of being struck by motor vehicles. Because there would potentially be exposure of bald eagles to humans, eagle mortality may occur over existing, pre-project levels. However, direct interaction between oil/gas equipment and vehicles and bald eagles would be rare.

The operation of oil/gas equipment may indirectly affect bald eagles that forage in the vicinity of the reservoirs, wildlife management ponds, or riparian areas. Motorized equipment and other motor vehicles currently use the highways and roads providing access to the WRPA. The noise may cause localized avoidance of these locations by eagles during the wintering period, which would be a short-term, minor adverse effect to this species.

Accidental Spills

Accidental oil or produced water spills in the vicinity of the reservoirs, wildlife management ponds, or riparian areas would temporarily reduce the number of prey species. Indirect effects

to the eagle would involve potential ingestion of PAHs and other potentially toxic constituents from prey. Under normal oil/gas operations, high concentrations of oil byproducts would not be encountered within the WRPA, and the likelihood of an accidental spill is low. Indirect, short-term, negligible adverse effects may result from eagles ingesting hydrocarbon derivatives through dietary sources associated with an accidental spill (EPA 2001).

Water used in drilling operations and other field watering systems often use biocides to control bacteria. Certain biocides are moderately toxic to avian species if directly ingested, but are categorized as practically nontoxic if taken in through dietary means (EPA 2001).

Effects Determination

Because of the potential presence of the bald eagle during the winter in the WRPA, there would be direct and indirect, but negligible effects from oil/gas development to bald eagles. With the implementation of avoidance and minimization measures identified in Section 2.8, the Proposed Action "is not likely to adversely affect" the threatened bald eagle.

4.9.3.2 Black-footed Ferret

The WRPA (and a 2-mile buffer) supports 1,243 acres of white-tailed prairie dog colonies that meet the requirements for providing potential black-footed ferret habitat. Under the Proposed Action, potential black-footed ferret habitat may be disturbed, if wells and associated facilities are constructed within white-tailed prairie dog colonies (Biggins et al. 1989, USFWS 1989).

Habitats

Conversion of prairie dog habitat to oil/gas production sites, cropland, and other development has substantially reduced available ferret habitat throughout the region. Recent GIS data for black-tailed prairie dog colonies in Montana found that 33 percent of the colonies were less than 10 acres in size and 84 percent were less than 100 acres (Sidle 1999). However, some colonies may be close enough to other colonies to provide adequate habitat for the ferret (USFWS 2000b).

Ferret reintroduction programs have had limited success because of the decline in prairie dog populations, and lack of adequate (quality and/or size) habitat. Researchers have not yet determined what makes good ferret habitat *(*Aschwanden 2001). Studies of recent reintroduction sites indicate that a sustainable population requires a minimum of 10,000 acres of contiguous prairie dog habitat of which there are fewer than ten suitable sites left in North America (Aschwanden 2001). Therefore, in a highly fragmented landscape, ferret recolonization within an area where prairie dog habitat has been modified may not be possible.

Burrow deterioration may also limit recolonization by prairie dogs particularly in areas where there is livestock grazing or unfavorable soil conditions. Once underground burrows collapse due to the effects of weathering and age, prairie dogs are less likely to reoccupy them and reestablish themselves. Prairie dogs re-establish slowly and with much less success where burrows have deteriorated (USFWS 2000b). Without an adequate population of prairie dogs, it would be unlikely that ferrets would inhabit the prairie dog colonies.

Human Disturbances

Direct interaction of heavy equipment and vehicles with individual ferrets would be unlikely. However, loss of soil structure or soil compaction from ORV or heavy equipment operations

could contribute to the destruction of prairie dog habitat and reduce the prey and habitat available for the ferret.

Indirect adverse effects may result from heavy equipment and other motorized vehicles that generate noise and ground vibrations near prairie dog colonies in which ferrets could be present. Depending on the intensity and duration of the noise or ground vibrations and the distance between the motorized equipment and the physical barriers that may exist between the source of the disturbance and ferrets, temporary exposure to high noise or vibration levels may influence ferret behavior.

Accidental Spills

Accidental oil, condensate, or produced water spills in the vicinity of prairie dog colonies, could temporarily reduce the number of prey species. Indirect affects to the black-footed ferret would involve potential ingestion of PAHs and other potentially toxic constituents. Under normal oil/gas operations, high concentrations of oil byproducts would not be encountered within the WRPA, and the likelihood of an accidental spill is low.

Effects Determination

Through implementation of avoidance and minimization measures by the Operators, the Proposed Action "is not likely to adversely affect" the black-footed ferret within the WRPA.

4.9.3.3 Canada Lynx

There would be no adverse effects of the proposed action on the threatened Canada lynx. This conclusion is based on the:

- Lack of snowshoe hare habitat (primary prey for lynx) within the WRPA.
- Lack of suitable habitat (boreal forest) for this species within the WRPA.

Although lynx have been found along the edges of boreal forests, such habitats are not present within the WRPA. Therefore, there would be "no effect" from the Wind River gas development project on this species.

4.9.3.4 Gray Wolf

Under the ESA, the gray wolf is considered an experimental population. This designation increases the flexibility of the USFWS in managing this reintroduced endangered species, because such experimental animals may be treated as a threatened rather than endangered species (USFWS 1994). The regulations of the gray wolf experimental populations require that experimental populations be separated geographically from non-experimental populations of the same species.

Habitats

Gray wolves are social animals, normally living in packs of 2-12 wolves. These packs typically occupy and defend territories from 32,000 to 665,000 acres. Wolves are considered opportunistic and do not require a specific habitat type for survival. They move within and between islands of occupied wolf habitats, including some habitats assumed to be unsuitable for long-term occupancy because of the potential for human conflict (WGFD 2003b). Wolf habitat is based largely on the density of prey species found in a given habitat. Resident wolf packs do

not exist within the WRPA and habitat usage in the area is rare.

The WRPA is located outside of the Wolf Management Area and the proposed Northwest Wyoming Wolf Data Analysis Units (DAU). To minimize wildlife or livestock conflicts on public, tribal, and private lands, the WGFD excluded the lower end of the Wind River Range from the Wyoming Grey Wolf Management Plans. Several individual and pairs of wolves have attempted to use the lower portion of this range in the last few years, and almost all of them have been removed from the wolf population due to livestock predation (WGFD 2003b). If the grey wolf population remains at current levels or increases in number and distribution, and the USFWS accepts the Wyoming Wolf Management Plan, the USFWS may propose delisting as soon as 2004 (WGFD 2003b). Should the gray wolf be delisted in the future, wolves that occupy areas outside the DAUs will be classified as predatory animals and would not be subject to USFWS regulations (WGFD 2003b). Therefore, due to the limited distribution of gray wolves, there would be negligible short-term effects to potential gray wolf habitat from the Proposed Action.

Human Disturbances

Activities associated with the Proposed Action would increase both the amount of roads within the WRPA as well as the amount of human activity. It is known that highways with low traffic volume are not barriers or significant mortality factors for carnivores such as the gray wolf, but traffic volume over 4,000 vehicles per day creates habitat fragmentation and wildlife mortality (Reudiger et al. no date). However, road improvements produce both positive and negative impacts to wolf habitat usage in the area.

Negative impacts include mortality caused by vehicle collisions and/or poaching, and harassment and/or displacement away from human activity. Positive impacts include increased carrion resulting from big game vehicle collisions, and snow compacted winter travel corridors (Ruediger et al, no date).

Accidental Spills

A temporary reduction in the number of prey species could result from accidental oil, condensate, or produced water spills in the WRPA. Indirect affects to the gray wolf would involve potential ingestion of PAHs and other potentially toxic constituents from prey. Under normal oil/gas operations, high concentrations of oil byproducts would not be encountered within the WRPA, and the likelihood of an accidental spill is low. Indirect, negligible, short-term impacts may occur from wolves ingesting hydrocarbons from prey contaminated by oil or condensate.

Effects Determination

Given the low likelihood of the presence of the gray wolf at the present time within the WRPA, negligible, short-term adverse effects to gray wolf populations would occur as a result of the Proposed Action. Therefore, the Proposed Action “is not likely to adversely affect” the gray wolf.

4.9.3.5 Grizzly Bear

The current extent of the grizzly bear’s range in Wyoming is not known precisely, but monitoring radio-collared bears from 1975 to 1999 has documented their general range. This area includes all of Yellowstone and Grand Teton National Parks, portions of adjacent National Forests, private lands to the south and east of Yellowstone, and south in the Wind River Range to the Green River Lakes. Most currently occupied grizzly bear habitat in Wyoming is on U. S. Forest

Service land. However, grizzly bears use other federal, state and private lands (WGFD 2002) and show a wide range of habitat tolerance.

Habitats

Grizzly bears are solitary animals, typically occupying a home range of one bear per 15-23 square miles (USFWS 1993). The size of each bear's home range varies in relation to food availability, weather conditions, and interactions with other bears.

Large tracts of land needed by grizzly bears remain available in only a few areas throughout Wyoming. Management efforts include maintaining movement corridors in the northern Rockies for grizzly bears. The major emphasis for management is to create areas of safe passage for the bears across highways, railroad tracks, and other developed areas (WGFD 2002b).

Much of the land outside of the grizzly bears' Primary Conservation Area (PCA) which is the area within the Wyoming portion of the Greater Yellowstone Ecosystem, is managed for multiple uses. Outside of the outer boundary of the grizzly bear PCA, the WGFD established an additional ecosystem transition zone (ETZ) (WGFD 2002e). This ETZ includes the southern and southwestern portions of the Wind River Indian Reservation.

Human Disturbances

Activities associated with the Proposed Action would increase both the amount of roads within the WRPA as well as the amount of human activity. Radio telemetry studies have identified roads as contributing to brown and grizzly bear habitat deterioration and increased mortality (WGFD 2002e). Impacts to grizzly bears from roads has been attributed to the percentage of habitat loss associated with increased road density (Mattson, et al. 1987).

Accidental Spills

A temporary reduction in the number of prey species could result from accidental oil or produced water spills in the WRPA. Indirect effects to the grizzly bear would involve potential ingestion of PAHs and other potentially toxic constituents from prey. Under normal oil/gas operations, high concentrations of oil byproducts would not be encountered within the WRPA, and the likelihood of an accidental spill is low. Indirect, short-term, negligible effects may occur from grizzly bears ingesting hydrocarbon derivatives through dietary sources associated with an accidental spill.

Effects Determination

It is unlikely that oil/gas operations would directly conflict with this species. Therefore, there would be negligible short-term effects on grizzly bear habitat. This conclusion is based on the fact that no resident grizzly bears exist in the WRPA, and observations of grizzly bears in WRPA are rare. Given the minimal acreage of disturbance relative to grizzly bear home ranges, the Proposed Action "is not likely to adversely affect" the grizzly bear.

4.9.3.6 Greater Sage-grouse

Although the greater sage-grouse is not federally listed as threatened or endangered at this time, it has be petitioned for listing and the USFWS (2004b) announced a positive finding and has initiated a status review of this species (69 FR 21484). The sage-grouse is presently categorized as a Wyoming State-sensitive species.

Habitats

Oil/gas developments are generally localized and are unlikely to have widespread impacts on sage-grouse. However, removal of vegetation can fragment and reduce the availability of suitable habitat, and mechanical and human disturbances may disrupt breeding activities (Aldridge 1998).

Sage-grouse rely on sagebrush habitat for leks, nesting sites, feeding sites, rearing sites, shelter and wintering grounds. Approximately 20,437 acres (22%) of sagebrush habitat are present within the WRPA. Although sagebrush is the most important component of the sage-grouse diet, forbs and grasses are also a significant food source.

The most suitable sage-grouse habitat was found south and west of the WRPA boundary. These areas consist of approximately 50-60 percent sagebrush (*Artemisia* spp.), 10-15 percent short grasses, with the remaining area bare ground. Several sage grouse leks have been reported in those areas (see Figure 3.9-3). However, no sage-grouse leks have been observed within the WRPA (Buys & Associates 2003a, Ryder, T. WGFD, personal communication, October 2004).

Construction activities could affect potential sage-grouse habitat. Direct habitat loss and degradation have been implicated in the decline in lek attendance and abandonment of sites where oil and gas development has occurred within 0.25 miles of leks or nesting areas (Braun et al. in press). Most nests are close to leks (Braun et al. 1977) and hens show strong site fidelity, which may be in response to the presence of important vegetative nesting habitat characteristics such as sagebrush, forbs and grass cover, and height of the sagebrush (Lyon 2000). Hens from disturbed nesting areas adapt in part by selecting higher canopy cover and shrub heights in sagebrush (Lyon 2000).

Both quantity and quality of the sagebrush environment determines its suitability as sage-grouse habitat. Suitable habitat consists of shrubs, grass and forbs that vary with the subspecies of sagebrush. Preferred seasonal habitats must occur in a patchwork or mosaic across the landscape. The spatial arrangement, amount and vegetative condition of the habitat determines its potential use by sage-grouse. Even if disturbed sites are reclaimed at a later date, they may fail to return to previously used habitats. This has been the case for several leks in Canada. In recent years, six traditional lek sites have been temporarily disturbed by oil and gas operations, and four of these are no longer active (Aldridge 1998).

Human Disturbances

New access roads could increase the number of predators in sage-grouse habitat. Predation, especially during nesting, egg laying, and brood rearing, limits the growth of sage-grouse populations. Predators cause approximately 50 percent of sage-grouse mortality. Adults are most vulnerable to predators in the winter because the snow makes them more visible (Aldridge 1998).

An increase in the number of roads would potentially contribute to direct, short-term negligible effect from mortality of sage grouse and fragmentation of the habitat. Sage-grouse cross roads to and from foraging grounds and leks, increasing the potential for road kills (Aldridge 1998). Roadways may render leks more visible to humans, which could lead to abandonment of the leks.

Accidental Spills

Accidental spills of produced water, oil, condensate, metals, and radionuclides could accumulate in sediments and in plants. These constituents present a source of exposure when birds ingest contaminated sediment (Ramirez 1993, Rattner et al. 1995, Grau et al. 1977). Accidental oil spills can reduce the insulating capacity of feathers or expose birds to toxic substances (USGAO 2003). However, studies have shown no signs of toxicity, reduction in feeding, loss of body weight or grossly visible pathological abnormalities in mallards fed up to 100,000 parts per million of weathered Exxon Valdez crude oil (Neff and Stubblefield 1995).

Effects Determination

Although no leks or nesting areas have been reported within the WRPA, disturbance to sagebrush, which takes years to recover from disturbances, would result in a moderate, long-term impact on the greater sage-grouse.

Mountain Plover

In 1999 the mountain plover was designated as a "proposed" species for listing as threatened under the ESA. On September 9, 2003, the USFWS withdrew the mountain plover as a proposed species (USFWS 2003b; Hnilicka, 2003a; USFWS 2003c). The mountain plover remains a Wyoming state sensitive species and a species of concern to the USFWS because it is considered rare (Hnilicka 2003a).

Oil/gas project development has the potential to cause both direct and indirect impacts to the mountain plover. Direct impacts include destruction of nests, loss of habitat, and mortality. Indirect impacts include avoidance of the area, reduction in reproductive potential, and reduction in food availability.

Habitats

Mixed-grass prairie on low slopes provides optimal mountain plover nesting habitat (Parrish et al. 1993). A total of 59,640 acres of potential mountain plover nesting habitat exists in the WRPA within the mixed prairie, desert shrub and sagebrush grassland habitat types (See Section 3.9). These habitat types comprise 65 percent of the WRPA. During field surveys, plovers were observed using these habitat types within the Pavillion field, and a 2-mile buffer surrounding the WRPA, particularly in areas near prairie dog colonies.

Degradation of an area may have an adverse effect on species richness, indicating a loss of ecological resources or a decrease in ecological function in that area. The development of gas and oil resources has the potential to disrupt complex associations of vegetation and wildlife in the WRPA, potentially warranting greater care or mitigation in certain areas to maintain an acceptable level of ecological function (LaTurrette et al. 2003). There is potential overlap between mountain plover habitat and white-tailed prairie dog colonies in the northwest corner within and immediately outside the boundaries of the WRPA (See Figure 4.8-1).

Minor, beneficial effects of the Proposed Action include the creation of bare ground that could be used as nesting habitat. Although increased suitable habitat might result from construction and drilling, these activities are also likely to cause nests to be abandoned or destroyed when these activities occur during the nesting season.

Human Disturbances

Indirect adverse effects may result from heavy equipment, vehicles and other motorized equipment that generate noise in or adjacent to potential mountain plover habitat. These disturbances could result in loss of potential nesting habitat, nest abandonment, impact to eggs and young, and increased mortality from predation.

Mountain plovers have been reported to vacate nesting habitat near wind turbines (USFWS 2003c). Nesting may be re-initiated, but a net loss in reproductive potential would have occurred because of the loss of the initial nest. Mountain plovers also show a high rate of fidelity to nest sites, often using the same area year after year. Modifications that make these areas less suitable for nesting may result in decreased reproductive success.

Accidental Spills

Depending on the proximity of mountain plover habitat to areas of development activity, and the frequency and scale of accidental spills of produced water, oil, gas condensate, metals, and radionuclides could accumulate in sediments. These constituents present a source of exposure when birds ingest contaminated sediment (Ramirez 1993, Rattner et al. 1995, Grau et al. 1977). Studies have shown no signs of toxicity, reduction in feeding, loss of body weight or grossly visible pathological abnormalities in mallards fed up to 100,000 parts per million of weathered Exxon Valdez crude oil (Neff and Stubblefield 1995).

Effects Determination

Overall, the adverse effects of the Proposed Action to the mountain plover would be minor and short-term.

4.9.4 Alternative A (485 wells) – Direct and Indirect Impacts

Under Alternative A oil/gas development would impact approximately 2,818.7 acres of wildlife habitat over the next twenty years. The residual disturbance would be 611.9 acres. Similar to the Proposed Action, it was assumed that well placement could be in any area within the Pavillion, Muddy Ridge, Coastal Extension, Sand Mesa, and Sand Mesa South fields.

The effects of Alternative A are similar to those presented under the Proposed Action, except that the potential for impacts under Alternative A are proportionately higher than the Proposed Action because of the greater number of well pads (485 vs. 325), and increases in disturbance (836.7 acres) and post-reclamation disturbance to 611.9 vs. 422.7 acres, (see Table 4.8-2), totaling 189.2 more acres of disturbance than the Proposed Action Because there would be more habitat disturbances than in the Proposed Action, there would potentially be more effects to threatened and endangered species and their habitats.

4.9.4.1 Bald Eagle

This species winters in the WRPA. Construction and drilling operations in the Pavillion field irrigated areas would be highest in the winter when bald eagles might roost within the WRPA. Impacts to the bald eagle from drilling operations would, therefore, be greater in the winter. In the other four development areas, drilling would occur throughout the year. The occasional disturbance of individual eagles by heavy equipment or vehicles passing nearby during the winter season would be minor, short-term, and indirect under Alternative A. Avoidance of foraging habitat by the eagle in or adjacent to oil/gas operations during the wintering period

would also impact this species. With implementation of the avoidance and minimization measures identified in Section 2.8, construction and drilling operations under Alternative A "are not likely to adversely affect" the bald eagle.

4.9.4.2 Black-footed Ferret

Under Alternative A, more frequent occurrences of noise, ground vibrations, and other development activities generated by oil/gas operations would occur in close proximity to areas potentially occupied by ferrets. However, with implementation of avoidance and minimization measures identified in Section 2.8, Alternative A "is not likely to adversely affect" the black-footed ferret.

4.9.4.3 Canada Lynx

Due to the lack of habitat within the WRPA there would be "no effect" on the Canada lynx under Alternative A.

4.9.4.4 Gray Wolf

The potential impact to the gray wolf under Alternative A would be similar to that previously described under the Proposed Action, except the increased potential for habitat fragmentation and degradation could temporarily decrease available prey in some areas of the WRPA. However, effects to gray wolf habitat would be short-term and negligible. Thus Alternative A "is not likely to adversely affect" the gray wolf.

4.9.4.5 Grizzly Bear

The effects of Alternative A would be similar to that previously described under the Proposed Action. Current use of the WRPA by the grizzly bear is rare, and it would be unlikely that this usage would change with the oil/gas development. Impacts on the grizzly bear due to Alternative A would result in negligible, short-term impacts. Therefore, Alternative A "is not likely to adversely affect" the grizzly bear.

4.9.4.6 Greater Sage-Grouse

The effects of Alternative A would be similar to that presented under the Proposed Action, except that the potential for impacts under Alternative A is proportionately higher. Overall, impacts from construction and drilling operations under Alternative A would be moderate and long term.

4.9.4.7 Mountain Plover

The potential for impacts to the mountain plover under Alternative A is proportionately higher, than that of the Proposed Action. Alternative A would have minor impacts since operations would be prohibited near nesting areas. Overall, the adverse effects from Alternative A would be short-term and minor.

4.9.5 Alternative B (233 wells) – Direct and Indirect Impacts

The effects of Alternative B would be the similar to those identified for the Proposed Action, except that Alternative B would involve comparatively less direct disturbance to threatened and endangered species and their habitat. The reduced number of well locations (233 vs. 325, or a

decreased disturbance of 372.4 acres) and post-reclamation habitat disturbance of 325.1 vs. 422.7 acres (or 97.6 acres less disturbance) would reduce the effects on listed species.

4.9.5.1 Bald Eagle

Effects on the bald eagle would be similar to those described for the Proposed Action, except that they would be proportionally lower. With the implementation of avoidance and minimization measures, Alternative B "is not likely to adversely affect" the bald eagle.

4.9.5.2 Black-footed Ferret

The effects on the black-footed ferret would be similar to those described for the Proposed Action, except that they would be proportionally lower. Therefore, Alternative B "is not likely to adversely affect" the black-footed ferret.

4.9.5.3 Canada Lynx

Due to the lack of habitat within the WRPA there would be "no effect" from Alternative B on the Canada lynx.

4.9.5.4 Gray Wolf

The effects of Alternative B on the gray wolf would be similar to those described for the Proposed Action, except that they would be proportionally lower. Therefore, Alternative B "is not likely to adversely affect" the gray wolf.

4.9.5.5 Grizzly Bear

The effects of Alternative B on the grizzly bear would be similar to those described for the Proposed Action, except that they would be proportionally lower. Therefore, Alternative B "is not likely to adversely affect" the grizzly bear.

4.9.5.6 Greater Sage-Grouse

The effects of Alternative B on the greater sage-grouse would be similar to those described for the Proposed Action, except that they would be proportionally lower. Therefore, Alternative B would result in minor long-term effects on the sage grouse.

4.9.5.7 Mountain Plover

The effects of Alternative B on the mountain plover would be similar to those described for the Proposed Action, except that they would be proportionally lower. Therefore, Alternative B would result in minor short-term effects on the mountain plover.

4.9.6 Alternative C (No Action 100 wells) – Direct and Indirect Impacts

Under the No Action Alternative, further drilling would only be allowed on private minerals and tribal minerals to offset drainage of the resource. Since new wells would only be drilled in the Pavillion field, there would be no impacts in the Muddy Ridge, Sand Mesa, Sand Mesa South, and Coastal Extension development areas. Impacts in the Pavillion Field would be reduced as compared to the Proposed Action. However, drilling on a case-by-case basis under individual APDs, could result in an overall increase in impacts, since development may not occur in a well-

planned manner.

With the implementation of avoidance and minimization measures, the No Action Alternative would result in negligible to minor and short-term to long-term, localized effects on federally listed species and species of special concern. Those species that may utilize road corridors (i.e., bald eagle, gray wolf, and grizzly bear) would likely be disturbed and possibly displaced temporarily by vehicles on the access roads. The disturbance and potential displacement would be short-term and generally would not adversely affect the federally listed endangered, threatened, or state species of concern. Therefore, Alternative C "is not likely to adversely affect" the bald eagle, black-footed ferret, gray wolf and grizzly bear. Alternative C would have "no effect" on the Canada lynx, since no habitat or primary prey species are present within the WRPA.

4.9.7 Impacts Summary

With the implementation of the Proposed Action or Alternatives A, B and C, direct loss of habitat would result from surface disturbance associated with the construction of wells and related access roads and pipelines. Small portions of potential bald eagle, sage-grouse, mountain plover, grizzly bear, gray wolf, and black-footed ferret habitat may be disturbed. The probability or impacts to wildlife and the intensity of such impacts would be greater under Alternative A than for the Proposed Action. The implementation of avoidance and minimization measures identified in Appendix B of this FEIS and a monitoring program (Wildlife Monitoring/Protection Plan, Appendix F in this FEIS), would minimize the potential impact to federally listed species and state sensitive-species.

Impacts resulting from the development of the Proposed Action or Alternatives A, B and C are summarized below:

- Project development is not expected to jeopardize the existence of any federally listed species within the WRPA (Appendix H in this FEIS).
- Impacts to the greater sage-grouse would range from minor to moderate and long term.
- Impacts to the mountain plover would be minor and short term.

4.9.8 Additional Mitigation Measures

If the avoidance and minimization measures described in Appendix B of this FEIS are implemented, no additional avoidance and minimization measures would be necessary.

4.9.9 Residual Impacts

Residual disturbance would remain in areas that are not reclaimed after the completion of drilling and construction activities.

4.10 RECREATION

4.10.1 Introduction

p. 4.10-1, fourth paragraph, add at the end of the paragraph: "Noise also potentially would disturb big game species."

Fifth paragraph, revise as noted: "They decrease as production takes over because land

disturbance is reclaimed and human activity ~~declines~~ is lower during production. ~~However, i~~ Impacts to the recreation setting from development generally are short-lived as drilling and pipeline construction moves from place to place during wellfield construction. However, impacts to big game-based recreation from the loss of forage from dry land vegetation would be long term, since this type of vegetation may take many years to recover. Potential impacts from all phases would be determined somewhat by the density of sites to be developed, as well.

4.10.2.1 Development (Proposed Action)

p. 4.10-2, first paragraph, revise as noted: "With the Proposed Action, ~~impacts to recreation from~~ development could last for 11 years…"

Second paragraph, revise as noted: "This assumes that drilling and production proceeds one well at a time, that the level of human activity decreases ~~to production levels~~ after completion (2 weeks to three months, depending on the field), and that cropland disturbance from drilling is substantially re-vegetated in about three years. ~~the minimal time for typical crops to become mature and productive. and for the reestablishment of rangeland vegetation. The impacts of this process to recreation resources are described next.~~ Though cropland disturbance would be minimized by revegetation, areas of disturbed dry land may take many years to recover."

Impacts to Recreation on Tribal Lands

p. 4.10-2, first paragraph of section, revise as noted: "but recreational use of the area is low because of remoteness, habitat quality ~~and access~~, access, and the fact that only tribal members can hunt on Tribal lands."

Second paragraph of section, revise as noted: "development effects ~~are anticipated to be~~ would be short-lived, as drilling and pipeline construction move from place to place and would generally depend on the location of construction sites in relation to recreation resources. However, big-game habitat disturbance on dry land would be long term, as a result of the slow recovery of sagebrush vegetation."

Third paragraph, last sentence, revise as noted: "…under the Proposed Action would be minor, ~~and short term~~ but long term for large game species due to the slow recovery of dry land vegetation (see Chapter 3—Affected Environment, Recreation Resources)."

Sand Mesa WHMA Recreation Resources within Fields

First paragraph under heading, fourth sentence, revise as noted: "…anticipated to be short-lived as drilling and pipeline construction moves from places to place, and would generally depend on the location of construction sites in relation to recreation resources. The exception would be large game species that forage on sagebrush vegetation, where impacts would be long term. The potentially impacted areas include the following:"

p. 4.10-4, fourth paragraph, second sentence, revise as noted: "At the same time, impacts to hunting near surface water and riparian areas would be ~~partially mitigated by prohibiting~~ reduced by the prohibition of construction within 500 feet (one-tenth of a mile) of surface water ~~and riparian areas~~."

p. 4.10-4, last full paragraph, revise as noted: "Overall, impacts to hunting are distributed among development areas that overlap parts of the Sand Mesa WHMA without covering it completely. ~~On the whole, impacts~~ Impacts from the Proposed Action to hunting resources of the Sand

Mesa WHMA would be minor and short term for some wildlife species, but long term for big game hunting due to the long-term impacts to game populations from sagebrush and desert shrub habitat disturbance."

Other Sand Mesa WHMA Recreation Resources

p. 4.10-5, first paragraph, first sentence, revise as noted: "…and cause temporary displacement of some ~~use from~~ recreationists from ~~some~~ popular Sand Mesa WHMA resources. As noted,…"

Sixth paragraph, correction, as noted: "…area on the Bass Lake ~~road~~ Road and potentially encounter views of gas development…"

Impacts to Recreation at Boysen State Park

p. 4.10-6, second paragraph of section , correct spelling as noted: "…of some Boyson Boysen State…"

4.10.2.2 Production

p. 4.10-8, second paragraph, revise as noted: "…… Areas where this impact is most likely to occur are areas in and near the Sand Mesa WHMA that support ~~limited~~ white-tailed deer hunting and wildlife observation.

Fourth paragraph, revise as noted: "Overall, impacts of production under the Proposed Action to recreation resources on private lands would be minor and short term, except for the potential long-term effect on big game hunting from sagebrush and desert shrub habitat disturbance."

4.10.3.1 Development

p. 4.10-8, first paragraph of section, revise as follows: "Under Alternative A, ~~impacts to recreation from~~ development ~~could~~ would last longer than the…"

p. 4.10-9, first paragraph, second sentence, revise as noted: "…that cropland ~~disturbance from drilling~~ is substantially re-vegetated and activity at a well site has decreased to production levels in the third year after the start of drilling. Although cropland disturbance would be reduced by revegetation, recovery of sagebrush and desert shrub vegetation may take many years."

Fourth paragraph, last sentence, revise as noted: "…would be minor and short term for most recreation resources. However, impacts to big game hunting and viewing under Alternative A would be moderate and long-term, since sagebrush and desert shrub habitat take years to recover from disturbance.

4.10.3.2 Production

p. 4.10-10, first paragraph, revise as noted: "Although production well density is higher under Alternative A than the Proposed Action, the ~~increment~~ additional ~~would~~ density would not be enough to affect the project's overall impact to most recreation resources, with the exception of big game hunting. As for the Proposed Action, most impacts to recreation would be minor and short term from production for Alternative A, but impacts to big game hunting would be moderate and long term."

4.10.4.1 Development

p. 4.10-10, first paragraph of section, revise as noted: "Under Alternative B, the duration of ~~impacts to recreation from~~ development would be…"

Third paragraph of section, second sentence, revise as noted: "…other alternatives, this occurs because drilling proceeds one well at a time and assumes that cropland disturbance from drilling is substantially reclaimed and activity at a well site has decreased to production levels in the third year after the start of drilling. Though cropland disturbance would be minimized by revegetation, recovery of sagebrush and desert shrub vegetation may take many years."

p. 4.10-11, first full paragraph, revise as noted: "Despite development under Alternative B being somewhat shorter and sparser than the Proposed Action, Alternative B would still cause minor short-term impacts to recreation resources in and near the WRPA, except that impacts to big game hunting and viewing would be minor and long-term because of the effect of sagebrush and desert shrub disturbance to game species."

4.10.4.2 Production

p. 4.10-11, second paragraph of section, first sentence, revise as noted: "…long-term impact on hunters and wildlife viewers would be smaller than the Proposed Action because of fewer facilities at a somewhat lower density in each ~~field.~~ field and less sagebrush and desert shrub disturbance. This would potentially …"

Last paragraph of section, second sentence, revise as noted: "As it would be for the Proposed Action and Alternative A, impacts to recreation would be minor and short term from production for Alternative B, except that impacts to big game hunting and viewing would be long term."

4.10.5 Alternative C (No Action 100 wells) – Direct and Indirect Impacts

p. 4.10-12, first line, correct as noted: "…anticipated density of 32 wells~~/~~ per section, because…"

4.10.5.1 Development

p. 4.10-12, first paragraph of section, second paragraph, revise as noted: "…with Alternative ~~B~~ C is eight years in Pavillion…"

Second paragraph of section, second sentence, revise as follows: "…progresses one well at a time and assumes that cropland disturbance from drilling is substantially re-vegetated and activity at a well site has decreased to production levels in the third year after the start of drilling. Additional impacts to big game habitat from dry land disturbance would potentially occur under Alternative C, but would be limited as sagebrush and desert shrub vegetation is less than 25 percent of the primary land cover in the Pavillion field."

Last paragraph of section, revise as noted: "…development in the Pavillion field, except that impacts to big game hunting and viewing would be minor and long term as a result of sagebrush disturbance."

4.10.5.2 Production

p. 4.10-12, last paragraph, second sentence, revise as noted: "…decrease ~~the impact patterns of~~ game use and the density of game populations and, in turn, potentially displace hunters or

affect the hunting experience. With Alternative C, these ~~affects~~ effects would be limited to hunting areas and other wildlife habitats where the Sand Mesa WHMA…"

p. 4.10-13, fourth paragraph, revise as noted: "Although new well development is limited to the Pavillion field with Alternative C, the expansion of production with Alternative C would still have minor short-term impacts to most recreation in and near the WRPA, with the exception that impacts to big game hunting and wildlife observation would minor and long term. Impacts to recreation under Alternative C would be limited for the most part….."

4.10.6 Impacts to Recreation Planning

P. 4.10-13, last paragraph, second sentence, revise as noted: "~~Given that p~~Prohibiting construction of facilities within 500 feet (one-tenth of a mile) of surface water and riparian areas would substantially mitigate effects to ~~principal~~ some hunting and fishing resources of the Sand Mesa WHMA. ~~,the Proposed Action is unlikely to conflict with such a policy for the area~~. However, disturbance of sagebrush and desert shrub habitats would affect large game species and potentially decrease big game hunting opportunities, which would be inconsistent with the current policy of capacity maintenance. The recreation …"

4.10.7 Impacts Summary

p. 4.10-14, first paragraph, revise as noted: "Impacts to specific recreation resources in the WRPA would be minor and short term to the WRPA overall regardless of whether the project is developed as proposed or under one of the alternatives, except that impacts to big game hunting and viewing would be minor and long term for the Proposed Action and Alternatives B and C, and moderate and long term for Alternative A."

Second paragraph, last sentence, revise as noted: "However, minor impacts would remain for the alternative as a whole because of additional activity in the Pavillion field under Alternative C."

Fourth paragraph, second sentence, revise as noted: "Impacts to wildlife observation in the Sand Mesa and Ocean Lake WHMAs also would be minor regardless of alternative, despite the high sensitivity to disturbance of the resource and its users. However, impacts to game species would be long term, due to the long recovery period of sagebrush and desert shrub, which serve as important forage for large game species."

4.13 SOCIOECONOMICS

p. 4.13-1 through 4.13-70, page header should read: "CHAPTER 4: ANALYSIS OF ENVIRONMENTAL CONSEQUENCES."

4.13.8 Residual Impacts

p. 4.13-69, first paragraph, first sentence, delete the space and comma after "…WRPA."

4.14.2.1 Development Phase Impacts

p. 4.14-6, revise the first sentence, as underlined: "As noted above, it is assumed likely that one rig…"

p. 4.14-15, first sentence under "Pavillion Field", revise as underlined: "…to the Pavillion field

(assuming from 10 to 18 wells/year…"

p. 4.14-16, first sentence under "Muddy Ridge Field", revise as underlined: "…to the Muddy Ridge field (assuming 12 wells/year…" and first sentence under "Coastal Extension Field", revise as underlined: "…to the Coastal Extension field (assuming one well/year…"

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

Replace the entire Chapter 5 of the DEIS with the following text:

5.1 INTRODUCTION

The National Environmental Policy Act, as amended (42 U.S. C 4321, et seq.) requires the evaluation of direct, indirect, and cumulative effects (impacts) of a major federal action, as part of the EIS process.

The term cumulative impacts is defined in Section 1508.7 of the Council of Environmental Quality (CEQ) regulations (40 CFR 1508.7) 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."*

The cumulative impacts discussed in this chapter are based on past, existing and reasonably foreseeable future activities (RFFA) in the cumulative impact analysis (CIA) area. The potential cumulative impacts of an action are assessed at the resource level and vary depending of the resource being evaluated. For example, the CIA area for air encompasses the WRPA, WRIR, and the northwestern part of the State of Wyoming. The CIA area for socioeconomics includes all of Fremont County. On the other hand, the CIA area for recreation is the WRPA and the recreation areas and adjacent to the WRPA and include Boysen Reservoir, Sand Mesa Wildlife Habitat Management Area, and Ocean Lake.

The discussion of potential cumulative impacts assumes implementation of the mitigation measures described in Chapter 2, Section 2.8 and the mitigation measures proposed by the Operators (see Chapter 2, Section 2.3 of the DEIS). In addition, it is assumed that the Operators will comply with the guidance prepared by Federal agencies, the State of Wyoming, and county, municipal, and local agencies.

5.2 PAST, EXISTING, AND REASONABLY FORESEEABLE FUTURE ACTIVITIES

Past, existing, and reasonably foreseeable future activities (RFFA) that are considered in this EIS include existing projects and those that are likely to be initiated in the near future in the Wind River Project Area, Wind River Indian Reservation, Bureau of Reclamation Riverton Withdrawal Area, Northwestern Wyoming region, Wyoming Game and Fish Department (WGFD) Wildlife Habitat Management Areas, and State Parks. Information on these areas is provided in the following sections.

5.2.1 Wind River Project Area

The Wind River Project Area (WRPA) is located in Townships 3 and 4 North and Ranges 2 through 5 East in Fremont County Wyoming (see Figure 1-1 in the DEIS). It is approximately 21

miles northwest of Riverton, Wyoming. Approximately 51.4 percent of the WRPA is on private surface, 32.2 percent on Bureau of Reclamation surface, and 51.7 percent on tribal surface (see Table 1-2 in the DEIS). The mineral ownership in the WRPA is 88.4 percent tribal and 11.6 percent private (see Table 1-3 in the DEIS).

The WRPA is bounded on the east by Boysen State Park. Within and adjacent to the WRPA are the Ocean Lake and Sand Mesa Wildlife Habitat Management Areas, managed by the Wyoming Game and Fish Department. The Sand Mesa WHMA includes Fivemile Creek, Muddy Creek, Middle Depression Reservoir, and a portion of the Muddy Ridge Reservoir.

Past, present and reasonably foreseeable future activities within the WRPA are summarized below.

Oil and gas development has occurred in the WRPA since 1960. There are currently 178 producing gas wells in the WRPA, as well as 62 miles of pipelines, and 16,600 horsepower of existing compression. Most of these wells are in the Pavillion and Muddy Ridge fields. The residual disturbance from the production operations is 285 acres, or 0.31 percent of the WRPA (see Chapter 2, Table 2-2 in the DEIS).

A sand and gravel mine is located on BOR land near Boysen Reservoir. Although sand and gravel were mined for many years, it is presently inactive. However, sand and gravel mining is likely to occur again in the reasonably foreseeable future. At the present time the stockpiled gravel at the mining site is used by the BOR for road repair and other uses (Dallman, J., BOR, personal communication, December 2003).

Crops, such as hay and alfalfa, are grown in much of the WRPA by the surface landowners. Oil and gas wells are frequently located within the agricultural fields. These activities are expected to continue in the reasonably foreseeable future.

There is residential development associated with the agricultural lands in the WRPA. There may be some increase in residential development within the WRPA. The town of Pavillion, which has the majority of the residential development, is located just west of the WRPA.

Most of the grazing lands within the WRPA are located on the eastern portion of the WRPA, and are expected to continue in the reasonably foreseeable future.

These activities, in conjunction with the oil and gas operations under the Proposed Action and Alternatives, are evaluated for potential cumulative impacts.

5.2.2 Wind River Indian Reservation

The Wind River Indian Reservation (WRIR) encompasses 3,500 miles and approximately 2.3 million acres. The reservation was established by the Fort Bridger Treaty of July 2, 1868. The WRIR was originally set aside for the Shoshone Tribe. In 1878 the Arapaho Tribe was settled on the reservation. The Shoshone members typically occupy the western areas of the reservation, including Fort Washakie, Crowheart, Burris, and the Dry Creek Ranch area. The Arapaho Tribe principally occupies the eastern section of the reservation, including Ethete and Arapaho. Current census data reports that there are 5,953 Arapaho tribal members and 2,650 Shoshone tribal members (http://www.wyoming.com/~arapahoe/about_us.htm).

Past, existing and reasonably foreseeable future northwest activities (RFFA) in the WRIR are identified below.

- Oil and gas development has occurred on the WRIR since the 1960s and will continue to occur on the reservation, northwest of the WRPA, through existing lease option agreements.
- Gravel mining has occurred on the WRIR. Most of the gravel mines are presently inactive, but initiation of gravel mining is anticipated in the future.
- Various crops, such as hay, alfalfa, and corn, are planted on agricultural land on the reservation.
- An increase in residential development is expected in the towns of Fort Washakie, Ethete, and Arapaho, and Riverton, Wyoming.
- Commercial development, including a casino, hotel, and various stores, is planned for the WRIR approximately 20 miles south of Riverton.

5.2.3 Bureau of Reclamation Riverton Withdrawal Area

A large portion of the WRPA lies within the Riverton Reclamation Withdrawal Area, Which consists of numerous irrigation canals, laterals, and drains. The area established as the Bureau of Reclamation Riverton Withdrawal Area is within the Boundary of the Wind River Indian Reservation. Under the 1905 Act, the WRIR was opened to settlement. In 1939, the area was closed to issuance of new fee patents from trust lands. In 1953, the United States purchased the non-patented lands within the WRIR for $6.25 per acre.

The Riverton Reclamation Withdrawal Area is managed for the BOR by the Midvale Irrigation District (MID), which delivers irrigation water to private landowners through an Irrigation Water Delivery System. The BOR surface consists of a total of 29,896 acres or 32.7 percent of the WRPA (see Table 1-2 in the DEIS).

5.2.4 Fremont County

Fremont County is in the west-central portion of the State of Wyoming. It is 9,266 mi^2 (23,999 sq. km.) with a population of 33,662. Activities in Fremont County include cattle and sheep ranching, oil and gas production, mineral mining (including uranium, phosphate, and bentonite), recreation, and timber resources. Important wildlife resources in Fremont County include big game, waterfowl, upland game birds, and threatened and endangered plant and animal species. Fremont County also contains cultural and natural history resources. The WRPA is located in the north-central part of Fremont County. The cumulative impact analysis area for socioeconomics includes the WRPA, the Midvale Irrigation District, and Fremont County.

5.2.5 Watersheds in the Cumulative Impact Analysis Area

The major surface water drainages within the WRPA include Fivemile Creek, Muddy Creek, Cottonwood Drain, and Cottonwood Creek, covering 915 mi^2, which comprise the northern portion of the Boysen Reservoir watershed (see Figure 3.5-1). The headwaters for these creeks are in the Owl Creek Mountains to the north of the WRPA. Fivemile Creek drains the southern portion of the WRPA, Muddy Creek drains the central portion, and Cottonwood Creek drains a small portion of the northern part of the WRPA. Fivemile and Muddy Creeks are mainly perennial streams, whereas Cottonwood Creek is an intermittent stream. Each of these streams flows into Boysen Reservoir, constructed in 1951, which flows into the Wind River. Surface water from all streams to the west (approximately 7,700 square miles) flows into Boysen Reservoir (see Section 3.5, Water Resources).

Other water bodies within the WRPA include the Wyoming Canal and the Pilot Canal, which are managed by the Midvale Irrigation District, Riverton Unit. Sources of water for the canals include Bull Lake Dam and Reservoir, Wind River Diversion Dam, and Pilot Butte Dam and Reservoir located upstream (i.e., west) of the WRPA. The flows of each of the major streams within the WRPA are affected by irrigation diversions, storage structures, and drains within the WRPA.

Two large water bodies adjacent to the WRPA are Ocean Lake and Boysen Reservoir. Ocean Lake (one mile south of the Pavillion field) is a natural lake and lies entirely within the Fivemile Creek watershed. It has a surface area of approximately 6,440 acres and is bounded on the east side by the WGFD Wildlife Habitat Management Area. The lake receives water from runoff and irrigation drains, and discharges into Fivemile Creek through the Ocean Drain. Boysen Reservoir is located on the eastern edge of the WRPA, with a small portion of the reservoir inside the WRPA. In addition, there are two small reservoirs Upper Depression and Middle Depression Reservoirs that are also within the WRPA. Both of these reservoirs discharge into Lake Cameahwait, which discharges into Boysen Reservoir and ultimately the Wind River.

The cumulative impact analysis area for soils, vegetation and wetlands, and water resources, and wildlife, includes the Fivemile Creek, Muddy Creek, and Cottonwood Creek sub-basins.

5.2.6 Northwestern Wyoming Region

The northwestern portion of the State of Wyoming is evaluated for the analysis of far-field cumulative impacts on air quality. The PSD Class I wilderness areas nearest to the WRPA are the Bridger and Fitzpatrick Wilderness areas located directly west of the WRPA in the Wind River Range. Contiguous with the Bridger Wilderness area are two PSD Class II areas, the Popo Agie Wilderness and the Wind River Roadless Area. More distant PSD Class I areas are the Teton and Yellowstone National Parks, and the Washakie, Teton, Cloud Peaks, and North Absaroka Wilderness areas (see Figure 3.4.-5 in the DEIS). The analysis of cumulative air quality impacts includes consideration of oil and gas development, livestock grazing, gravel mining, recreational activities, residential development, and commercial and industrial development.

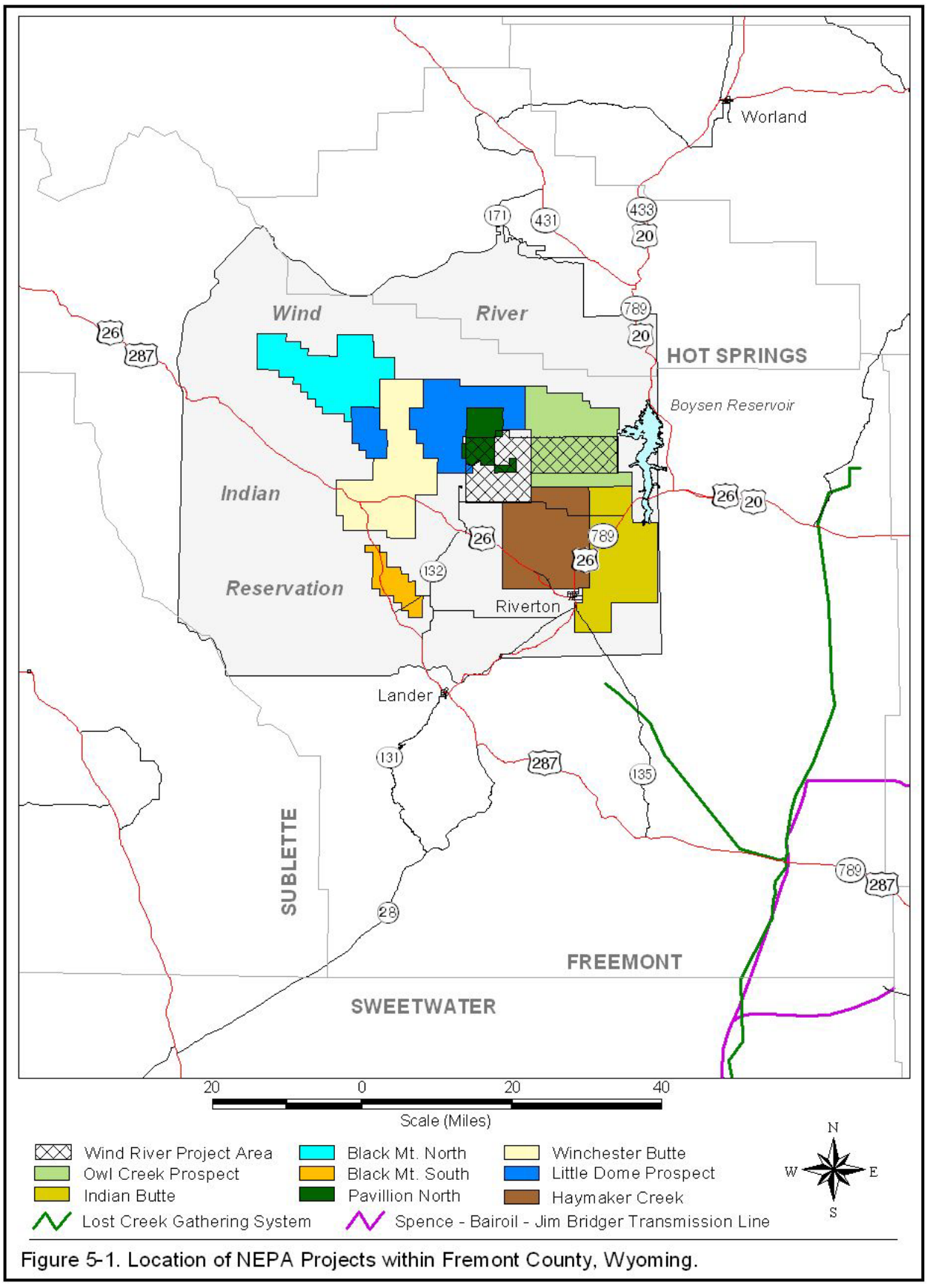


Figure 5-1. Location of NEPA Projects within Fremont County, Wyoming.

5.2.7 State Parks and WGFD Wildlife Habitat Management Areas

Boysen Reservoir, located along the eastern boundary of the WRPA, is a state park. Only a small portion of the park is within the WRPA. However, the park is widely used for recreation activities, such as camping, boating, fishing, and swimming.

Ocean Lake is also a popular destination for recreational activities. It is located outside the WRPA and is approximately one mile south of the Pavillion field. The eastern portion of Ocean Lake is a Wildlife Habitat Management Area, managed by the Wyoming Game and Fish Department.

The Sand Mesa WHMA traverses the WRPA. This WHMA includes Fivemile and Muddy Creeks, the riparian areas adjacent to these creeks, and Middle Depression Reservoir and Upper Depression Reservoir.

5.2.8 Past Environmental Assessments conducted in or near the WRPA

Oil and gas activities within and near the WRPA have been evaluated in Environmental Assessments (EAs). Some of these EAs were prepared for oil and gas operations within the WRPA, while the other EAs are for reasonably foreseeable future activities west and north of the WRPA on reservation lands. The general location of these oil and gas leases and other projects is shown in Figure 5-1.

"*Tom Brown, Inc., Pavillion North Oil/Gas Lease Wind River Indian Reservation, Fremont County, Wyoming, Environmental Assessment and Finding of No Significant Impact"* (BIA 1992) was prepared to evaluate the potential effects of proposed leasing of 25,216 acres in Pavillion North for oil and gas exploration and development by Tom Brown, Inc. A total of 17,068 acres are within the WRIR and 8,148 surface acres are located within the Riverton Reclamation Withdrawal Area.

"*Tom Brown, Inc., Haymaker Creek, Indian Butte, Little Dome, and Owl Creek Oil/Gas Lease Option Proposals Located within the Wind River Reservation of Fremont County, Wyoming, Environmental Assessment and Finding of No Significant Impact*" (BIA 1994a) was prepared to determine the potential environmental impacts resulting from the issuance of four separate oil and gas lease options to Tom Brown, Inc. for a total of 341,960 mineral acres, of which 290,608 surface acres are within the WRIR and 113,432 surface acres are within the Riverton Reclamation Withdrawal Area.

"*Tom Brown, Inc. Winchester Butte Oil/Gas Lease Option, Environmental Assessment and Finding of No Significant Impact*" (BIA 1994b) was prepared to determine the potential environmental impacts resulting from issuance of an oil and gas lease option to Tom Brown, Inc. The proposed lease option encompasses approximately 101,760 acres within the Winchester Butte Prospect and would grant TBI the exclusive right to explore for hydrocarbon reserves and lease those lands within the optioned area that demonstrate the potential for oil and gas production. Approximately 87,106 acres are within the WRIR and 14,654 surface acres are within the Riverton Reclamation Withdrawal Area.

"*Tom Brown, Inc.; Brownlie, Wallace, Armstrong & Bander Exploration; and Enron Oil & Gas Company; Black Mountain Oil and Gas Lease Option Area, Environmental Assessment and Finding of No Significant Impact*" (BIA 1995) was prepared for the purpose of evaluation and possible leasing of 108,160 acres of land within the WRIR, between the town of Ethete on the

east and Fort Washakie on the west.

"*Tom Brown, Inc. and Brownlie, Wallace, Armstrong & Bander Exploration, Wind River Oil and Gas Exploration License Agreement, Environmental Assessment and Finding of No Significant Impact*" (BIA 1996) would grant Tom Brown, Inc. and Brownlie, Wallace, Armstrong & Bander Exploration exclusive rights for oil/gas exploration and development on approximately 514,905 mineral acres within the WRIR for geophysical evaluation and exploratory drilling.

Other Environmental Assessments and Environmental Impact Statements prepared for industrial operations within Fremont County are listed below.

The "*Record of Decision for the Environmental Impact Statement on the Jackpot Uranium Mine Plan of Operation Fremont and Sweetwater Counties, Wyoming*" (BLM 1995) was prepared to assess the impacts of a proposed uranium mine project in the Green Mountain area of southeastern Fremont County and northeastern Sweetwater County. This proposed project has not been implemented.

The "*Record of Decision, Altamont Gas Transportation Project*" (BLM 1991). This Environmental Impact Statement was prepared to assess the potential impacts from a 30-inch diameter gas pipeline transmission system. The proposed project was not implemented.

"*Environmental Assessment and Plan of Development for the Lost Creek Gathering System Project, Finding of No Significant Impact*" (BLM 1999) was prepared to assess the impacts of a 120-mile, 24-inch natural gas gathering system from Burlington Resources' Lost Cabin Gas Plant in Fremont County, Wyoming, southward to an interconnection with an existing interstate natural gas transmission pipeline that parallels Interstate 80 near Wamsutter in Sweetwater County, Wyoming.

"*Pacific Power and Light company Spence-Bairoil, Jim Bridger Transmission Line Project*" (BLM 1989) was prepared to assess the impacts of a proposed pipeline. The pipeline route is from Casper, Wyoming to Jeffrey City and follows the Gas Hill Haul Road.

"Environmental Assessment of the Wind River Indian Reservation Western Alliance Oil and Gas Lease and Development, September 13, 1985 was prepared for oil and gas leasing on 50,000 acres of the WRIR.

Environmental Assessment for Snyder Oil Corporation's Alkali Butte Oil and Gas Lease Option Agreement, Wind River Indian Reservation, Fremont County Wyoming (BIA 1996). Snyder Oil Corporation entered into lease option agreement with the Shoshone and Arapaho Tribes for exclusive rights for exploration and development for oil and gas within 33,072 acres of the WRIR. Construction of a total of 18 wells at approximately 18,000 feet total depth was proposed.

5.3 POTENTIAL CUMULATIVE IMPACTS BY RESOURCE

The potential cumulative effects of past, current and reasonably foreseeable future activities on the resource elements are discussed in the following sections. Table 5.3-37 summarizes the cumulative impacts to the resources in the Cumulative Impact Assessment Areas. Note that these areas vary by the resource analyzed.

5.3.1 Geology/Minerals/Paleontology

5.3.1.1 Geological Resources

Cumulative impacts to geological, mineral, and paleontological resources from the Proposed Action or Alternatives and reasonably foreseeable future activities include increased erosion, removal of areas for future mineral development, and impacts to fossils, both negative and beneficial.

Future projects that may be permitted within and near the WRPA include additional oil and gas development, sand and gravel mining, and timber harvesting in the Owl Creek and Wind River Mountains. Additional oil and gas pipelines may also be needed as production in the region increases. Other commercial development includes construction of a casino, a hotel, and shops just south of Riverton. In addition, increased residential development, possibly with additional roads, is expected in Ft. Washakie, Ethete, and Arapaho.

5.3.1.2 Increased Erosion

Each future project would increase the area potentially subjected to erosion. Residential and commercial development, as well as additional oil and gas development, would remove topsoil and vegetation from selected areas, thus increasing runoff and, potentially, erosion of surficial materials. Increased erosion would be a temporary cumulative impact for projects involving residential development and pipeline construction, because these areas would be revegetated after construction. Timber harvesting and oil and gas development would potentially result in minor, long-term increases in erosion.

5.3.1.3 Mineral Extraction

Within and adjacent to the WRPA, increased mining for sand and gravel is expected to occur on Tribal and other lands. Residential development, casino development, and additional oil and gas development may decrease the area available for extraction of sand and gravel. However, as stated in the mitigation section of Chapter 2, the Operators would avoid precluding the development of these resources and any conflicts would be mediated by the BIA or other agencies. Some loss of these resources may occur over time as development occurs outside the WRPA, including the consumption of the materials to build these projects. Local regulatory agencies would need to review proposed developments carefully to minimize the loss of these resources.

5.3.1.4 Paleontological Resources

The development of oil and gas wells and associated infrastructure as described for the Proposed Action and alternatives, as well as other reasonably foreseeable projects, including mining of surface mineral resources and construction materials, may have a cumulative impact on paleontological resources. Construction can directly impact fossil resources, and newly built roads can open previously inaccessible areas to illegal collection and destruction of fossil resources by vandalism. Scientifically significant fossils and fossil localities containing them are rare and not uniformly distributed throughout the geologic deposits in the WRPA. As a result, loss of fossil resources from rare and scientifically important localities and the loss of some of these areas themselves would have a cumulative impact. On the other hand, development could increase the potential for discovering scientifically significant fossil resources. If such resources are discovered, and the nature and significance of the paleontological material is

recognized, adequate measures would be applied to ensure proper handling and recovery of the resource. Mitigation of these impacts would be accomplished by conducting paleontological surveys prior to construction and requiring that construction stop when fossils are encountered.

5.3.2 Soils

Cumulative impacts to soils from the Proposed Action or Alternatives and reasonably foreseeable future activities include increased erosion, increased runoff, compaction, and loss of topsoil productivity.

Future projects that may be permitted within and near the WRPA include additional oil and gas development, sand and gravel mining, and timber harvesting in the Owl Creek and Wind River Mountains. Additional oil and gas pipelines may also be proposed as production in the region increases. Other commercial development includes construction of a casino, hotel, and shops just south of Riverton. In addition, increased residential development is expected in Ft. Washakie, Ethete, and Arapaho.

5.3.2.1 Increased Runoff and Erosion

Each future project would increase the area potentially subjected to erosion. Residential and commercial development, as well as additional oil and gas development, would remove topsoil and vegetation from selected areas, thus increasing runoff and, potentially, erosion of surficial materials. Increased erosion would be a temporary impact for projects involving residential development and pipeline construction, since these areas would be revegetated after construction. Timber harvesting and oil and gas development would potentially result in minor, long-term increases in erosion. Clear-cutting of timber would lead to increases in runoff from the affected areas. This increased runoff could lead to more erosion along waterways and the migration of the gulleys of small streams in the upstream direction. Application of Best Management Practices during construction of future projects would mitigate these cumulative impacts.

5.3.2.2 Soil Compaction

Oil and gas, residential, and commercial development result in increased soil compaction at sites underlain by the project facilities. Future projects and development would lead to additional areas of soil being lost. However, the cumulative impacts to soil would be offset by the beneficial effects of the future projects.

5.3.2.3 Loss of Topsoil Productivity

Soil that is excavated loses its structure and therefore, some productivity. In addition, the past use of non-native fill materials may have increased soil salinity in some areas, resulting in a loss of productivity. Stockpiling of topsoil during construction for future projects would lead to some loss of productivity of the soils that are reapplied to affected areas as reclamation material. This loss of productivity is a temporary effect that decreases as the soil receives moisture and is cultivated with plants.

5.3.2.4 Potential Contamination of Soils with Petroleum Constituents

Preliminary data collected during the summer of 2004 suggests that contamination of soils with petroleum constituents may be common, especially in the Pavillion Field. Additional oil and gas development has the potential to increase the amount of soil that is impacted by petroleum.

The mitigation measures identified above in section 2.8 of the DEIS should be sufficient to ensure that drilling and production wastes are handled in a manner to preclude additional contamination of soils.

5.3.3 Air Quality

5.3.3.1 Introduction

As an unavoidable result of project related activities, additional pollutants would be emitted to the atmosphere. Emissions generated from project activities would act in concert with emissions generated from other cumulative sources, both existing and future.

To assess total air quality impacts, emission inventories were developed for a number of cumulative source categories. Specifically, the cumulative inventories estimated emissions for the following source groups:

- Permitted Sources – Sources permitted by State agencies that are currently operating;
- Reasonably Foreseeable Future Actions – Sources permitted by State Agencies that have yet to initiate operations;
- Tribal Sources – Sources located on Tribal lands permitted by the EPA;
- Well Emissions – Sources of emissions related to existing oil and gas wells, and
- Reasonably Foreseeable Development – Sources associated with NEPA projects that are not yet fully developed. This category only includes predicted emissions for the undeveloped portions of the project.

Potential emissions for cumulative source categories are summarized in Table 5.3-1. As shown, the primary pollutant of concern emitted by the cumulative sources is NO_X. Detailed documentation of the emission inventories is provided in a separate report; Emissions Inventory for the Wind River Natural Gas Development Project (Buys & Associates, 2004).

Table 5.3-1. Summary of Potential Cumulative Source Emissions.

Pollutant	Permitted Sources [1] (tons/yr)	Reasonably Foreseeable Future Actions [1] (tons/yr)	Tribal Sources [1] (tons/yr)	Well Sources [2] (tons/yr)	Reasonably Foreseeable Development [3] (tons/yr)	Total Cumulative Sources (tons/yr)
NO_X	2,116	4,621	382	73	14,684	21,876
SO_X	109	124	-	-	1	234
PM_{10}	67	109	-	-	47	223
$PM_{2.5}$	23	109	-	-	47	179

[1]Emission Inventory for the Wind River Natural Gas Field Development Project, June 2004, page EI-10.
[2]Emission Inventory for the Wind River Natural Gas Field Development Project, June 2004, page EI-13.
[3]Emission Inventory for the Wind River Natural Gas Field Development Project, June 2004, page EI-17.

The cumulative air quality assessment focused upon potential impacts that could occur within areas of special concern (i.e., Federal designated Class I areas and areas identified as important to the Tribes and the USFS). To assess potential cumulative impacts, the CALPUFF set of dispersion models were applied. The CALPUFF set of models (CALMET, CALPUFF, CALPOST, and associated utilities) were designed specifically to assess ambient air quality impacts at significant distances from the source and therefore long pollutant travel times. For the cumulative assessment, impacts from the following source categories were summed: permitted sources, RFFA sources, Tribal sources, well sources and RFD sources. Potential

impacts that would result from the combination of cumulative Project Alternatives sources were evaluated. The predicted pollutant concentrations were compared to the most stringent of the State of Wyoming and National Air Quality Standards (WAAQS, NAAQS) and (for informational purposes only) to the Prevention of Significant Deterioration (PSD) increments. In addition, the predicted concentration and deposition results were processed to evaluate potential visibility and acid deposition impacts for comparison with the Federal Land Manager (FLM) Limits of Acceptable Change (LAC).

Throughout this analysis all comparisons with PSD increments are intended only to evaluate a level of concern and do not represent a regulatory PSD increment consumption analysis. PSD Increment consumption analyses are applied to large industrial sources and are solely the responsibility of the State and the Environmental Protection Agency.

5.3.3.2 Cumulative Sources - Direct and Indirect Impacts

Potential air quality impacts resulting from cumulative sources, including state permitted, Tribal land, RFFA, RFD and oil and gas wells, are summarized below. The predicted cumulative impacts will occur independent from any further development within the WRPA.

Ambient Air Quality Standards

Predicted maximum pollutant concentrations that may occur as a result of cumulative sources are summarized in Table 5.3-2 and compared with the most stringent Wyoming and National ambient air quality standards. As demonstrated, impacts resulting from cumulative sources are predicted to occur at levels below the ambient standards. The greatest impact resulting from cumulative sources is for NO_X, at a predicted concentration of 2.36 $\mu g/m^3$.

Table 5.3-2. Cumulative Source Ambient Air Quality Standards Comparison.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	2.36	Cloud Peak Wilderness	3.4	5.76	100	5.8%
SO_2	3-hour	0.39	Grand Teton National Park	132	132.39	1300	10.2%
	24-hour	0.08	Grand Teton National Park	43	43.08	260	16.6%
	Annual	0.01	Grand Teton National Park	9	9.01	60	15.0%
PM_{10}	24-hour	0.08	Cloud Peak Wilderness	61	61.08	150	40.7%
	Annual	0.00	Grand Teton National Park	22	22.00	50	44.0%

PSD Increments

Tables 5.3-3 and 5.3-4 compare cumulative source impacts with the PSD Class I and Class II Increments. As demonstrated, increases in pollutant concentrations are not predicted to exceed the Increments.

Table 5.3-3. Cumulative Source PSD Class I Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class I Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class I Increment
NO_2	Annual	0.063	Bridger Wilderness	2.5	2.53%
SO_2	3-hour	0.386	Grand Teton National Park	25	1.54%
	24-hour	0.080	Grand Teton National Park	5	1.60%
	Annual	0.009	Grand Teton National Park	2	0.44%
PM_{10}	24-hour	0.039	Grand Teton National Park	8	0.49%
	Annual	0.004	Grand Teton National Park	4	0.09%

Table 5.3-4. Cumulative Source PSD Class II Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class II Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class II Increment
NO_2	Annual	2.361	Cloud Peak Wilderness	25	9.44%
SO_2	3-hour	0.316	Cloud Peak Wilderness	512	0.06%
	24-hour	0.045	Cloud Peak Wilderness	91	0.05%
	Annual	0.002	Cloud Peak Wilderness	20	0.01%
PM_{10}	24-hour	0.079	Cloud Peak Wilderness	30	0.26%
	Annual	0.003	Cloud Peak Wilderness	17	0.02%

Terrestrial Acid Deposition

Results of the Cumulative source nitrogen and sulfur atmospheric deposition analysis are illustrated in Tables 5.3-5 and 5.3-6. As shown, the greatest nitrogen deposition rate is predicted to occur within the Cloud Peak Wilderness area. Cumulative deposition rates for the other areas of special concern would be approximately ten times less than the rate predicted for Cloud Peak. Increases in sulfur deposition are predicted to be two to three orders of magnitude less than the existing background rates and would therefore be inconsequential.

Table 5.3-5. Cumulative Source Nitrogen Deposition.

Area of Special Concern	Predicted Nitrogen (N) Deposition (kg/ha/yr)	Background Nitrogen (N) Deposition (kg/ha/yr)	Total Nitrogen (N) Deposition (kg/ha/yr)
Bridger Wilderness	0.02	1.3	1.3
Cloud Peak Wilderness	0.37	1.3	1.7
Fitzpatrick Wilderness	0.01	1.3	1.3
North Absaroka Wilderness	0.01	1.1	1.1
Owl Creek Range	0.01	1.3	1.3
Popo Agie Wilderness	0.01	1.3	1.3
Phlox Mountain	0.01	1.3	1.3
Grand Teton National Park	0.01	1.1	1.1
Teton Wilderness	0.01	1.1	1.1
Washakie Wilderness	0.01	1.1	1.1
Wind River Canyon	0.01	1.3	1.3
Wind River Roadless Area	0.01	1.3	1.3
Yellowstone National Park	0.01	1.1	1.1
Maximum	**0.37**	**1.3**	**1.7**

Table 5.3-6. Cumulative Source Sulfur Deposition LAC Comparison.

Area of Special Concern	Predicted Sulfur (S) Deposition (kg/ha/yr)	Background Sulfur (S) Deposition (kg/ha/yr)	Total Sulfur (S) Deposition (kg/ha/yr)
Bridger Wilderness	0.001	1.1	1.1
Cloud Peak Wilderness	0.002	1.1	1.1
Fitzpatrick Wilderness	0.001	1.1	1.1
North Absaroka Wilderness	0.001	0.9	0.9
Owl Creek Range	0.001	1.1	1.1
Popo Agie Wilderness	0.001	1.1	1.1
Phlox Mountain	0.001	1.1	1.1
Grand Teton National Park	0.004	0.9	0.9
Teton Wilderness	0.002	0.9	0.9
Washakie Wilderness	0.001	0.9	0.9
Wind River Canyon	0.001	1.1	1.1
Wind River Roadless Area	0.000	1.1	1.1
Yellowstone National Park	0.002	0.9	0.9
Maximum	**0.004**	**1.1**	**1.1**

Aquatic Acid Deposition

Cumulative source emissions are predicted to impact ANC levels at two lakes located within the Cloud Peak Wilderness. Impacts to ANC at Florence Lake in excess of the LAC are predicted. Changes in ANC are also predicted at Emerald Lake. However, the predicted impacts at Emerald Lake are less than the LAC. For the remaining lakes of special concern, changes in ANC would be substantially less than the LAC. All predicted impacts are shown in Table 5.3-7.

Table 5.3-7. Cumulative Source ANC Impacts.

High Elevation Lake	Baseline 10%Lowest ANC (µeq/l)	Level of Acceptable Change [1]	Predicted Change in ANC (µeq/l)	Percentage Change In ANC
Black Joe Lake	67.0	10% or 6.7 µeq/l	0.15	0.22%
Deep Lake	59.9	10% or 6.0 µeq/l	0.15	0.25%
Emerald Lake	69.8	10% or 7.0 µeq/l	2.09	3.00%
Florence Lake	33.0	10% or 3.3 µeq/l	3.36	10.2%
Hobbs Lake	69.9	10% or 7.0 µeq/l	0.12	0.17%
Lower Saddlebag	55.5	10% or 5.6 µeq/l	0.15	0.27%
Ross Lake	53.5	10% or 5.4 µeq/l	0.10	0.18%
Stepping Stone Lake	19.9	1 µeq/l	0.05	0.23%
Twin Island Lake	17.6	1 µeq/l	0.05	0.29%
Upper Frozen Lake	5.0	1 µeq/l	0.15	3.07%
Maximum			**3.36**	**10.2%**

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC

Visibility Impairment

Cumulative emission sources are predicted to cause a total of 24 days of visibility impairment greater than 1.0 deciview. The majority of the impaired days, 12, are predicted to occur within the Cloud Peak Wilderness area. Other areas that would exhibit impaired visibility are Popo Agie Wilderness, Wind River Canyon, Wind River Roadless Area, and the Owl Creek Range including Phlox Mountain. The greatest change in visibility, 2.03 dv, is predicted to occur within the Wind River Canyon as shown in Table 5.3-8.

Table 5.3-8. Cumulative Source Visibility Impairment.

Area of Special Concern	Number of Days with Δ dv Greater Than 1.0	Greatest Predicted Δ dv
Bridger Wilderness	0	0.96
Cloud Peak Wilderness	12	1.65
Fitzpatrick Wilderness	0	0.70
North Absaroka Wilderness	0	0.73
Owl Creek Range	3	1.90
Popo Agie Wilderness	3	1.14
Phlox Mountain	1	1.32
Grand Teton National Park	0	0.55
Teton Wilderness	0	0.35
Washakie Wilderness	0	0.89
Wind River Canyon	3	2.03
Wind River Roadless Area	2	1.18
Yellowstone National Park	0	0.42
Total Days / Max Δ dV	**24**	**2.03**

5.3.3.3 Cumulative and Proposed Action Sources - Direct and Indirect Impacts

Potential air quality impacts resulting from cumulative sources in conjunction with Proposed Action sources are summarized below.

Ambient Air Quality Standards

Predicted maximum pollutant concentrations that could occur as a result of cumulative and Proposed Action sources are summarized in Table 5.3-9 and compared with the most stringent Wyoming and National ambient air quality standards. Project sources would contribute slightly to the predicted cumulative source particulate matter concentrations. Predicted NO_2 and SO_2 concentrations would not change substantially as a result of Project emissions. As illustrated below, impacts resulting from Cumulative and Proposed Action sources are predicted to occur at levels below the ambient standards.

Table 5.3-9. Cumulative and Proposed Action Ambient Air Quality Standards Comparison.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	2.36	Cloud Peak Wilderness	3.4	5.76	100	5.8%
SO_2	3-hour	0.39	Grand Teton National Park	132	132.39	1300	10.2%
	24-hour	0.08	Grand Teton National Park	43	43.08	260	16.6%
	Annual	0.01	Grand Teton National Park	9	9.01	60	15.0%
PM_{10}	24-hour	1.51	Wind River Canyon	61	62.51	150	41.7%
	Annual	0.13	Wind River Canyon	22	22.13	50	44.3%

PSD Increments

Tables 5.3-10 and 5.3-11 compare cumulative and Proposed Action impacts with PSD Class I and Class II Increments. As shown, increases in pollutant concentrations are not predicted to exceed the increments.

Table 5.3-10. Cumulative and Proposed Action PSD Class I Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class I Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class I Increment
NO_2	Annual	0.064	Bridger Wilderness	2.5	2.55%
SO_2	3-hour	0.386	Grand Teton National Park	25	1.54%
	24-hour	0.080	Grand Teton National Park	5	1.60%
	Annual	0.009	Grand Teton National Park	2	0.44%
PM_{10}	24-hour	0.068	Fitzpatrick Wilderness	8	0.85%
	Annual	0.004	Grand Teton National Park	4	0.09%

Table 5.3-11. Cumulative and Proposed Action PSD Class II Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class II Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class II Increment
NO_2	Annual	2.363	Cloud Peak Wilderness	25	9.45%
SO_2	3-hour	0.316	Cloud Peak Wilderness	512	0.06%
	24-hour	0.045	Cloud Peak Wilderness	91	0.05%
	Annual	0.003	Wind River Canyon	20	0.01%
PM_{10}	24-hour	1.510	Wind River Canyon	30	5.03%
	Annual	0.131	Wind River Canyon	17	0.77%

Terrestrial Acid Deposition

Proposed Action sources would not contribute substantially to cumulative terrestrial deposition rates of nitrogen or sulfur.

Aquatic Acid Deposition

Cumulative and Proposed Action sources would impact ANC levels at Florence Lake in excess the LAC. Measurable decreases in ANC less than the LAC are also predicted at Emerald Lake. For the remaining lakes of special concern, all predicted changes in ANC levels, as summarized in Table 5.3-12, would be significantly less than the LAC.

Table 5.3-12. Cumulative and Proposed Action ANC Impacts.

High Elevation Lake	Baseline 10%Lowest ANC (ueq/l)	Level of Acceptable Change [1]	Predicted Change in ANC (ueq/l)	Percentage Change In ANC
Black Joe Lake	67.0	10% or 6.7 µeq/l	0.17	0.25%
Deep Lake	59.9	10% or 6.0 µeq/l	0.17	0.28%
Emerald Lake	69.8	10% or 7.0 µeq/l	2.12	3.0%
Florence Lake	33.0	10% or 3.3 µeq/l	3.39	10.3%
Hobbs Lake	69.9	10% or 7.0 µeq/l	0.12	0.18%
Lower Saddlebag	55.5	10% or 5.6 µeq/l	0.17	0.31%
Ross Lake	53.5	10% or 5.4 µeq/l	0.10	0.19%
Stepping Stone Lake	19.9	1 µeq/l	0.05	0.23%
Twin Island Lake	17.6	1 µeq/l	0.05	0.30%
Upper Frozen Lake	5.0	1 µeq/l	0.17	3.4%
Maximum			**3.39**	**10.3%**

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC

Visibility Impairment

Cumulative and Proposed Action sources would cause 30 days of visibility impairment greater than 1.0 deciview. As presented in Table 5.3-13, the majority of the impaired days, 12, are predicted to occur within the Cloud Peak Wilderness area. Other areas that would exhibit impaired visibility are Popo Agie Wilderness, Wind River Canyon, Wind River Roadless Area, Bridger Wilderness and the Owl Creek Range including Phlox Mountain. The greatest change in visibility, 2.15 dv, is predicted to occur within the Wind River Canyon.

Table 5.3-13. Cumulative and Proposed Action Visibility Impairment.

Area ofSpecial Concern	Number of Days with Δ dv Greater Than 1.0	Greatest Predicted Δ dv
Bridger Wilderness	2	1.10
Cloud Peak Wilderness	12	1.66
Fitzpatrick Wilderness	0	0.72
North Absaroka Wilderness	0	0.76
Owl Creek Range	4	1.97
Popo Agie Wilderness	3	1.27
Phlox Mountain	1	1.34
Grand Teton National Park	0	0.55
Teton Wilderness	0	0.35
Washakie Wilderness	0	0.90
Wind River Canyon	6	2.15
Wind River Roadless Area	2	1.26
Yellowstone National Park	0	0.42
Total Days / Max Δ dV	**30**	**2.15**

5.3.3.4 Cumulative and Proposed Action Post-Construction Sources - Direct and Indirect Impacts

Potential air quality impacts resulting from cumulative sources in conjunction with Proposed Action sources following the completion of construction activities are summarized below.

Ambient Air Quality Standards

Predicted maximum pollutant concentrations that could occur as a result of cumulative and post-construction Proposed Action sources are summarized in Table 5.3-14 and compared with the most stringent Wyoming and National ambient air quality standards. As demonstrated, impacts are predicted to occur at levels below the ambient standards. Following the completion of construction activities, particulate matter concentrations would be reduced to levels only slightly greater than the predicted cumulative source impact.

Table 5.3-14. Cumulative and Proposed Action Post-Construction Ambient Air Quality Standards Comparison.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	2.36	Cloud Peak Wilderness	3.4	5.76	100	5.8%
SO_2	3-hour	0.39	Grand Teton National Park	132	132.39	1300	10.2%
	24-hour	0.08	Grand Teton National Park	43	43.08	260	16.6%
	Annual	0.01	Grand Teton National Park	9	9.01	60	15.0%
PM_{10}	24-hour	0.10	Wind River Canyon	61	61.10	150	40.7%
	Annual	0.01	Wind River Canyon	22	22.01	50	44.0%

PSD Increments

Tables 5.3-15 and 5.3-16 compare cumulative and post-construction Proposed Action impacts with the PSD Class I and Class II Increments. As demonstrated, increases in pollutant concentrations are not predicted to exceed the Class I Increments.

Table 5.4-15. Cumulative and Proposed Action Post-Construction PSD Class I Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class I Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class I Increment
NO_2	Annual	0.064	Bridger Wilderness	2.5	2.55%
SO_2	3-hour	0.386	Grand Teton National Park	25	1.54%
	24-hour	0.080	Grand Teton National Park	5	1.60%
	Annual	0.009	Grand Teton National Park	2	0.44%
PM_{10}	24-hour	0.039	Grand Teton National Park	8	0.49%
	Annual	0.004	Grand Teton National Park	4	0.09%

Table 5.4-16. Cumulative and Proposed Action Post-Construction PSD Class II Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class II Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class II Increment
NO_2	Annual	2.362	Cloud Peak Wilderness	25	9.45%
SO_2	3-hour	0.316	Cloud Peak Wilderness	512	0.06%
	24-hour	0.045	Cloud Peak Wilderness	91	0.05%
	Annual	0.002	Cloud Peak Wilderness	20	0.01%
PM_{10}	24-hour	0.100	Wind River Canyon	30	0.33%
	Annual	0.008	Wind River Canyon	17	0.05%

Terrestrial Acid Deposition

Proposed Action post-construction emissions would not contribute substantially to cumulative terrestrial deposition rates of nitrogen or sulfur.

Aquatic Acid Deposition

The completion of construction activities would result in only minor reductions in ANC impacts. The reduced impacts would result primarily from the decrease in NO_X emissions following the completion of drilling operations. Cumulative emissions in conjunction with post-construction Proposed Action sources are predicted to cause changes in ANC levels at Florence Lake which exceed the LAC. For the remaining lakes of special concern, the predicted ANC impacts would be less than the LACs. All impacts are summarized in Table 5.3-17.

Table 5.3-17. Cumulative and Proposed Action Post-Construction ANC Impacts.

High Elevation Lake	Baseline 10%Lowest ANC (µeq/l)	Level of Acceptable Change [1]	Predicted Change in ANC (µeq/l)	Percentage Change In ANC
Black Joe Lake	67.0	10% or 6.7 µeq/l	0.16	0.24%
Deep Lake	59.9	10% or 6.0 µeq/l	0.16	0.27%
Emerald Lake	69.8	10% or 7.0 µeq/l	2.11	3.0%
Florence Lake	33.0	10% or 3.3 µeq/l	3.38	10.2%
Hobbs Lake	69.9	10% or 7.0 µeq/l	0.12	0.17%
Lower Saddlebag	55.5	10% or 5.6 µeq/l	0.16	0.30%
Ross Lake	53.5	10% or 5.4 µeq/l	0.10	0.19%
Stepping Stone Lake	19.9	1 µeq/l	0.05	0.23%
Twin Island Lake	17.6	1 µeq/l	0.05	0.30%
Upper Frozen Lake	5.0	1 µeq/l	0.17	3.31%
Maximum			**3.38**	**10.2%**

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC.

Visibility Impairment

Following the completion of construction activities, cumulative and Proposed Action visibility impacts would be reduced from 30 days to 25 days of impairment greater than 1.0 deciview. The reduction in visibility impacts would result primarily from a decrease in particulate matter generated from construction activities and the elimination of NO_X emissions from drill rig engines. As presented in Table 5.3-18, the majority of the impaired days, 12, are predicted to occur within the Cloud Peak Wilderness. Other areas that would exhibit impaired visibility are Popo Agie Wilderness, Wind River Canyon, Wind River Roadless Area, Bridger Wilderness and the Owl Creek Range including Phlox Mountain. The greatest change in visibility, 2.10 dv at Wind River Canyon, represents a slight reduction from the 2.15 dv impact predicted for the construction phase of the Proposed Action.

Table 5.3-18. Cumulative and Proposed Action Post-Construction Visibility

Area ofSpecial Concern	Number of Days with Δ dv Greater Than 1.0	Greatest Predicted Δ dv
Bridger Wilderness	1	1.02
Cloud Peak Wilderness	12	1.66
Fitzpatrick Wilderness	0	0.71
North Absaroka Wilderness	0	0.75
Owl Creek Range	3	1.94
Popo Agie Wilderness	3	1.19
Phlox Mountain	1	1.33
Grand Teton National Park	0	0.55
Teton Wilderness	0	0.35
Washakie Wilderness	0	0.89
Wind River Canyon	3	2.10
Wind River Roadless Area	2	1.22
Yellowstone National Park	0	0.42
Total Days / Max Δ dV	**25**	**2.10**

5.3.3.5 Cumulative and Alternative A Sources - Direct and Indirect Impacts

Potential air quality impacts resulting from cumulative sources in conjunction with Alternative A sources are summarized below.

Ambient Air Quality Standards

Predicted maximum pollutant concentrations that could occur as a result of cumulative and Alternative A sources are summarized in Table 5.3-19 and compared with the most stringent Wyoming and National ambient air quality standards. As demonstrated, impacts are predicted to occur at levels below the ambient standards.

Table 5.3-19. Cumulative and Alternative A Ambient Air Quality Standards Comparison.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	2.36	Cloud Peak Wilderness	3.4	5.76	100	5.8%
SO_2	3-hour	0.39	Grand Teton National Park	132	132.39	1300	10.2%
	24-hour	0.08	Grand Teton National Park	43	43.08	260	16.6%
	Annual	0.01	Grand Teton National Park	9	9.01	60	15.0%
PM_{10}	24-hour	1.63	Wind River Canyon	61	62.63	150	41.8%
	Annual	0.14	Wind River Canyon	22	22.14	50	44.3%

PSD Increments

Tables 5.3-20 and 5.3-21 compare cumulative and Alternative A impacts with PSD Class I and Class II Increments. As demonstrated, increases in pollutant concentrations would not exceed the Increments.

Table 5.3-20. Cumulative and Alternative A PSD Class I Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class I Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class I Increment
NO_2	Annual	0.064	Bridger Wilderness	2.5	2.56%
SO_2	3-hour	0.386	Grand Teton National Park	25	1.54%
	24-hour	0.080	Grand Teton National Park	5	1.60%
	Annual	0.009	Grand Teton National Park	2	0.44%
PM_{10}	24-hour	0.071	Fitzpatrick Wilderness	8	0.89%
	Annual	0.004	Grand Teton National Park	4	0.09%

Table 5.3-21. Cumulative and Alternative A PSD Class II Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class II Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class II Increment
NO_2	Annual	2.364	Cloud Peak Wilderness	25	9.45%
SO_2	3-hour	0.316	Cloud Peak Wilderness	512	0.06%
	24-hour	0.045	Cloud Peak Wilderness	91	0.05%
	Annual	0.003	Wind River Canyon	20	0.02%
PM_{10}	24-hour	1.633	Wind River Canyon	30	5.44%
	Annual	0.140	Wind River Canyon	17	0.82%

Terrestrial Acid Deposition

Alternative A emissions would not contribute substantially to cumulative terrestrial deposition rates of nitrogen or sulfur.

Aquatic Acid Deposition

Cumulative source and Alternative A emissions are predicted to cause changes in ANC levels at Florence Lake which exceed the LAC. For the remaining lakes of special concern, the predicted ANC impacts would be less than the LACs. All impacts are summarized in Table 5.3-22.

Table 5.3-22. Cumulative and Alternative A ANC Impacts.

High Elevation Lake	Baseline 10%Lowest ANC (µeq/l)	Level of Acceptable Change [1]	Predicted Change in ANC (µeq/l)	Percentage Change In ANC
Black Joe Lake	67.0	10% or 6.7 µeq/l	0.17	0.26%
Deep Lake	59.9	10% or 6.0 µeq/l	0.17	0.29%
Emerald Lake	69.8	10% or 7.0 µeq/l	2.13	3.1%
Florence Lake	33.0	10% or 3.3 µeq/l	3.39	10.29%
Hobbs Lake	69.9	10% or 7.0 µeq/l	0.12	0.18%
Lower Saddlebag	55.5	10% or 5.6 µeq/l	0.18	0.32%
Ross Lake	53.5	10% or 5.4 µeq/l	0.11	0.20%
Stepping Stone Lake	19.9	1 µeq/l	0.05	0.23%
Twin Island Lake	17.6	1 µeq/l	0.05	0.30%
Upper Frozen Lake	5.0	1 µeq/l	0.18	3.5%
Maximum			**3.39**	**10.3%**

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC

Visibility Impairment

Cumulative and Alternative A sources would cause 34 days of visibility impairment greater than 1.0 deciview. Cloud Peak Wilderness area would experience the greatest number of impaired days. Other areas that would exhibit impaired visibility are Popo Agie Wilderness, Wind River Canyon, Wind River Roadless Area, Bridger Wilderness and the Owl Creek Range including Phlox Mountain. As presented in Table 5.3-23, the greatest change in visibility, 2.22 dv, is predicted to occur within the Wind River Canyon.

Table 5.3-23. Cumulative and Alternative A Visibility Impairment.

Area ofSpecial Concern	Number of Days with Δ dv Greater Than 1.0	Greatest Predicted Δ dv
Bridger Wilderness	2	1.13
Cloud Peak Wilderness	12	1.66
Fitzpatrick Wilderness	0	0.73
North Absaroka Wilderness	0	0.77
Owl Creek Range	6	1.99
Popo Agie Wilderness	3	1.31
Phlox Mountain	1	1.35
Grand Teton National Park	0	0.55
Teton Wilderness	0	0.35
Washakie Wilderness	0	0.90
Wind River Canyon	8	2.22
Wind River Roadless Area	2	1.28
Yellowstone National Park	0	0.42
Total Days / Max Δ dV	**34**	**2.22**

5.3.3.6 Cumulative and Alternative B Sources - Direct and Indirect Impacts

Potential air quality impacts resulting from cumulative sources in conjunction with Alternative B emissions are summarized below.

Ambient Air Quality Standards

Predicted maximum pollutant concentrations that could occur as a result of cumulative and Alternative B sources are summarized in Table 5.3-24 and compared with the most stringent Wyoming and National ambient air quality standards. As demonstrated, impacts are predicted to occur at levels below the ambient standards.

Table 5.3-24. Cumulative and Alternative B Ambient Air Quality Standards Comparison.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	2.36	Cloud Peak Wilderness	3.4	5.76	100	5.8%
SO_2	3-hour	0.39	Grand Teton National Park	132	132.39	1300	10.2%
	24-hour	0.08	Grand Teton National Park	43	43.08	260	16.6%
	Annual	0.01	Grand Teton National Park	9	9.01	60	15.0%
PM_{10}	24-hour	1.48	Wind River Canyon	61	62.48	150	41.7%
	Annual	0.13	Wind River Canyon	22	22.13	50	44.3%

PSD Increments

Tables 5.3-25 and 5.3-26 compare cumulative and Alternative B impacts with PSD Class I and Class II Increments. As demonstrated, increases in pollutant concentrations are not predicted to exceed the increments.

Table 5.3-25. Cumulative and Alternative B PSD Class I Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class I Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class I Increment
NO_2	Annual	0.064	Bridger Wilderness	2.5	2.55%
SO_2	3-hour	0.386	Grand Teton National Park	25	1.54%
	24-hour	0.080	Grand Teton National Park	5	1.60%
	Annual	0.009	Grand Teton National Park	2	0.44%
PM_{10}	24-hour	0.067	Fitzpatrick Wilderness	8	0.84%
	Annual	0.004	Grand Teton National Park	4	0.09%

Table 5.3-26. Cumulative and Alternative B PSD Class II Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class II Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class II Increment
NO_2	Annual	2.362	Cloud Peak Wilderness	25	9.45%
SO_2	3-hour	0.316	Cloud Peak Wilderness	512	0.06%
	24-hour	0.045	Cloud Peak Wilderness	91	0.05%
	Annual	0.003	Wind River Canyon	20	0.01%
PM_{10}	24-hour	1.476	Wind River Canyon	30	4.92%
	Annual	0.129	Wind River Canyon	17	0.76%

Terrestrial Acid Deposition

Alternative B emissions would not contribute substantially to cumulative terrestrial deposition rates of nitrogen or sulfur.

Aquatic Acid Deposition

Cumulative and Alternative B emissions are predicted to cause changes in ANC which exceed the LAC at Florence Lake. For the remaining lakes of special concern, the predicted ANC impacts would be less than the LACs. All impacts are summarized in Table 5.3-27.

Table 5.3-27. Cumulative and Alternative B ANC Impacts.

High Elevation Lake	Baseline 10%Lowest ANC (µeq/l)	Level of Acceptable Change [1]	Predicted Change in ANC (µeq/l)	Percentage Change In ANC
Black Joe Lake	67.0	10% or 6.7 µeq/l	0.16	0.2%
Deep Lake	59.9	10% or 6.0 µeq/l	0.16	0.3%
Emerald Lake	69.8	10% or 7.0 µeq/l	2.11	3.0%
Florence Lake	33.0	10% or 3.3 µeq/l	3.38	10.2%
Hobbs Lake	69.9	10% or 7.0 µeq/l	0.12	0.2%
Lower Saddlebag	55.5	10% or 5.6 µeq/l	0.17	0.3%
Ross Lake	53.5	10% or 5.4 µeq/l	0.10	0.2%
Stepping Stone Lake	19.9	1 µeq/l	0.05	0.2%
Twin Island Lake	17.6	1 µeq/l	0.05	0.3%
Upper Frozen Lake	5.0	1 µeq/l	0.17	3.3%
Maximum			3.38	10.2%

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC

Visibility Impairment

Cumulative and Alternative B sources are predicted to cause 28 days of visibility impairment greater than 1.0 deciview. The majority of the impaired days, 12, are predicted to occur within the Cloud Peak Wilderness. Other areas that would exhibit impaired visibility are Popo Agie Wilderness, Wind River Canyon, Wind River Roadless Area, Bridger Wilderness and the Owl Creek Range including Phlox Mountain. As presented in Table 5.3-28, the greatest change in visibility, 2.12 dv, is predicted to occur within the Wind River Canyon.

Table 5.3-28. Cumulative and Alternative B Visibility Impairment.

Area of Special Concern	Number of Days with Δ dv Greater Than 1.0	Greatest Predicted Δ dv
Bridger Wilderness	2	1.07
Cloud Peak Wilderness	12	1.66
Fitzpatrick Wilderness	0	0.71
North Absaroka Wilderness	0	0.75
Owl Creek Range	3	1.95
Popo Agie Wilderness	3	1.24
Phlox Mountain	1	1.34
Grand Teton National Park	0	0.55
Teton Wilderness	0	0.35
Washakie Wilderness	0	0.89
Wind River Canyon	5	2.12
Wind River Roadless Area	2	1.25
Yellowstone National Park	0	0.42
Total Days / Max Δ dV	**28**	**2.12**

5.3.3.7 Cumulative and Alternative C Sources - Direct and Indirect Impacts

Potential air quality impacts resulting from cumulative sources in conjunction with the No Action Alternative sources are summarized below.

Ambient Air Quality Standards

Predicted maximum pollutant concentrations that could occur as a result of cumulative and No Action sources are summarized in the Table 5.3-29 and compared with the most stringent Wyoming and National ambient air quality standards. As demonstrated, impacts are predicted to occur at levels below the ambient standards.

Table 5.3-29. Cumulative and Alternative C Ambient Air Quality Standards Comparison.

Pollutant	Averaging Time	Maximum Predicted Impact ($\mu g/m^3$)	Maximum Impact Location	Background Concentration ($\mu g/m^3$)	Background Plus Impact ($\mu g/m^3$)	WAAQS NAAQS Standard ($\mu g/m^3$)	Impact Percentage of WAAQS/ NAAQS
NO_2	Annual	2.36	Cloud Peak Wilderness	3.4	5.76	100	5.8%
SO_2	3-hour	0.39	Grand Teton National Park	132	132.39	1300	10.2%
	24-hour	0.08	Grand Teton National Park	43	43.08	260	16.6%
	Annual	0.01	Grand Teton National Park	9	9.01	60	15.0%
PM_{10}	24-hour	0.22	Wind River Canyon	61	61.22	150	40.8%
	Annual	0.01	Wind River Canyon	22	22.01	50	44.0%

PSD Increments

Tables 5.3-30 and 5.3-31 compare cumulative and No Action source impacts with the PSD Class I and Class II Increments. As demonstrated, increases in pollutant concentrations are not predicted to exceed the Class I Increments.

Table 5.3-30. Cumulative and Alternative C PSD Class I Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class I Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class I Increment
NO_2	Annual	0.063	Bridger Wilderness	2.5	2.54%
SO_2	3-hour	0.386	Grand Teton National Park	25	1.54%
	24-hour	0.080	Grand Teton National Park	5	1.60%
	Annual	0.009	Grand Teton National Park	2	0.44%
PM_{10}	24-hour	0.039	Grand Teton National Park	8	0.49%
	Annual	0.004	Grand Teton National Park	4	0.09%

Table 5.3-31. Cumulative and Alternative C PSD Class II Increment Comparison.

Pollutant	Averaging Time	Maximum Impact ($\mu g/m^3$)	Maximum Impact Location	PSD Class II Increment ($\mu g/m^3$)	Impact Percentage Of PSD Class II Increment
NO_2	Annual	2.361	Cloud Peak Wilderness	25	9.44%
SO_2	3-hour	0.316	Cloud Peak Wilderness	512	0.06%
	24-hour	0.045	Cloud Peak Wilderness	91	0.05%
	Annual	0.002	Cloud Peak Wilderness	20	0.01%
PM_{10}	24-hour	0.217	Wind River Canyon	30	0.72%
	Annual	0.013	Wind River Canyon	17	0.07%

Terrestrial Acid Deposition

Emissions resulting from the No Action Alternative would not contribute substantially to cumulative terrestrial deposition rates of nitrogen or sulfur.

Aquatic Acid Deposition

Cumulative and No Action source emissions are predicted to cause changes in ANC levels at Florence Lake which exceed the LAC. As shown in Table 5.3-32, predicted changes in ANC levels would less than the LAC for the remaining lakes of special concern.

Table 5.3-32. Cumulative and Alternative C ANC Impacts.

High Elevation Lake	Baseline 10%Lowest ANC (µeq/l)	Level of Acceptable Change [1]	Predicted Change in ANC (µeq/l)	Percentage Change In ANC
Black Joe Lake	67.0	10% or 6.7 µeq/l	0.15	0.22%
Deep Lake	59.9	10% or 6.0 µeq/l	0.15	0.25%
Emerald Lake	69.8	10% or 7.0 µeq/l	2.10	3.00%
Florence Lake	33.0	10% or 3.3 µeq/l	3.36	10.18%
Hobbs Lake	69.9	10% or 7.0 µeq/l	0.12	0.17%
Lower Saddlebag	55.5	10% or 5.6 µeq/l	0.15	0.27%
Ross Lake	53.5	10% or 5.4 µeq/l	0.10	0.19%
Stepping Stone Lake	19.9	1 µeq/l	0.05	0.23%
Twin Island Lake	17.6	1 µeq/l	0.05	0.29%
Upper Frozen Lake	5.0	1 µeq/l	0.16	3.11%
Maximum			**3.36**	**10.18%**

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC

Visibility Impairment

Cumulative and No Action sources are predicted to cause 24 days of visibility impairment greater than 1.0 deciview. The No Action Alternative would not substantially contribute to visibility impacts resulting from cumulative sources. As presented in Table 5.3-33, visibility impacts that may result from the combination of cumulative and no action sources are essentially equivalent to the predicted impacts for the cumulative sources alone.

Table 5.3-33. Cumulative and Alternative C Visibility Impairment.

Area of Special Concern	Number of Days with Δ dv Greater Than 1.0	Greatest Predicted Δ dv
Bridger Wilderness	0	0.98
Cloud Peak Wilderness	12	1.65
Fitzpatrick Wilderness	0	0.70
North Absaroka Wilderness	0	0.73
Owl Creek Range	3	1.90
Popo Agie Wilderness	3	1.15
Phlox Mountain	1	1.32
Grand Teton National Park	0	0.55
Teton Wilderness	0	0.35
Washakie Wilderness	0	0.89
Wind River Canyon	3	2.04
Wind River Roadless Area	2	1.19
Yellowstone National Park	0	0.42
Total Days / Max Δ dV	**24**	**2.04**

5.3.3.8 Summary of Cumulative Air Quality Impacts

Ambient Air Quality Standards and PSD Increments

Maximum predicted pollutant concentrations are summarized in Table 5.3-34 for cumulative sources in conjunction with project alternatives. Predicted impacts would not exceed the ambient standards or PSD Class I or Class II increments. Impacts upon SO_2 concentrations would be negligible. However, moderate impacts upon NO_2 and PM_{10} concentrations are predicted. The duration of the PM_{10} impacts would be short-term, occurring predominately during the development phase of the project. Following the completion of construction activities, PM_{10} impacts would be reduced to minor levels. The moderate NO_2 impacts would be long-term, existing for the duration of the project.

Table 5.3-34. Summary of Ambient Air Quality Impacts.

Pollutant	Averaging Time	Cumulative Source Maximum Predicted Impact ($\mu g/m^3$)	Cumulative and Proposed Action Maximum Predicted Impact ($\mu g/m^3$)	Cumulative and Proposed Action Post-Construction Maximum Predicted Impact ($\mu g/m^3$)	Cumulative and Alternative A Maximum Predicted Impact ($\mu g/m^3$)	Cumulative and Alternative B Maximum Predicted Impact ($\mu g/m^3$)	Cumulative and Alternative C Maximum Predicted Impact ($\mu g/m^3$)
NO_2	Annual	2.36	2.36	2.36	2.36	2.36	2.36
SO_2	3-hour	0.39	0.39	0.39	0.39	0.39	0.39
	24-hour	0.08	0.08	0.08	0.08	0.08	0.08
	Annual	0.01	0.01	0.01	0.01	0.01	0.01
PM_{10}	24-hour	0.08	1.51	0.10	1.63	1.48	0.22
	Annual	0.00	0.13	0.01	0.14	0.13	0.01

Terrestrial Acid Deposition

Impacts upon total sulfur deposition would be negligible. Minor long-term nitrogen deposition impacts are predicted to occur at Could Peak Wilderness as a result of cumulative sources. The Wind River Project would not substantially contribute to the Cloud Peak deposition impacts. Nitrogen deposition impacts are predicted to be negligible for the remaining areas of special concern.

Aquatic Acid Deposition

Predicted impacts to lake ANC resulting from cumulative and project sources are summarized in Table 5.3-35. As a result of cumulative sources impacts are predicted to occur at two lakes located in Cloud Peak Wilderness. Moderate long-term impacts are predicted to occur at Florence Lake, where changes in ANC are predicted to exceed the level of acceptable change. Minor long-term impacts are predicted to occur at Emerald Lake where changes in ANC levels would be detectable. The contribution of Project sources upon these cumulative impacts would be negligible. Impacts to ANC at the remaining lakes of special concern would be negligible.

Table 5.3-35. Summary of Predicted ANC Impacts.

High Elevation Lake	Level of Acceptable Change [1] (µeq/l)	Cumulative Source Predicted Change in ANC (µeq/l)	Cumulative and Proposed Action Predicted Change in ANC (µeq/l)	Cumulative and Proposed Action Post-Construction Predicted Change in ANC (µeq/l)	Alternative A Predicted Change in ANC (µeq/l)	Alternative B Predicted Change in ANC (µeq/l)	Alternative C Predicted Change in ANC (µeq/l)
Black Joe Lake	6.7	0.15	0.17	0.16	0.17	0.16	0.15
Deep Lake	6.0	0.15	0.17	0.16	0.17	0.16	0.15
Emerald Lake	7.0	2.09	2.12	2.11	2.13	2.11	2.10
Florence Lake	3.3	3.36	3.39	3.38	3.39	3.38	3.36
Hobbs Lake	7.0	0.12	0.12	0.12	0.12	0.12	0.12
Lower Saddlebag	5.6	0.15	0.17	0.16	0.18	0.17	0.15
Ross Lake	5.4	0.10	0.10	0.10	0.11	0.10	0.10
Stepping Stone Lake	1.0	0.05	0.05	0.05	0.05	0.05	0.05
Twin Island Lake	1.0	0.05	0.05	0.05	0.05	0.05	0.05
Upper Frozen Lake	1.0	0.15	0.17	0.17	0.18	0.17	0.16
Maximum		**3.36**	**3.39**	**3.38**	**3.39**	**3.38**	**3.36**

[1]For lakes with existing acid neutralizing capacity (ANC) levels less than 25 microequivalents per liter (µeq/l), a LAC of no greater than 1 µeq/l is applied. For lakes with existing ANC levels greater than 25 µeq/l, the LAC is no greater than a 10 percent change in the background ANC

Visibility Impairment

Cumulative and Project sources would contribute to regional visibility impacts. Tables 5.3-36 and 5.3-37 summarize the predicted visibility impacts. Moderate long-term visibility impacts are predicted to occur at Cloud Peak Wilderness as a result of cumulative sources. However, the contribution from Project sources to the Cloud Peak impacts would be negligible. Moderate short-term visibility impacts are predicted to occur at Wind River Canyon and the Owl Creek Range, which includes Phlox Mountain. However impacts at these areas would be reduced to minor levels following the completion of project construction activities. Minor long-term visibility

impacts would also occur at Bridger Wilderness, Popo Agie Wilderness, and the Wind River Roadless Area.

Table 5.3-36. Summary of Predicted Visibility Impairment Days.

Area of Special Concern	Cumulative Source Number of Days with Δ dv Greater Than 1.0	Cumulative and Proposed Action Number of Days with Δ dv Greater Than 1.0	Cumulative and Proposed Action Post-Construction Number of Days with Δ dv Greater Than 1.0	Cumulative and Alternative A Number of Days with Δ dv Greater Than 1.0	Cumulative and Alternative B Number of Days with Δ dv Greater Than 1.0	Cumulative and Alternative C Number of Days with Δ dv Greater Than 1.0
Bridger Wilderness	0	2	1	2	2	0
Cloud Peak Wilderness	12	12	12	12	12	12
Fitzpatrick Wilderness	0	0	0	0	0	0
North Absaroka Wilderness	0	0	0	0	0	0
Owl Creek Range	3	4	3	6	3	3
Popo Agie Wilderness	3	3	3	3	3	3
Phlox Mountain	1	1	1	1	1	1
Grand Teton National Park	0	0	0	0	0	0
Teton Wilderness	0	0	0	0	0	0
Washakie Wilderness	0	0	0	0	0	0
Wind River Canyon	3	6	3	8	5	3
Wind River Roadless Area	2	2	2	2	2	2
Yellowstone National Park	0	0	0	0	0	0
Total Days	**24**	**30**	**25**	**34**	**28**	**24**

Table 5.3-37. Summary of Predicted Visibility Impairment.

Area of Special Concern	Cumulative Source Greatest Predicted Δ dv	Cumulative and Proposed Action Greatest Predicted Δ dv	Cumulative and Proposed Action Post-Construction Greatest Predicted Δ dv	Cumulative and Alternative A Greatest Predicted Δ dv	Cumulative and Alternative B Greatest Predicted Δ dv	Cumulative and Alternative C Greatest Predicted Δ dv
Bridger Wilderness	0.96	1.10	1.02	1.13	1.07	0.98
Cloud Peak Wilderness	1.65	1.66	1.66	1.66	1.66	1.65
Fitzpatrick Wilderness	0.70	0.72	0.71	0.73	0.71	0.70
North Absaroka Wilderness	0.73	0.76	0.75	0.77	0.75	0.73
Owl Creek Range	1.90	1.97	1.94	1.99	1.95	1.90
Popo Agie Wilderness	1.14	1.27	1.19	1.31	1.24	1.15
Phlox Mountain	1.32	1.34	1.33	1.35	1.34	1.32
Grand Teton National Park	0.55	0.55	0.55	0.55	0.55	0.55
Teton Wilderness	0.35	0.35	0.35	0.35	0.35	0.35
Washakie Wilderness	0.89	0.90	0.89	0.90	0.89	0.89
Wind River Canyon	2.03	2.15	2.10	2.22	2.12	2.04
Wind River Roadless Area	1.18	1.26	1.22	1.28	1.25	1.19
Yellowstone NP	0.42	0.42	0.42	0.42	0.42	0.42
Maximum Δ dv	**2.03**	**2.15**	**2.10**	**2.22**	**2.12**	**2.04**

5.3.4 Water Resources

Potential cumulative impacts on water resources would involve the combination of impacts from the proposed gas development activities in the WRPA with those impacts attributed to ongoing oil and gas development activities, recent construction projects, and reasonably foreseeable future projects. Cumulative impacts are assessed for the WRPA and the northern portion of the Boysen Reservoir watershed which includes the Fivemile Creek, Muddy Creek, and Cottonwood Creek drainage areas.

5.3.4.1 Wind River Project Area

Surface Water

Since oil and gas exploration and development activities must comply with federal and tribal environmental laws, major water quality and quantity impacts are not expected on a cumulative scale. On-going erosion of drill pads, roads, and other facilities result in increased sediment loading into Fivemile, Muddy, and Cottonwood Creeks. However, containment of sediment on-site and the reclamation of roadside ditches and pipeline right-of-ways have reduced sediment loading to creeks from these operations. Estimated sediment loading to the Boysen Reservoir, are 11 tons per year. According to the USGS (1994), approximately 561,000 tons per year of suspended sediment are carried by the Wind River into Boysen Reservoir. Each of the alternatives (Proposed Action and Alternatives A, B and C) and the existing development would represent less than 0.001 percent of the suspended solids entering Boysen Reservoir. Thus, the impacts from the Proposed Action and alternatives on surface water would be considered negligible. Overall, the cumulative impacts of the Wind River gas development project and other reasonably foreseeable future projects in the vicinity of the WRPA are expected to be minor.

The main source of salts, Sodium Adsorption Ratio (SAR), and other pollutants, as described in Chapter 3.5, in the WRPA, is from irrigation return water. There is a slight potential for increased salt, SAR, and nutrient loading in the WRPA, mainly due to agriculture activities. In terms of trace metals and other dissolved solids, the Wind River gas development project is expected to have no impact, unless there is a spill or loss of containment. To minimize such an impact, a Spill Prevention, Control, and Countermeasure (SPCC) Plan would be implemented. If an incident does occur, steps would be taken to contain it immediately to minimize the impact. Thus, the cumulative impacts of the Proposed Action or alternatives and other projects on surface water would be considered negligible.

Groundwater

To date, no serious groundwater pollution problems have been reported in the watershed within and adjacent to WRPA. Some concerns have been voiced by landowners to the Operators on the deterioration of the water quality of domestic water wells. However, studies conducted by consultants indicated that oil and gas activities were not directly responsible for the problems. In addition, oil and gas operations are required to implement Spill Prevention, Control and Countermeasure Plans minimizing the potential impacts of spills and loss of containment within and near the WRPA.

In terms of groundwater usage, all water for the construction and operation within the WRPA would be from water wells. As described in Chapter 4, these wells may been a permit or change of use from the State Water Engineer for state water rights and the Tribes for reserved water rights. It is estimated that total annual use over a 20-to 40- year life of project would be approximately 0.01 percent to 0.02 percent of the annual water available, and would result in negligible cumulative impacts.

5.3.4.2 Affected Watershed

Surface Water

As described in Chapter 3.5, the Fivemile Creek, Muddy Creek, and Cottonwood Creek watersheds have a total area of 915 mi^2. Within the affected watersheds, there is a potential of

cumulative impacts from other activities occurring upstream from the WRPA. Evaluation of the Wyoming Department of Environmental Quality (2003) database for National Pollution Discharge Elimination System (NPDES) permits indicates that six permits have been issued for the Fivemile Creek drainage basin, with only one permit being current. There are no NPDES permits issued for Muddy Creek and Cottonwood Creek. As development occurs upstream from the WRPA additional discharges into theses streams may occur. Because produced water from each of the Alternatives will not be directly discharged into surface water, no NPDES permit would be required for the proposed operations. Thus, there would only be cumulative impacts to the streams from produced water and condensate if accidental spills occurred.

Based on a report by the USGS (1994), it is estimated that 243 tons of sediment are generated per square mile of the watersheds in the Wind River Basin or 222,300 tons/year for the combined basins of Fivemile, Muddy, and Cottonwood Creeks. The predicted increase in sediment loading from the Proposed Action is 82 tons/yr, that from Alternative A is 83 tons/yr, that from Alternative B is 77 tons/yr, and that from Alternative C is 20.6 tons/yr. These represent about 0.037 percent, 0.037 percent, 0.035 percent, and 0.009 percent of the total sediment loading in these basins, respectively. Accordingly, these changes in sediment loading would not be measurable and are considered negligible in terms of potential cumulative impacts.

Groundwater

In the upper portions of the watershed, as with the WRPA, there have been no serious groundwater pollution problems. By complying with tribal and federal laws, using state-of-the-art drilling methods, lining pits, and implementing SPCC plans, the Proposed Action or Alternatives would not impact the groundwater systems. Because up-gradient groundwater systems discharge into streams prior to reaching the WRPA, no cumulative impacts would be expected to the groundwater system.

5.3.5 Vegetation and Wetlands

Cumulative effects of the Proposed Action or Alternatives to vegetation and wetlands were determined by combining the effects of each alternative with other past, present, and reasonably foreseeable future actions. Actions that have the potential to result in cumulative effects to vegetation and wetlands in conjunction with the oil/gas development within the WRPA are identified in Section 5.2.

The area analyzed for cumulative impacts on sagebrush, desert-shrub, mixed-grass prairie, greasewood fans and flats, and saltbush fans and flats, consists of all potential oil/gas exploration and development fields within the boundaries of the WRPA, and major and minor drainages, ponds and reservoirs, in the Boysen Reservoir watershed (which includes Muddy, Fivemile, and Cottonwood Creeks, Middle Depression Reservoir and state wildlife habitat management area ponds) within and adjacent to the WRPA. Specific locations where vegetation disturbance would occur within the WRPA are not currently known. Likewise, in assessing cumulative impacts, it was not possible to specifically determine where future projects near the WRPA would occur.

5.3.5.1 Vegetation

The cumulative impact analysis for vegetation evaluates the impacts of proposed gas development project when combined with other past, present, and future activities that are

reasonably likely to occur within the Cumulative Impact Analysis Area (CIAA), (i.e., Muddy Creek, Fivemile Creek, and Cottonwood Creek sub-basins). This area contains native mixed-grass prairie, greasewood fans and flats, saltbush fans and flats, and riparian shrub and Wyoming big sagebrush and desert-shrub vegetation. Fragmentation of this native vegetation cover has occurred through localized conversion to crops, roads, and overgrazing by domestic livestock, as well as oil and gas production. These past vegetative disturbances have encouraged the spread of invasive grasses and noxious weeds throughout the area.

The proposed gas field development project is estimated to result in long-term (residual) disturbances of 422.7 acres under the Proposed Action, 611.9 acres under Alternative A, 325.1 acres under Alternative B, and 79.3 acres under Alternative C. The direct and indirect impacts from the proposed gas development project would include loss of vegetation, increased erosion, reduction in species diversity, increase in bare ground and increase in noxious weeds and nuisance species. These impacts from the Proposed Action or alternatives, when combined with other past, present, and reasonably foreseeable future activities in the CIAA would result in minor to moderate cumulative impacts to vegetation, depending upon the vegetation species. Implementation of avoidance and minimization measures listed in Section 2.8 of the DEIS would mitigate the impacts to vegetation.

5.3.5.2 Wetlands and Riparian Habitats

Riparian areas and herbaceous wetlands are subjected to many sources of disturbance, such as oil and gas activities, road construction, recreation, including the use of ORVs, and livestock grazing. Residential and commercial development would add additional disturbance to the riparian areas. The increased activities would result in erosion, increased sediment yield to streams and reduction in vegetative cover along riparian areas. Irrigation diversions, storage structures, and drains would also affected the riparian areas.

The cumulative impacts from the Proposed Action or alternatives, when combined with other past, present, and reasonably foreseeable future activities in the CIAA is anticipated to vary from negligible to minor, since no construction or drilling would occur within 500 feet of Muddy and Fivemile Creeks, in accordance with Operator-committed and agency-required mitigation measures identified in Section 2.8 of the DEIS.

5.3.6 Land Use

The Cumulative Impact Analysis (CIA) area for land use is the WRPA plus areas within a few miles of the WRPA. In addition to the Proposed Action or Alternatives A, B and C (No Action), the land use in the CIA area includes the current gas well development within the WRPA and the following reasonably foreseeable future actions that may occur within and/or adjacent to the WRPA: gravel/sand mining operations, residential development, casino/retail development, and other oil and gas exploration and development.

In addition to the gas development within the WRPA, it is reasonable to foresee future oil and gas development occurring on lands within the WRIR. The cumulative impact of further gas development in the region may influence land use within the WRPA as perceptions of the region may reflect the gradual industrialization of the landscape character. The land-use type that would most likely reflect this change in public perception would be residential. As the WRPA becomes more industrial in character, landowners within and adjacent to the WRPA may find it more difficult to develop their property for residential use. In addition, potential buyers may be discouraged from purchasing land or residences in these areas due to the shifting character of

the surrounding lands.

Agricultural and ranching land use within the WRPA may be also be affected by the cumulative long-term disturbance. If gas development interferes with normal farm or ranching operations, farmers and ranchers may cease operations on those portions of land that are most affected.

Gravel/sand mining operations within the WRPA on tribal and/or BOR lands may displace some rangeland uses, but it is likely that cattle grazing would continue on lands immediately adjacent to the gravel/sand mines.

Therefore, cumulative impacts of oil and gas development, residential development, gravel mining and other reasonably foreseeable future activities would be minor.

5.3.7 Wildlife

The cumulative impact analysis for wildlife evaluates the impacts of proposed gas development project when combined with other past, present , and future activities that are reasonably likely to occur within the Cumulative Impact Analysis Area (CIAA), which comprises the Boysen Reservoir watershed (i.e., Muddy Creek, Fivemile Creek, and Cottonwood Creek sub-basins).

The major activity that occurs within and near the WRPA is oil and gas development. Other activities that occur in the area include residential and commercial development, agriculture and livestock grazing, and sand and gravel mining. These activities are not expected to increase substantially from the current levels. The residual disturbance resulting from the existing oil and gas development in the WRPA is shown in Table 5.3-32. However, the specific locations of the proposed wells, access roads, and ancillary facilities, have not been determined. The locations and acreage of disturbance from activities outside the WRPA have also not been determined, so that the cumulative impacts of the reasonably foreseeable future activities (RFFAs) cannot be estimated quantitatively.

Table 5.3-32. Residual Disturbance by Field within the WRPA

	Alternatives				
Fields	**Existing Development (ac)**	**Proposed Action (ac)**	**Alternative A (ac)**	**Alternative B (ac)**	**Alternative C (No Action) (ac)**
Pavillion	159	159.4	215.5	113.7	79.4
Muddy Ridge	182	119.4	158.4	96.3	0
Sand Mesa	33	121.5	159.6	96.4	0
Sand Mesa South	0	16.7	59.4	13.5	0
Coastal Extension	0	5.7	18.7	5.2	0
Other wells within WRPA	36	-	-	-	-
TOTAL	**410**	**422.7**	**611.6**	**325.1**	**79.4**

5.3.7.1 Big Game

Five big game species have been reported from the general vicinity of the WRPA. They include pronghorn antelope (*Antilocapra americana)*, mule deer (*Odocoileus hermionus*), white-tailed deer (*Odocoileus virginianus*), elk (*Cervus elaphus*), and moose (*Alces alces*). Yearlong habitat exists in the WRPA for the pronghorn antelope, mule deer, and white-tailed deer. The use the

WRPA by elk is sporadic, and only rare observations of moose have been reported. The ranges of these species are based on GIS data provided by the WGFD (1999) (see Figures 3.8-1 to 3.8-5 in the DEIS). Data on the specific ranges of game species within the Wind River Indian Reservation (WRIR) are not available. Cumulative impacts to the pronghorn antelope, mule deer, and white-tailed deer would include reduction in forage, habitat displacement, habitat fragmentation, reduction in reproductive success, impacts on movement throughout the range, increased mortality from vehicle collisions, increased noise from equipment and human activities, and increased predation.

Pronghorn Antelope

There are an estimated 110,247 acres of yearlong pronghorn antelope habitat within the WRPA and east to Boysen Reservoir (see Figure 3.8-1). The residual disturbance estimates for the existing development, Proposed Action and Alternatives are shown in Table 5.3-33. However, the seasonal ranges of pronghorn antelope within the WRIR has not been determined.

Although the direct habitat disturbance in the WRPA from the Proposed Action or alternatives is small (Table 5.3-33), recovery of sagebrush and desert shrub vegetation (important forage for the pronghorn antelope) from cumulative disturbances would take many years, which would result in long-term loss of important foraging areas for this species. However, pronghorn antelope also feed in the crop fields, which comprise approximately 50 percent of the WRPA (see Table 3.6-1 and Figure 3.6-1 in the DEIS). The availability of other sources of forage (e.g., crops) would reduce the impact of loss of sagebrush to this species. Increased human activity and vehicle use from the proposed development would also have an impact on the pronghorn antelope. However, it is expected that these disturbances would decrease after completion of construction and drilling operations at a well. Some studies have shown that pronghorn antelopes acclimate to noise from traffic and heavy equipment (Easterly 1991, Segerstrom 1982, Deblinger 1988, and Reeve 1984). Implementation of Operator-committed and agency-required mitigation measures, specified in Section 2.8 of the DEIS, would mitigate the impacts to the pronghorn antelope. Therefore, the cumulative impacts to the pronghorn antelope from the Proposed Action or alternatives, when combined with other past, present, and reasonably foreseeable future activities in the CIAA is anticipated to be moderate.

Table 5.3-33. Estimated Residual Disturbance from Existing and Proposed Development in the WRPA and in the Pronghorn Antelope Yearlong Range

Alternative	Disturbance (ac.)	% of WRPA	% of Yearlong Habitat
Proposed Action	833.2	0.91	0.76
Alternative A	1022.4	1.11	0.93
Alternative B	735.6	0.80	0.67
Alternative C	489.8	0.53	0.44

Mule Deer

There are 258,993 acres of yearlong mule deer habitat within the WRPA and east to Boysen Reservoir (see Figure 3.8-2 in the DEIS). The residual disturbance estimates for the existing development and Proposed Action and Alternatives within the WRPA are shown in Table 5.3-34. However, the extent of the mule deer habitat within the WRIR has not been determined.

Although the direct habitat disturbance from the Proposed Action or alternatives is small, recovery of sagebrush and desert shrub vegetation (important forage for the mule dear) would take many years, which would result in long-term loss of important forage for this species. However, the mule deer also feeds in the crop fields, which comprise approximately 50 percent of the WRPA (see Table 3.6-1 and Figure 3.6-1). The availability of other sources of forage would reduce the impact of loss of sagebrush to this species. Increased traffic and heavy equipment use from the proposed development would also have an impact on the mule deer. However, it is expected that these disturbances would decrease after the completion of construction and drilling operations. Some studies have shown that mule deer acclimate to noise from traffic and heavy equipment (Easterly 1991, Segerstrom 1982, Deblinger 1988, and Reeve 1984). Implementation of avoidance and minimization measures listed in Section 2.8 of the DEIS would mitigate the impacts to the mule deer. Therefore, the cumulative impacts to the mule deer from the Proposed Action or alternatives, when combined with other past, present, and reasonably foreseeable future activities in the CIAA is anticipated to be moderate.

Table 5.3-34. Estimated Disturbance from the Existing and Proposed Development within the WRPA and in the Mule Deer Yearlong Range[1]

Alternative	Disturbance (acres)	% of WRPA	% of Year-Long Habitat
Proposed Action	8333.2	0.91	0.32
Alternative A	1022.4	1.11	0.39
Alternative B	735.6	0.80	0.28
Alternative C	489.8	0.53	0.19

[1] See Appendix C in DEIS

WHITE-TAILED DEER

According to the WGFD, white-tailed deer are present within the WRPA area throughout the year, even though there are no herd units in this area. Although the direct habitat disturbance from the Proposed Action or alternatives is small, recovery of sagebrush and desert shrub vegetation (important forage for the white-tailed) would take many years, which would result in long-term loss of important forage for this species. However, the white-tailed deer also feeds in the crop fields, which comprise approximately 50 percent of the WRPA (see Table 3.6-1 and Figure 3.6-1), which would reduce the impact of loss of sagebrush to this species. Increased human and vehicle activity from the proposed development would also have an impact on the white-tailed deer. However, it is expected that these disturbances would decrease after the completion of construction and drilling operations at a well. Implementation of avoidance and minimization measures listed in Section 2.8 of this DEIS would mitigate the direct and indirect impacts to the white-tailed deer. Therefore, the cumulative impacts to the white-tailed deer from the Proposed Action or alternatives, when combined with other past, present, and reasonably foreseeable future activities in the CIAA is anticipated to be moderate.

Elk

There are 30,354 acres identified as “limited use” elk habitat by the WGFD (1999) within the WRPA and east to Boysen Reservoir (see Figure 3.8-4 in the DEIS). The residual disturbance estimates for the existing development, Proposed Action, and Alternatives within the WRPA are shown in Table 5.3-35. However, the extent of elk habitat within the WRIR has not been determined.

Based on the sporadic use of the WRPA by the elk (T. Ryder WGFD, personal communication,

October 13, 2004, the Wind River Gas Field Development Project is not likely to affect the elk. Therefore, the cumulative impacts to the elk from the Proposed Action or alternatives, when combined with other past, present, and reasonably foreseeable future activities in the CIAA would be minor.

Table 5.3-35. Estimated Residual Disturbance from Existing and Proposed Development in the WRPA and in the Elk Limited-Use Area[1]

Alternative	Disturbance (acres)	WRPA (%)	Limited-Use Area (%)
Proposed Action	833.2	0.91	2.75
Alternative A	1022.4	1.11	3.37
Alternative B	735.6	0.80	2.42
Alternative C	489.8	0.53	1.61

[1]See Appendix C in the DEIS

5.3.7.2 Raptors

Several species of raptors, including golden eagles, have been reported in the WRPA, and nests of raptors have also been observed within and adjacent to the WRPA (see Figure 3.8-6 and Appendix I). The home range of raptors varies based on the species and size. The home range of the northern goshawk is approximately 5,900 acres (rrc.boisestate.edu, accessed January 16, 2004); the home range of Swainson's hawk is approximately 1,280 acres [(www.id.blm.gov/bopnca/swainson.htm) accessed January 16, 2004]; and the home range of the red-tailed hawk varies from 292-1,150 acres. The residual impact in the Muddy Ridge and Pavillion fields, where the red-tailed hawks and nests have been observed (Buys & Associates 2003a), is estimated to be 619.8.8 acres (341.0 acres of disturbance from existing operations and 278.8 acres under the Proposed Action). Raptors could potentially be impacted by destruction of habitat, noise from construction activities, and reduction in prey species. Since there are few trees or rocky ledges in the Sand Mesa, Sand Mesa South, and Coastal Extension fields, the impacts to raptor nesting in these fields are expected to be negligible. Implementation of the mitigation measures described in Section 2.8 of the DEIS, such as no drilling within one mile of raptor nests, would further reduce potential cumulative impacts. Even with additional habitat disturbance from other past, present and reasonably foreseeable future activities, such as oil and gas development projects, residential and commercial development, and gravel mining, the cumulative impacts to raptors are expected to be minor.

5.3.7.3 Game Birds

Several species of game birds, including ring-necked pheasant, Canada goose, waterfowl (e.g., western grebe, cinnamon teal, northern pintail), greater sage-grouse, and gray partridge, have been reported for the WRPA, WRIR, and other areas in the vicinity of the Wind River Gas Field Development Project (see Appendix I). Under the Proposed Action or alternatives, direct and indirect impacts would occur to game birds due to the increased human activity, noise, and traffic. Implementation of avoidance and minimization measures listed in Section 2.8 of this DEIS would mitigate the direct and indirect impacts to the game birds. Therefore, the cumulative impacts to game birds from the Proposed Action or alternatives, when combined with other past, present, and reasonably foreseeable future activities in the CIAA would range from minor to moderate, depending on the species.

5.3.7.4 Fish

Several fish species were reported from Muddy, Fivemile, and Cottonwood Creeks within

WRPA (See Appendix I). Sport fish are stocked in Middle Reservoir, Boysen Reservoir and Ocean Lake. Since no oil and gas activities are allowed within 500 feet of these creeks, the impacts from the Proposed Action or alternatives are expected to be negligible. Other activities, such as residential development, agriculture, and grazing, and sand and gravel extraction, which may occur adjacent to creeks, lakes and reservoirs, may have a greater impact on the fish than oil and gas operations. Overall the cumulative impacts from the proposed gas development project, when combined with other past, present, and reasonably foreseeable future activities are expected to be minor. With implementation of the mitigation measures described in Section 2.8 of the DEIS the cumulative impacts to native and sport fish would be further reduced.

5.3.8 Threatened, Endangered, and State-Sensitive Species

Cumulative effects on threatened, endangered, and state-sensitive species were determined by combining the effects of the Proposed Action or alternatives with other past, present, and reasonably foreseeable future actions. The area analyzed for cumulative impacts on threatened, endangered or state-sensitive species comprises the Boysen Reservoir watershed, and includes the Muddy, Fivemile and Cottonwood Creek sub-basins within and adjacent to the WRPA.

Oil/gas development under the Proposed Action or Alternatives would be a small contributor to the cumulative impacts to federally listed, or state-sensitive species and their habitats within the WRPA. Even when these effects are combined with the incremental effects resulting from future residential and commercial development, gravel and sand mining, and increased vehicle use; the cumulative impacts would be minor. Implementation of avoidance and minimization measures identified in Section 2.8 of the DEIS would further reduce cumulative impacts. The potential cumulative impacts on individual threatened, endangered and sensitive species are discussed below.

5.3.8.1 Threatened and Endangered Species

Bald Eagle

The bald eagle, listed under the ESA as threatened, is known to winter in the general vicinity of the WRPA. There could be sporadic disturbance of individual eagles by construction, oil/gas development, or gravel mining. Recreational activities, such as hunting of large and small game species would continue within and adjacent to the WRPA could also contribute to potential cumulative impacts to the bald eagle. However, the moderate level of these activities in bald eagle foraging habitat would have not have a substantial impact on the available prey base. In addition, implementation of avoidance and minimization measures listed in Section 2.8 of the DEIS would reduce the likelihood of potential impacts to the bald eagle. Therefore, the Proposed Action or alternatives, when combined with other past, present, and reasonably foreseeable future activities in the CIAA would have minor cumulative impacts on bald eagle roosting, nesting and foraging habitat, and is "*not likely to adversely affect*" this species.

Black-footed Ferret

The endangered black-footed ferret has the potential to inhabit white-tailed prairie dog colonies of sufficient size and sufficient burrow density. The white-tailed prairie dog colonies in the northwest portion of the WRPA were determined to be of sufficient size and burrow density to support black-footed ferrets. However, the USFWS has determined that wild populations of black-footed ferrets are unlikely to be present within the white-tailed prairie dog colonies within Townships 3-4N and Ranges 2-5E in the WRPA and surrounding areas. These areas have been included in a "block clearance" by the USFWS (2004). However, the USFWS cautions that while it is unlikely that a wild population of ferrets would occur in these areas, the impact of an action on the value of prairie dog colonies as future reintroduction sites should be evaluated by the responsible agency (FWS 2004) prior to construction (e.g., at the time of the APD). With the implementation of avoidance and minimization measures identified in Section 2.8 of the DEIS, the Proposed Action or alternatives, combined with other past, present and reasonably foreseeable future activities would have negligible impacts on the black-footed ferret, and are "*not likely to adversely affect*" this species.

Canada Lynx

Due to the lack of forested habitat and the primary prey species, (i.e., snow shoe hare) within and adjacent to the WRPA, there would be no cumulative effects from past, present, and reasonably foreseeable future activities on the Canada lynx.

Grizzly Bear and Gray Wolf

There have been incidental observations of grizzly bears and gray wolves in the WRPA and WRIR. Although the Proposed Action or alternatives would result in impacts to grizzly bear and gray wolf habitats, they would be temporary and localized. As construction and is completed and abandoned well sites reclaimed, the amount of grizzly bear and gray wolf habitats impacted would be reduced. Implementation of avoidance and minimization measures listed in Section 2.8 of the DEIS would further reduce the likelihood of potential impacts to these species. Therefore, the cumulative impacts to the gray wolf and grizzly bear from the Proposed Action or alternatives, when combined with other past, present, and reasonably foreseeable future activities in the CIAA is anticipated to be negligible, and they are "*not likely to adversely affect*" these species.

5.3.8.2 State-Sensitive Species

Greater Sage-Grouse

The greater sage-grouse is identified as a species of concern by the USFWS and WGFD. This species has also been petitioned for listing under the ESA (69 Federal Register 21284). The sage grouse requires sagebrush habitat for foraging, courtship, breeding, and wintering habitat. Activities that are responsible for loss of sagebrush habitat in the Boysen Reservoir watershed include conversion of native sagebrush to cropland, residential and commercial development, oil and gas development, and past grazing practices within the sagebrush habitat, that encouraged the growth of tall grasses, forbs, and non-native grasses. Conversion of sagebrush to cropland is likely to continue as a result of reasonably foreseeable future activities in the CIAA. Although the level of increase of these activities is expected to be low, the cumulative impacts to the greater sage-grouse from further loss of sagebrush habitat would be moderate. However, implementation of avoidance and minimization measures listed in Section 2.8 of the DEIS would

reduce the cumulative impacts to the sage grouse.

Mountain Plover

The mountain plover was recently removed from the list of proposed listed species by the USFWS (2003b). Nevertheless, the mountain plover remains a species of special concern to the WGFD and USFWS. The mountain plover is commonly associated with prairie dog colonies and areas of sparse vegetation. Since a large number of prairie dogs colonies have been eliminated throughout their range, the mountain plover habitat has also been greatly reduced. The past, present, and reasonably foreseeable future activities in the Boysen Reservoir watershed that would impact the mountain plover include residential and commercial development, agriculture, livestock grazing, sand and gravel mining, and oil and gas development. Implementation of avoidance and minimization measures listed in Section 2.8 of the DEIS would mitigate the direct and indirect impacts to the mountain plover. Therefore, the cumulative impacts to the mountain plover from the Proposed Action or alternatives, when combined with other past, present, and reasonably foreseeable future activities in the CIAA is anticipated to be minor.

5.3.9 RECREATION

Cumulative impacts to recreation have been analyzed for the WRPA, the WRIR, and the WHMAs adjacent to WRPA. Reasonably foreseeable future development includes other oil and gas development in the WRIR, agriculture and grazing, and residential development in and near the WRPA. These activities in addition to gas development in the WRPA, could potentially cumulatively impact recreation.

5.3.9.1 Oil and Gas Development

To date oil and gas development within and near the WRPA has had a minor impact on recreation resources. As analyzed in Chapter 4, Environmental Consequences, the Proposed Action or Alternatives could increase impacts somewhat, but have a minor impact overall on recreation resources, with the exception that impacts to big-game hunting and viewing opportunities would be minor and long term under all of the alternatives and would be moderate and long term under Alternative A.

In the reasonably foreseeable future, the cumulative impact of oil and gas development would be the sum of the residual disturbance from past and existing gas development plus residual disturbance from new gas development from the Proposed Action or Alternatives, as well as any additional potential impacts of other oil and gas development in the WRIR.

The cumulative impacts of past oil and gas development plus potential impacts of the Proposed Action or Alternatives could range from 0.53 percent of the total acreage of the WRPA for Alternative C to 0.1.11 percent for Alternative A. This is based on estimates of cumulative residual disturbance for each alternative:

- **Proposed Action – 325 Wells.** The Proposed Action could add approximately 422.7 acres of residual disturbance to the existing residual disturbance of 410.5 acres, for a cumulative residual disturbance of 833.2 acres, or 0.91 percent of the WRPA,
- **Alternative A – 485 Wells.** Alternative A could add approximately 611.9 acres of residual disturbance to the existing residual disturbance, for a cumulative residual disturbance of 1022.4 acres, or 1.11 percent of the WRPA.

- **Alternative B – 233 Wells.** Alternative B could add approximately 325.1 acres of residual disturbance to the existing residual disturbance, for a cumulative residual disturbance of 735.6 acres, or 0.80 percent of the WRPA.
- **Alternative C (No Action) – 100 Wells, Pavillion Field Only.** Alternative C could add approximately 79.3 acres of residual disturbance to the total, for a cumulative residual disturbance of 489.8 acres, or 0.53 percent of the WRPA.

The effect of residual disturbance would be concentrated within the five fields, increasing the percentage of disturbed lands in those areas. However, even at within-field disturbance percentages, it is unlikely that the cumulative impacts of existing and proposed oil and gas development within the WRPA could be higher than the incremental impacts of the alternatives. In other words, the cumulative impact of oil and gas development is likely to be about the same as the incremental impact of the proposed project itself, regardless of alternative.

By type of impact, cumulative impacts to recreation would be:

- **Loss of federal lands available for recreation**. The cumulative loss of lands available for recreation would be minor and short term for all alternatives.
- **Loss of trust lands available for recreation**. Recreational use of trust lands is restricted to tribal members. The cumulative loss of lands available for recreation by tribal members would be minor and short term for all alternatives.
- **Reduction in hunting opportunities**. There would be a cumulative, moderate reduction in hunting opportunities in the WRPA under Alternative A (485 Wells) and minor reductions in hunting opportunities under the Proposed Action (325 Wells), Alternative B (233 Wells) and Alternative C (No Action). The cumulative reduction in hunting opportunities in the WRPA would be long term under all of the alternatives, because the recovery of sagebrush and desert shrub vegetation, used as forage by big game species, would take many years.
- **Reduction in fishing opportunities**. The cumulative reduction in fishing opportunities in the WRPA would be minor and short-term under all of the alternatives.
- **Reduction in ORV recreation**. The cumulative reduction in ORV recreation in the WRPA would be minor and short-term under all of the alternatives.
- **Decreased enjoyment of recreational experience**. The cumulative impact to enjoyment from recreational experience in the WRPA under Alternative A (485 Wells) would be a moderate reduction. There would be fewer opportunities to view large wildlife species because of the same factors, as noted previously, that would potentially cause a reduction in big-game hunting opportunities. The reduction in enjoyment from recreational experience would be minor under the Proposed Action (325 Wells), Alternative B (233 Wells) and Alternative C (No Action).

5.3.9.2 Oil and Gas Development Outside the WRPA

Other foreseeable future activities include oil and gas exploration and development that are planned for north and west of the WRPA in the WRIR. Development in this general area would probably have a negligible impact on the resources already affected in the WRPA because of their distance from existing fields, probably five miles or more, assuming that new oil and gas development takes place adjacent to the northwest corner of the WRPA.

However, reasonably foreseeable future oil and gas exploration and development in that area could potentially impact recreation resources in the northwest corner of the WRPA that may not have been affected to date. These would probably be lands that Tribal members may use for hunting in the vicinity of Muddy Ridge. Foreseeable future exploration and development nearby

could potentially change patterns of game use, affect the density of game populations and potentially displace hunters or impact the quality of the hunting experience. The locations of future oil and gas activity on WRIR land are not known at this time. The impacts to tribal hunting resources within the WRPA would likely be minor and would not change the level of cumulative impacts to the recreation resources of various kinds in the WRPA.

5.3.9.3 Other Reasonably Foreseeable Future Activities (RFFA)

Irrigated agriculture began with private and public water development projects in the early 20th century. Original game habitat lost in the conversion to cropland was replaced by new game habitat supported by water development. Agricultural areas support the levels of recreational hunting and fishing that exist today and provide hunting, fishing and other recreation activity—including pheasant and waterfowl hunting and water-based, non-consumptive recreation—that are regionally important in an otherwise dry part of the state.

Recreational access to lakes, streams and related facilities that were originally developed or improved by the BOR, is now maintained by Wyoming state agencies, (e.g. Boysen State Park, Sand Mesa WHMA, and Ocean Lake WHMA). On a smaller scale, the state promotes public access to private habitat through the leasing of "walk-in" hunting areas. Recreation opportunities are greater today because of water development and irrigated agriculture, which have jointly had a major beneficial impact on recreation in the WRPA.

Residential development can impact recreation resources by absorbing or fragmenting habitat, changing game populations and distribution, and increasing demand for recreation. However, impacts to recreation from residential development in and near the WRPA have been minimal.

As noted in Section 4.7 (Land Use), the nearest residential area is the Town of Pavillion, one mile west of the WRPA. Most of the residences in and near the WRPA are isolated homes that are part of larger agricultural areas. Tribal land in and near the WRPA has no residential development. These Tribal lands are devoted to rangeland and resource extraction, and most are in more remote area of the WRIR that is not served by a federal or state highway.

These characteristics suggest that Reasonably Foreseeable Future Development (RFFD) is unlikely to include more than limited residential development on private land and on Tribal land. Given that scenario, residential development in the future would make a minor contribution to cumulative impacts to recreation resources in and near the WRPA.

5.3.10 Visual Resources

The Cumulative Impacts Analysis area (CIAA) for visual resources is the WRPA plus the vicinity around the WRPA, where people can see the wells and facilities (assumed to be within a few miles of the WRPA boundaries). In addition to the Proposed Action or Alternatives A, B and C (No Action), the visual resource CIA area includes the following reasonably foreseeable future activities actions that may occur within and/or adjacent to the WRPA: gravel/sand mining operations, residential development, casino/retail development, and oil and gas exploration and development.

The Proposed Action and Alternatives A, B and C (No Action) would add to the existing impact to visual resources associated with natural gas development in the WRPA. Impacts to visual resources within the WRPA under the Proposed Action and Alternatives A and B would shift the character of the landscape in some areas from farming and ranching to a more industrial nature.

Alternative C (No Action) would result in similar cumulative impacts over a smaller geographic area, as development would be limited to the Pavillion field. However, because Pavillion field is located within the most densely populated area of the WRPA, the limited geographic influence on cumulative impacts has the potential to affect a large number of people, when compared to the entire population within the WRPA. Reasonably foreseeable future development of one or multiple gravel/sand extraction operations within the WRPA would contribute to the change in landscape character by creating additional contrasts in the line, color, form and texture with the surrounding landscape.

The cumulative effects of these visual impacts would create the appearance of a highly modified landscape and alter the visual experience for those traveling through or residing in the WRPA. This change in overall landscape character may affect property values within the WRPA, which may influence future residential development. Visitation to recreation areas within and adjacent to the WRPA may also be affected by this change in landscape character and visual experience. One has to remember these are not public lands. Non-Indians are “guests” on the Reservation.

5.3.11 Cultural Resources

The CIA area for cultural resources is the WRPA and adjacent areas within the Wind River Indian Reservation in Fremont County. The WRPA and surrounding areas are known to contain archaeological sites associated with nearly all of the prehistoric phases and complexes dating to about 11,000 years ago. Only about 20 percent of the WRPA has been surveyed for cultural resources, and no major excavations have been completed in the area. It is therefore possible that the WRPA contains archaeological sites that would contribute substantially to our understanding of prehistory. Development of natural gas fields in this area has been accomplished since 1960 without reported adverse impacts to significant archaeological sites, and the limited extent of the proposed gas development (in terms of percentage of total land area) indicates that proposed development under the Proposed Action or Alternatives A, B or C could be accomplished without substantial impacts to significant archaeological resources. If significant archaeological sites cannot be avoided, impacts to the sites can be mitigated through data recovery, which would add to the body of knowledge about the prehistory of the region.

Available cultural resources records and literature sources have not indicated that outstanding cultural resources exist within the WRPA that might be visually affected by natural gas development. Elders of the Eastern Shoshone and Northern Arapaho Tribes have indicated that potential Traditional Cultural Properties do not exist within the WRPA. Execution of the proposed natural gas development in conjunction with other reasonably foreseeable future activity in the WRIR is, therefore, unlikely to have substantial cumulative impacts to cultural resources under the Proposed Action or Alternatives A, B, and C.

5.3.12 Socioeconomics

5.3.12.1 Introduction

Potential cumulative socioeconomic effects are assessed for the following areas:

- Wind River Indian Reservation
- Fremont County
- WRPA portion of the Midvale Irrigation District

Cumulative socioeconomic effects would be associated with past, current and reasonably foreseeable future activities that affect economic, employment and population conditions on the WRIR and within Fremont County. Past natural gas development and future residential, commercial and industrial development in the WRPA portion of the MID could also result in cumulative socioeconomic impacts.

5.3.12.2 Reasonably Foreseeable Future Activities on the Wind River Indian Reservation

The Northern Arapaho Tribe has announced plans to build a casino on the WRIR south of Riverton. Current plans are to begin construction in the spring of 2004. Some US Department of Interior approvals are still pending, however (Casper Star Tribune 2003, Thorsen 2004). Under the most optimistic schedule, it is likely to be several years before the casino would be operational. While the casino could require some non-local employees, most of the workforce is anticipated to come from the WRIR and Fremont County. The small non-local workforce would not appreciably add to county population or housing demand in the early years of operation. Depending on the scale and success of the casino, the effects on indirect employment in retail, wholesale, service and other sectors of the local economy could be substantial. However, many of these jobs would also be filled from the local labor pool. Therefore, population increases associated with the casino would be anticipated to be negligible to minor.

5.3.12.3 Reasonably Foreseeable Future Activities in Fremont County

The Town of Riverton has recently decided to pursue location of a Wyoming Department of Corrections prison facility in the Riverton area. The site selection process is in the early stages, therefore it is not yet known if Riverton will be successful in its efforts (Riverton Ranger 2003b, Thorsen 2004). Consequently the potential prison facility was not considered in this cumulative assessment.

There are considerable oil and gas reserves in Fremont County. In 2001, Fremont County produced six percent of all oil produced in Wyoming and nine percent of all gas. Exploration and production of oil and gas resources is driven in large part by price. Substantial increases in the price of oil and gas could accelerate oil and gas exploration and development in the county and elsewhere in the state, resulting in increases in employment and, potentially, population. As described in Section 4.13, the regional oil and gas service industry could accommodate a substantial increase in activity with existing capacity and by hiring or in some cases re-hiring currently unemployed or underemployed workers in the region. Moreover, community infrastructure in Riverton has capacity to accommodate population levels that are higher than currently exist. Consequently, moderate increases in oil and gas exploration and development could be accommodated by the existing oil and gas service industry, local labor pool and community infrastructure.

5.3.12.4 Past, Present and Reasonably Foreseeable Future Activities in the WRPA

Currently, there are 178 producing wells in the WRPA, including 100 in the Pavillion field, 75 in the Muddy Ridge field and 3 in the Sand Mesa field. These wells, ancillary facilities and the associated development and production activity have affected socioeconomic conditions in the WRPA, and these effects are described as part of the characterization of the affected environment contained in Section 3.13.6. Currently the existing WRPA wells are in the production stage, and generate lower levels of activity than during development. But, when combined with the development associated with the Proposed Action or alternatives, the

existing development would contribute to cumulative impacts on certain elements of the socioeconomic environment. Cumulative economic, employment, and fiscal effects would be positive. Cumulative effects on split estate, the rural character of certain areas within the WRPA and associated property values could be negative.

Most cumulative socioeconomic effects would occur in the Pavillion and Muddy Ridge fields; the Sand Mesa field has only three producing wells, there has been no development in the Sand Mesa South field and no recent development in the Coastal Extension field. Under Alternative C – No Action, cumulative socioeconomic effects would occur only in the Pavillion field.

Cumulative gas field activities would increase demand for law enforcement and emergency response services under all alternatives, but the increment of demand associated with proposed production activities is minor.

The existing natural gas-related disturbance on irrigated land would result in losses in MID assessment revenues, if the BOR were to reclassify agricultural land within the district (see Section 3.13.6.1). The Operators anticipate drilling wells on irrigated land only in the Pavillion field. For wells on irrigated lands, where well heads and access roads have been reclaimed to an approximate 8 foot by 8 foot disturbance area, the total amount of residual disturbance for all wells would be substantially less than 1 acre, for any alternative, which would result in losses of less than $15.00/year to the MID, if the BOR reclassified the land. Residual disturbance for production facilities associated with wells on irrigated land would total an estimated 20.7 acres under the Proposed Action, although many of these facilities would be located along roads and off irrigated lands. Total Proposed Action-related residual disturbance for wells and production facilities in the Pavillion field would be about 21 acres which would result in losses in $315/year to the MID if the BOR were to reclassify the land. The amount of existing residual disturbance associated with older wells and facilities on all lands is 145 acres. Although most is on dry land, some portion of those wells and facilities are located on irrigated lands. The portion of older wells and facilities on irrigated land has not been identified for this assessment; however, it is substantially less than 100 acres. For illustration purposes, if all 100 acres were reclassified by the BOR, the MID would lose $1,500/year in assessment revenues, which, when added to the potential lost revenue amounts associated with existing new wells on irrigated lands and proposed wells on irrigated lands, the total lost revenue would be less than $2,000 a year under any alternative.

Although the potential for conflict on split-estate lands is diminished during the production phase, conflict still could occur, particularly during reentry on surface lands for re-completion and other well maintenance activities. As with the Proposed Action and alternatives, the mitigation measures listed in Section 4.13.7 would reduce the potential for conflict.

Although natural gas development has been ongoing in the Pavillion field for over 40 years, the recent acceleration in the pace of development, and the resultant cumulative disturbance and increased development and production activity has accelerated the pace of change in rural character toward a mixture of rural and resource extraction land uses.

The combined existing and proposed gas development would remove some agricultural land from production and potentially disrupt irrigation systems and cultivation practices, affecting net income of agricultural operations. This loss in agricultural income would be offset by surface use agreement payments and Operator-committed mitigation measures.

Potential future commercial and industrial activities which may affect socioeconomic conditions in the WRPA include sand and gravel mining on Tribal lands within the WRPA and sand and gravel mining, oil and gas exploration and development, and timber harvesting on the WRIR lands north and west of the WRPA. At present, the location, timing, size and other characteristics of these activities are unspecified, so the cumulative effects of these activities on socioeconomic conditions within the WRPA cannot be assessed.

5.3.13 TRANSPORTATION

The cumulative impacts analysis area for transportation includes the WRPA and the adjacent segments of the federal and state highways and county roads that provide access to the WRPA. Traffic generating activities within the WRIR and Fremont County were also considered for the cumulative assessment.

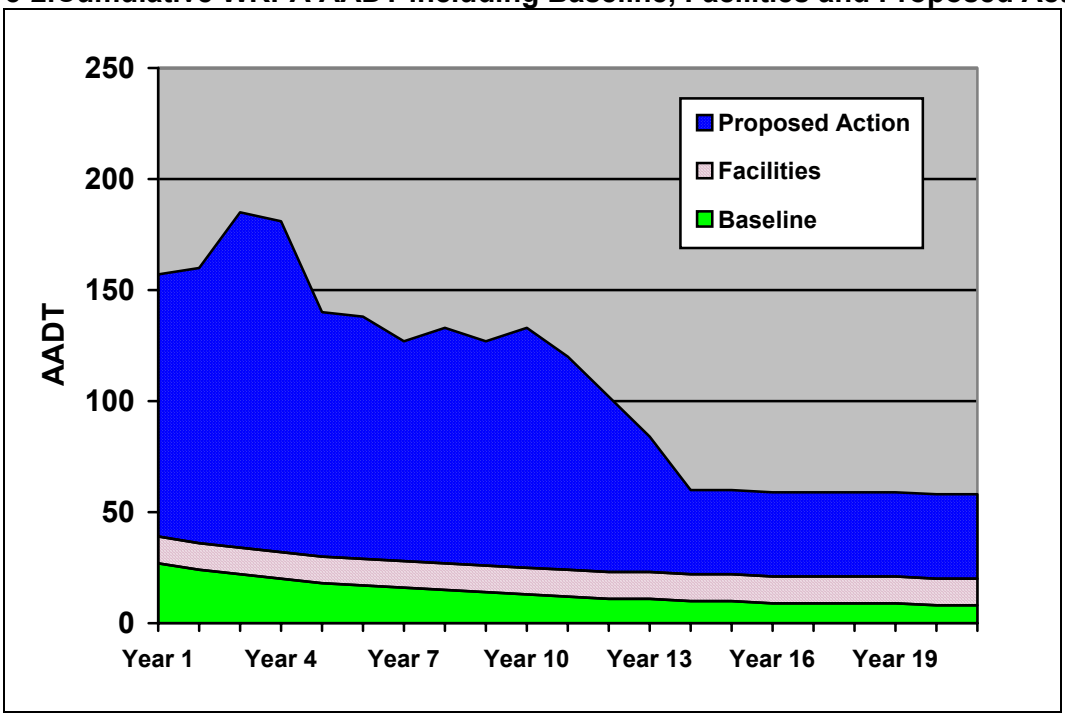
5.3.13.1 Reasonably Foreseeable Future Activities Potentially Affecting Transportation Conditions in the WRPA

Potential cumulative transportation impacts would be associated with existing and future natural gas development and production operations in the WRPA, existing and potential increases in residential, agricultural, recreational and Midvale Irrigation District (MID) traffic within the WRPA, potential increases in commercial and industrial traffic in and near the WRPA, and increases in thru-traffic on the adjacent segments of the federal and state highways providing access to the WRPA.

Existing Natural Gas Operations within the WRPA

Figure 5-2 displays projected total average annual daily traffic (AADT) to and from the WRPA for traffic associated with existing production operations, traffic associated with compression and production facilities within the WRPA, and traffic associated with the Proposed Action.

Figure 5-2.Cumulative WRPA AADT including Baseline, Facilities and Proposed Action.



As shown by Figure 5-2, baseline AADT, associated with existing gas production operations, would decline over time as existing wells cease production and are plugged and abandoned, but compression and production facilities AADT would remain relatively constant as new production replaces production from existing wells. Cumulative gas operations AADT would peak at an estimated 158 in the third year of the Proposed Action and decline to about 58 after the development phase of the Proposed Action is completed. Cumulative gas production AADT would continue to decline over time as wells are plugged and abandoned.

Residential, Agricultural and Recreational Activities within the WRPA

In addition to the natural gas-related activities discussed above, existing traffic within the WRPA is generated by residential, agricultural and recreational land uses, and by the activities of the MID.

Residential land uses in the WRPA may increase in the near term as larger parcels of farm land are subdivided, sold and developed into low-density residential housing. This trend is currently occurring in parts of the WRPA, but at current levels would not increase traffic appreciably across the entire WRPA over the next several decades. Agricultural activities and related traffic are anticipated to remain relatively constant.

Recreational use within the WRPA may also increase over time. Recreational use data for Boysen Reservoir, Bass Lake, and Ocean Lake all show generally flat or slightly upward trends, with seasonal variations and changes in use in response to fluctuations in reservoir levels. This is especially true at Boysen Reservoir's west side and at Bass Lake. Boysen Reservoir has excess day and overnight recreation use capacity throughout the park, so in the future, increases on the west side (potentially affecting Bass Lake Road) would be slightly upward, but not disproportionate to the rest of the park. It is likely that the features of the Sand Mesa WHMA will be maintained rather than expanded, and no improvements are planned which would drive

increases in recreational use of tribal and private lands (see Section 4.10.6).

The MID has an ongoing program of maintenance of water distribution and drainage systems within the WRPA and elsewhere in the district, which generates fluctuating volumes of truck and heavy equipment traffic on a short-term basis. In addition, the MID is emphasizing conversion from open conduits to pipelines and sprinklers. Conversion of water distribution and delivery systems may generate additional construction traffic, but this traffic would be short-term in nature.

Commercial and Industrial Activities in and near the WRPA

Potential future commercial and industrial activities, which may affect traffic conditions, include sand and gravel mining on Tribal lands within the WRPA and sand and gravel mining, oil and gas exploration and development, and timber harvesting on the WRIR lands north and west of the WRPA. At present, the location, timing, size and other characteristics of these activities are unspecified, so the cumulative effects of these activities on highways and roads providing access to and within the WRPA cannot be assessed.

The Northern Arapaho Tribe is planning to build a casino on tribal land located south of Riverton, and has hired an architectural firm and a construction contractor (Casper Star Tribune 2003). This development would likely increase thru-traffic on US 26 north and west of Riverton, but the cumulative effect of casino and WRPA traffic is likely to be relatively small when compared to peak summer-time traffic volumes that already occur on this highway. Development of the casino would be unlikely to have a measurable effect on other highways and roads providing access to and within the WRPA.

The Riverton City Council has decided to actively pursue the construction and operations of a new medium security state prison in Riverton (Riverton Ranger 2003b). At present, it is not known when or whether the State of Wyoming will decide to locate a prison in the Riverton area, so the effects of the prison on area highways cannot be assessed.

5.3.13.2 Federal and State Highways Providing Access to the WRPA

Table 5.3-36 displays percentage increases and decreases in total and truck AADT on highways proving access to the WRPA between 1991 and 2001.

Table 5.3-36: Percentage Increase (Decrease) in Average Annual Daily Traffic

Highway	Segment	Total Increase in Overall AADT: 1991 - 2001	Total Increase in Truck AADT: 1991 - 2001
US 26/789	Shoshoni west corporate limits	8%	-8%
	Junction WYO 134	27%	-23%
	Riverton north corporate limits	32%	-8%
US 26	Riverton west corporate limits	35%	-9%
	Junction WYO 133	28%	-14%
WYO 134	Junction US 26	59%	47%
	Midvale	40%	23%
WYO 133	Junction US 26	44%	20%
	Junction WYO 134	41%	-23%
	Pavillion west corporate limits	37%	-23%

As shown by the table, AADT increased on every affected segment between 1991 and 2001. Increases ranged from 8 percent at the west corporate limits of Shoshoni (or less than one percent per year) to 59 percent at the junction of US 26 and WYO 134 (almost 6 percent per year). In contrast, truck traffic decreased on most segments, the notable exception being on WYO 134, which had a 47 percent increase at the junction with US 26 and a 20 percent increase at Midvale, and the junction of WYO 133 and US 26, which had a 20 percent increase. Although the percentage increase in truck traffic at these locations was substantial, the numerical increase was modest, ranging from 35 more trucks per day at the junction of WYO 134 and US 26, to 15 more trucks per day at both WYO 134 at Midvale and the junction of WYO 133 and US 26.

WYDOT has not prepared forecasts of future traffic conditions on the highways which provide access to the WRPA, but the agency generally assumes that traffic increases on highways across the state will average from 3 to 5 percent annually (Steele 2003), which is consistent with average annual increases on most of the affected segments between 1991 and 2001. If this assumption holds in the future, traffic on the affected segments would double in 15 to 25 years. As traffic from other sources on affected highway segments increases over time, the traffic

associated with the Proposed Action or alternatives would become a smaller portion of the total traffic on these highways. Consequently, the contribution of the Proposed Action or other alternatives to cumulative traffic volume on highways providing access to the WRPA would be negligible to minor on most segments, except where gas related traffic converges on WYO 134 in the Midvale area, where impacts and particularly truck impacts could be minor to moderate.

5.3.13.3 Fremont County Roads Providing Access to and within the WRPA

As noted above, residential, and recreational traffic within the WRPA may increase modestly over the next several decades. Traffic associated with agricultural activities is anticipated to remain relatively stable and traffic associated with the MID may show short term increases during facility construction and reconstruction. Traffic associated with existing natural gas operations would decline over time. Although there may be some traffic associated with natural resource extraction activities within the WRPA (sand and gravel mining) and outside the WRPA to the north and west (sand and gravel mining, oil and gas exploration and development, timber harvesting) schedules and locations for these activities have not been specified and have not been considered for this assessment. Therefore, the only activities which would have a substantial impact on county roads within the WRPA would be the Proposed Action and alternatives.

5.3.13.4 Private and Operator-Maintained Roads within the WRPA

Estimates of the total length of new private and Operator maintained resource roads are provided in Section 4.14 (Transportation) for each alternative. It is anticipated that resource roads may also be used for agricultural and recreational activities, but because these roads would not be thoroughfares or provide access to key developed recreation facilities and use areas, use by other than the Operators is anticipated to be minor. Use of resource roads on private lands would be controlled by the landowners.

5.3.14 Health and Safety

For cumulative impacts to human health and safety, the various project-related activities were considered along with other reasonably foreseeable future projects that may occur in the region. These other projects include oil and gas activities in the WRIR outside of the WRPA, gravel mining, timber harvesting in the Owl Creek Mountains, a planned casino/commercial development, and modest levels of residential growth in and around Riverton, Pavillion, Fort Washakie, Ethete, and Arapaho.

The Proposed Action and Alternatives, when considered with other projects, would result in a slight increase in occupational accidents in the region above and beyond those identified for the Proposed Action alone, resulting in a minor impact.

Human health and safety effects to the residents of properties adjacent to the major access roads within the WRPA would be minor. These minor risks would result from generation of increased traffic, noise, air emissions, and fugitive dust from project-related vehicles associated with any of the alternatives. Truck trips and related hazards to public safety associated with increased accident risks, dust, and noise emissions from the multiple activities would be slightly greater than described for the Proposed Action or alternatives alone. The cumulative impact associated with traffic increases would be experienced over a broader geographic area than just in and around the WRPA. Given the broad geographic area affected and the rural charter of the region, the cumulative impacts to health and safety would be minor.

The cumulative increase in fire hazards associated with the Proposed Action or Alternatives and all other projects considered in the overall region would be similar to those described for the Proposed Action, but would be distributed over a larger geographic area and are rated as negligible.

Pipeline ruptures and accidents could potentially occur anywhere in the region where pipelines would be located. Given the relatively infrequent incidence of pipeline accidents, the rural character of the region, and modest level of overall construction and utility installation activity, pipeline–related ruptures and accidents would result in minor cumulative impacts to health and safety.

Other projects and construction activities in the region that would utilize, store or transport hazardous materials, and/or generate hazardous wastes would be subject to regulations that would minimize the potential for accidental spills or releases into the environment. Assuming that the Proposed Action or Alternatives and all other projects comply with applicable regulations, the cumulative human health and safety impacts within and near the WRPA are rated as negligible.

5.3.15 Noise

Sources of noise within the WRPA would result from:

- Construction, drilling, and completion of wells.
- Compressor stations.
- Project-related traffic along access roads.

However, cumulative noise effects within the WRPA would be minor for two reasons. First, no additional noise sources other than natural gas development are anticipated within or immediately adjacent to the WRPA. In addition, there would be sufficient distance between project construction sites, facilities, and compressor stations, and residences within the WRPA and WRIR.

Under all alternatives, there would be minor increases in the cumulative noise resulting from increases in AADT along roads leading into the WRPA. The noise would be greatest during the development phase (well pad construction, drilling, and completion) of the Wind River Gas Development Project. Additionally, the traffic noise would generally be the greatest during morning and evening when workers and equipment would be arriving and departing the construction sites. After all the wells are operational, traffic noise would decrease.

Cumulative noise increases would be the highest along Gables Road and Eight Mile Road because approximately 70 percent of project traffic would use these routes to enter the WRPA from U.S. Highway 134. The other 30 percent would use Wyoming Highways 133 and 134 from U.S. Highway 26, resulting in a smaller increase of traffic noise along these roads.

These minor increases would be similar for each alternative. However, he length of the construction phase of each alternative would vary, so that the cumulative noise effects would last the longest time under Alternative A, followed by the Proposed Action, then Alternative B, and finally Alternative C

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Table 5.3-37. Summary of Cumulative Impacts from the Proposed Wind River Gas Field Development Project. [1,2,3,4]

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
DISTURBANCE (ACRES)[5]					
Disturbance – WRPA Before reclamation – acres (% WRPA) After reclamation – acres (% WRPA)	Varies with resource analyzed	1,982 (2.15) 423 (0.46)	2,819 (3.06) 612 (0.67)	1,610 (1.75) 325 (0.35)	317 (0.34) 79 (0.09)
GEOLOGY/MINERALS/PALEONTOLOGY					
Increased surface runoff and erosion	Wind River Indian Reservation	Minor	Moderate	Minor	Minor
Deplete petroleum reserves	WRIR	Major	Major	Major	Major
Deplete other resources, e.g. sand and gravel	WRIR	Negligible	Negligible	Negligible	Negligible
Damage to fossils	WRIR	Negligible	Minor	Negligible	Negligible
Uncover new fossils and localities **(beneficial)**	WRIR	Minor	Moderate	Minor	Minor
SOILS					
Increased runoff and	Boysen Reservoir Watershed: includes Fivemile Creek, Muddy Creek, Cottonwood Drain, Cottonwood Creek	Minor	Moderate	Minor	Minor
Soil compaction	Boysen Reservoir Watershed	Minor	Moderate	Minor,	Minor
Loss of topsoil productivity	Boysen Reservoir Watershed	Minor	Moderate	Minor	Minor
Soil contamination (petroleum hydrocarbons and salts)	Boysen Reservoir Watershed	Unknown	Unknown	Unknown	Unknown
AIR QUALITY					
Increases in Local Pollutant Concentrations	Near Field – Project Area + 22.7 miles	PM_{10}: Moderate; NO_2,: Moderate SO_2: negligible	PM_{10}: Moderate; NO_2,: Moderate SO_2: negligible	PM_{10}: Moderate; NO_2,: Moderate SO_2: negligible	PM_{10}: Moderate; NO_2,: Moderate SO_2: negligible
Increases in Regional	Far Field -Regional	PM_{10}: Moderate,	PM_{10}: Moderate,	PM_{10}: Moderate	PM_{10}: Moderate

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
Pollutant Concentrations	including northwestern portion of WY, Grand Teton and Yellowstone National Parks and Bridger, Fitzpatrick, Popo Agie, Cloud Peak, North Absaroka, Teton, and Washakie wilderness areas	NO_2,: Moderate SO_2: negligible	NO_2,: Moderate SO_2: negligible	NO_2,: Moderate SO_2: negligible	NO_2,: Moderate SO_2: negligible
Increases in Terrestrial Acid Deposition (nitrogen only: sulfur is negligible in all cases).	Far Field - Regional	Cloud Peak: Minor, Other areas: negligible.	Cloud Peak: Minor, Other areas: negligible	Cloud Peak: Minor, Other areas: negligible	Cloud Peak: Minor, Other areas: negligible
Increases in Aquatic Acid Deposition (Decreased Lake ANC)	Far Field - Regional	Florence Lake: Moderate Emerald Lake: minor, Other lakes: negligible.	Florence Lake: Moderate Emerald Lake: minor, Other lakes: negligible	Florence Lake: Moderate Emerald Lake: minor, Other lakes: negligible	Florence Lake: Moderate Emerald Lake: minor, Other lakes: negligible
Reductions in Visibility (Regional Haze)	Far Field - Regional	Days > 1.0 dv: 30 Max Δ dv: 2.15, Wind River Canyon	Days > 1.0 dv: 34 Max Δ dv: 2.22, Wind River Canyon	Days > 1.0 dv: 28 Max Δ dv: 2.12, Wind River Canyon	Days > 1.0 dv: 24 Max Δ dv: 2.04, Wind River Canyon
SURFACE WATER					
Disruption of surface drainage systems	Boysen Reservoir Watershed	Minor to moderate	Minor to moderate	Minor	Minor
Increased runoff and erosion	Boysen Reservoir watershed	Minor to moderate	Minor to moderate	Minor	Minor
Increased sedimentation in lakes and reservoirs	Boysen Reservoir Watershed	Minor	Moderate	Negligible	Negligible
Increased suspended solids (turbidity)	Boysen Reservoir Watershed	Moderate	Moderate	Minor	Minor
Change in water quality	Boysen Reservoir Watershed	Minor	Minor	Negligible	Negligible
GROUNDWATER					
Change in water quality,	Boysen Reservoir Watershed	Negligible	Negligible	Negligible	Negligible
VEGETATION					
Loss of vegetation	Boysen Reservoir	Minor	Moderate	Minor	Minor

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
	Watershed				
Reduction in species diversity	Boysen Reservoir Watershed	Minor	Moderate	Minor	Minor
Increase in noxious weeds and nuisance species	Boysen Reservoir Watershed	Minor	Moderate	Minor,	Minor
WETLANDS					
Loss of wetlands, riparian areas.	Boysen Reservoir Watershed	Minor	Minor	Minor	Minor
LAND USE					
Impact to agricultural lands	WRPA plus Surrounding area	Moderate	Moderate	Minor	Minor[4]
Impact to range resources	WRPA plus Surrounding area	Minor	Minor	Minor	Negligible
Impact to residential areas	WRPA plus Surrounding area	Moderate	Moderate	Minor	Minor
Impact to recreational areas/ WHMAs	WRPA plus Surrounding area	Minor	Minor	Minor	Negligible
WILDLIFE					
Impacts to fish and wildlife species	Boysen Reservoir Watershed:	Minor to moderate depending on species	Minor to moderate depending on species	Minor to moderate depending on species	Minor to moderate depending on species
Loss of habitat	Boysen Reservoir Watershed	Minor to moderate depending on species	Minor to moderate depending on species	Minor to moderate depending on species	Minor to moderate depending on species
Wildlife displacement	Boysen Reservoir Watershed	Minor to moderate	Moderate	Minor	Minor
Increased mortality	Boysen Reservoir Watershed	Minor	Minor	Minor	Minor
Habitat fragmentation	Boysen Reservoir Watershed	Minor to moderate depending on species	Minor to moderate depending on species	Minor to moderate depending on species	Minor to moderate depending on species
THREATENED/ ENDANGERED/STATE SENSITIVE SPECIES					
Loss of Canada lynx habitat	Boysen Reservoir Watershed	None	None	None	None
Loss of bald eagle nesting, roosting, foraging	Boysen Reservoir Watershed	Minor	Minor	Minor	Minor

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
habitat					
Loss of black-footed ferret habitat	White-tailed prairie dog colonies in WRPA	Negligible	Negligible	Negligible	Negligible
Loss of gray wolf habitat	Boysen Reservoir Watershed	Negligible	Negligible	Negligible	Negligible
Loss of grizzly bear habitat	Boysen Reservoir Watershed	Negligible	Negligible	Negligible	Negligible
Loss of mountain plover habitat	Boysen Reservoir Watershed	Minor	Minor	Minor	Minor
Loss of sage-grouse habitat	Boysen Reservoir Watershed	Moderate	Moderate	Moderate	Moderate
RECREATION					
Reduction in hunting and fishing opportunities, wildlife viewing and ORV recreation.	WRPA, WRIR, and WHMAs adjacent to WRPA	Minor	Minor	Minor	Minor
VISUAL RESOURCES					
Alteration of landscape character	WRPA + Surrounding area	Moderate	Moderate	Minor	Minor
Reduction in scenic quality	WRPA + Surrounding area	Moderate	Moderate	Moderate	Minor
Impact to VRI Class III areas	WRPA + Surrounding area	Minor	Moderate	Negligible	Negligible
CULTURAL RESOURCES					
Impacts to cultural resources.	WRPA + 5 mi Buffer	Minor	Minor	Minor	Minor
Disturbance of Native American traditional uses	WRPA + 5 mi Buffer	Minor	Minor	Minor	Minor
SOCIOECONOMICS					
Regional economic output **(beneficial)**	WRIR, Fremont County	Moderate	Moderate	Moderate	Minor
Employment **(beneficial)**	Moderate, WRIR, Fremont County	Moderate	Moderate	Moderate	Minor
Personal income	WRIR, Fremont County	Major	Major	Major	Minor

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
(beneficial)					
Revenues to the Eastern Shoshone and Northern Arapaho Tribes **(beneficial)**	Major, Long term WRIR, Fremont County	Major	Major	Moderate	Minor
Revenues to Fremont County taxing entities **(beneficial)**	WRIR, Fremont County	Moderate,	Moderate	Minor	Minor
Split estate conflicts	WRIR, Fremont County	Moderate,	Moderate	Moderate	Moderate
Increased traffic and maintenance demands on state and federal Highways	WRPA and Public Access into Area	Minor (except for WYO 134, which would be moderate	Minor (except for WYO 134, which would be moderate),	Minor (except for WYO 134, which would be moderate),	Negligible (except for WYO 134, which would be minor
Increased traffic and maintenance demand on county roads.	WRPA, Public Access into Area	Minor to Moderate (varying over time and across the WRPA),	Minor to Moderate (varying over time and across the WRPA	Minor to Moderate (varying over time and across the WRPA	Minor to Moderate (varying over time and across the WRPA
HEALTH AND SAFETY					
Increased work-related accidents	WRPA, Public Access into Area	Minor	Minor	Minor	Negligible
Increased vehicle traffic and accidents	WRPA, Public Access into Area	Minor	Minor	Minor	Negligible
Increased likelihood of wildfires	WRPA, Public Access into Area	Negligible	Negligible	Negligible	Negligible
Pipeline Fire and Explosion Hazards	WRPA, Public Access into Area	Minor	Minor	Minor	Negligible
Hazardous Materials and Waste – spills and releases	WRPA, Public Access into Area	Negligible	Negligible	Negligible	Negligible
NOISE					
Noise from construction	WRPA and surrounding area	Moderate	Moderate	Moderate	Moderate
Noise from drilling	WRPA and surrounding area	Moderate	Moderate	Moderate	Moderate
Vehicle noise	WRPA and surrounding area	Minor	Minor	Minor	Minor

DESCRIPTION OF POTENTIAL CUMULATIVE IMPACT	CUMULATIVE IMPACT AREA	CUMULATIVE IMPACTS (Past, Present, RFFA)			
		Proposed Action (325 Wells)	**Alternative A (485 Wells)**	**Alternative B (233 Wells)**	**Alternative C (No Action)**
Compressor noise	WRPA and surrounding area	Moderate	Moderate	Moderate	Moderate

[1]**Definitions:**
Negligible impacts – Changes in resource condition are lightly above level of detection.
Minor Impacts – Changes is resource condition are measurable, but small and localized.
Moderate Impacts – Changes in resource condition are measurable and result in consequences that are relatively localized.
Major Impacts – Changes in resource condition are measurable and have substantial consequences at a regional level.
[2]See DEIS Chapter 5 for detailed discussion of cumulative impacts.
[3]All impacts are adverse unless identified as "beneficial."
[4] Note that these determinations assume implementation of mitigation.
[5] Quantitative data are not available for disturbances from past, present, and RFFA

CHAPTER 6: CONSULTATION AND COORDINATION

There were no changes to Chapter 6 text.

REFERENCES CITED

Add the following references:

Anderson, G. 2004. Wyoming Game and Fish Department, personal communication with M. Fischel, Buys & Associates, Inc., October 8, 2004.

Dolhopf, D.J. 2004. Hydrocarbon and Salt-Contaminated Soil Resources Associated with Gas Well Development on Lands Near Pavillion, Wyoming. August 11, 2004.

Erwin, K. 2004. US Fish and Wildlife Service, personal communication with M. Fischel, Buys & Associates, Inc., October 2004.

Green, J. and J. Flinders. 1980. Habitat and dietary relationships of the pygmy rabbit. Journal of Rangeland Management, 33:136-142.

Interagency Conservation Strategy Team. 2003. Final Conservation Strategy for the Grizzly Bear in the Yellowstone Ecosystem. Missoula, MT. 86 pp.

Interagency Grizzly Bear Committee. 1986. Interagency grizzly bear guidelines. Missoula, MT. 100 pp.

Moore, Mary H., 2004, Correspondence dated October 28, 2004, Wyoming Department of State Parks and Cultural Resources, Division of State Parks and Historic Sites.

U.S. Fish and Wildlife Service. 2004a. Letter from Brian Kelly (USFWS) on Black-footed Ferret Surveys in Wyoming. February 2, 2004.

USFWS. 2004b. Endangered and Threatened Wildlife and Plants: 90-day Finding for Petitions to List the Greater Sage-grouse as Threatened or Endangered. 69 Federal Register 21484, April 21, 2004.

U.S. Fish and Wildlife Service. 2004c. Letter from Brian Kelly (USFWS) “Review of the Draft Environmental Impact Statement for the Proposed Wind River Natural Gas Field Development Project. August 30, 2004.

Wilson, D. and S. Ruff. 1999. The Smithsonian Book of North American Mammals. Smithsonian Institution Press. Washington and London 750 pp.

Wyoming Game and Fish Department. 2004. Letter from Bill Wichers, Deputy Director, WGFD, commenting on the Wind River Gas Field Development Project Draft EIS. August 23, 2004.

GLOSSARY

There were no changes to the Glossary.

VOLUME II

APPENDICES IN DRAFT EIS

APPENDIX A: HISTORY OF THE WRIR

There were no changes to Appendix A text.

APPENDIX B: AGENCY MITIGATION GUIDELINES

Cover sheet and Headings, correct misspelling, “GUIDELINES.’

APPENDIX C – SURFACE DISTURBANCE CALCULATIONS

There were no changes to Appendix C text.

APPENDIX D– RECLAMATION PLAN

There were no changes to Appendix D text.

APPENDIX E- HAZARDOUS MATERIALS MANAGEMENT PLAN

There were no changes to Appendix E text.

APPENDIX F – SOILS

There were no changes to Appendix F text.

APPENDIX G – WATER RESOURCES DATA

There were no changes to Appendix G text.

APPENDIX H – WETLAND INVENTORY FOR THE WRPA

There were no changes to Appendix H text.

APPENDIX I – WILDLIFE SPECIES REPORTED IN THE WRPA

There were no changes to Appendix I text.

APPENDIX J – WILDLIFE SURVEY REPORTS FOR THE WRPA

There were no changes to Appendix J text.

APPENDIX K - USFWS LETTERS/MEMOS ON T/E AND PROPOSED SPECIES

Change title of Appendix K to “U.S. FWS and WGFD Scoping Comments”

The following pages of Appendix K appeared in the Hard Copy of the DEIS issued July, 2004, but were inadvertently omitted from the CD version of the DEIS. They are included here for completeness.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

ES-61411
ke/W.02/WY6365.ke

October 31, 2002

Memorandum

To: Ray Nation, Environmental Coordinator, Bureau of Indian Affairs, Wind River Agency, Fort Washakie, Wyoming

From: Michael M. Long, Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Scoping Comments for Proposed Wind River Natural Gas Development Project

Thank you for your letter of September 30, 2002, received in this office October 2, regarding the proposed Wind River Natural Gas Development Project. The project includes 325 natural gas wells and 78 miles of gas pipeline in and adjacent to the existing Muddy Ridge and Pavillion Fields. The project also identifies additional access roads and associated facilities as well as an increase of 18,175 horse power (hp) of compression to the existing 14,540 hp. The project area is located in T3-4N, R2-5W, in Fremont County, Wyoming.

Due to the increased workload of this office we are unable to provide specific comments for your proposed project at this time. However, the U.S. Fish and Wildlife Service is providing you with the following information as our general scoping comments. Please consider this information during project planning and alternative development.

In accordance with section 7(c) of the Endangered Species Act of 1973, as amended (Act), my staff has determined that the following threatened or endangered species, or species proposed for listing under the Act, may be present in the project area.

LISTED AND PROPOSED SPECIES

Species	Status	Expected Occurrence
Black-footed ferret (*Mustela nigripes*)	Endangered	Potential resident in prairie dog (*Cynomys* sp.) colonies.
Bald eagle (*Haliaeetus leucocephalus*)	Threatened	Nesting. Winter resident, Migrant

Grizzly bear (*Ursus arctos horribilis*)	Threatened	Montane areas
Gray wolf (*Canis lupus*)	Threatened	Greater Yellowstone Ecosystem
Canada lynx (*Lynx candensis*)	Threatened	Montane forests
Mountain plover (*Charadrius montanus*)	Proposed	Grasslands statewide

Black-footed ferret: Black-footed ferrets may be affected if prairie dog colonies are impacted. If white-tailed prairie dog (*Cynomys leucurus*) colonies or complexes greater than 200 acres will be disturbed, surveys for ferrets are recommended in order to determine if the action will result in an adverse effect to the species. These surveys are recommended even if only a portion of the colony or complex will be disturbed. A prairie dog town or complex consists of two or more neighboring prairie dog towns each less than 7 kilometers (4.34 miles) from each other (Black-footed Ferret Survey Guidelines, USFWS, 1989). If a field check indicates that prairie dog towns may be affected, you should contact this office for guidance on ferret surveys.

Bald eagle: Habitat loss remains a threat to the bald eagle's full recovery. Bald eagles are believed to live 30 years or longer in the wild. They mate for life and build huge nests which are often reused year after year. Bald eagles incubate 2-3 eggs for about 35 days and young eagles are flying within 3 months. Disease, lack of food, bad weather, or human interference can kill eaglets; sometimes only about half will survive their first year. In order to reduce adverse effects to the bald eagle a disturbance-free buffer zone of one mile should be maintained around their nests. Activity within one mile of an eagle nest may disturb the eagles and result in incidental "take".

Grizzly bear: The grizzly bear has a wide range of habitat tolerance. Contiguous, relatively undisturbed mountainous habitat having a high level of topographic and vegetative diversity characterizes most areas where the species remains. Habitat loss and direct and indirect human-caused mortality is related to the decline in numbers. Bears have been attracted to carrion, waste products of construction camps, recreational camps and sprawling residential areas that have encroached into their habitat and consequently increased human-bear interactions (Grizzly Bear Recovery Plan, 1993). Additionally, potential impacts to grizzly bears may also result from changes to important components within their habitat.

Gray wolf: All wolves within Wyoming are now considered part of the nonessential experimental population. Although such wolves remain listed and protected under the Endangered Species Act (Act), additional flexibility is provided for their management under the provisions of the final rule and special regulations promulgated for the nonessential experimental population on November 22, 1994 (59 FR 60252). Requirements for interagency consultation under section 7 of the Act differ based on the surface ownership and/or management responsibility where the animals occur.

Additional management flexibility is provided for managing wolves existing outside of the National Park or National Wildlife Refuge System (e.g., Forest Service lands). Wolves designated as nonessential experimental in these areas are treated as proposed rather than listed. Two provisions of section 7 apply to Federal actions outside National Parks or National Wildlife Refuges: (1) section 7 (a)(1), which states all Federal agencies shall utilize their authorities to carry out programs for the conservation of listed species; and (2) section 7 (a)(4), which requires Federal agencies to confer with the Service on actions that are likely to jeopardize the continued existence of the species.

Under all management jurisdictions, the action agency needs to assess the potential impact of any proposed action on the gray wolf. The Service recommends that Federal agencies analyze impacts on nonessential populations, along with other populations of fish and wildlife, when complying with the requirements of the National Environmental Policy Act. Any protective measures in addition to those outlined in the final rule or additional review procedures, are at the discretion of the Federal action agency.

Canada lynx: In the final rule for listing the Canada lynx (March 2000), the U.S. Fish and Wildlife Service (Service) identified that significant threats to the lynx were (1) loss and/or modification of habitat; (2) past commercial harvest (trapping), which is partially responsible for the extremely small lynx population; (3) inadequate regulatory mechanisms to protect lynx and their habitat; and (4) other factors such as increased human access into suitable habitat and human-induced changes in habitat allowing other species (e.g., bobcats and coyotes) to move into lynx habitat and compete with them. Examples of human alteration of forests include loss of and conversion of forested habitats through urbanization, ski area and other developments; fragmentation that leads to isolation of forested habitats by highways or other major construction; and certain timber harvesting practices and fire suppression measures.

In Wyoming, the lynx lives in subalpine/coniferous forests of mixed age and structural classes. Mature forests with downed logs and windfalls provide cover for denning sites, escape, and protection from severe weather. Early successional forest stages provide habitat for the lynx's primary prey, the snowshoe hare. The home range of a lynx can be 5 to 94 square miles. They are capable of moving extremely long distances in search of food. Lynx are highly dependent on snowshoe hare, but when hare populations drop they also prey on other small mammals and birds. This change in diet causes sudden drops in the productivity of adult females and survival of young.

Elevated levels of human access into forests are a significant threat to Canada lynx because they increase the likelihood of lynx encountering people, which may result in more lynx deaths by intentional and unintentional shooting, trapping, and being hit by automobiles. Human access into Canada lynx habitat in many areas has increased over the last several decades because of increased construction of roads and trails and the growing popularity of snowmobiles and other off-road vehicles.

The Service would caution you when making "no effect" rulings on Canada lynx, specifically if the ruling is based on the fact that there are no recent records of their occurrence in an area. It is difficult to accept these types of "no effect" rulings for the following reasons:

1. Lynx in the northern Rockies are few in number and very difficult to locate, and lack of verification in an area does not preclude them from existing there.

2. The Service is obligated both to protect and recover threatened and endangered species. An action can adversely affect or jeopardize the continued existence of a species through its affects on an existing population and/or on the potential habitat of a species that incrementally reduces the ability to recover or reestablish the species.

Historically, lynx have been observed in every mountain range in the State. Concentrations of observations occur in western Wyoming in the Wyoming and Salt River ranges and continuing north through the Tetons and Absaroka ranges in and around Yellowstone National Park. Numerous records have also come from the west slope of the Wind River Range, with fewer observations in the Bighorn and Uinta mountains (Reeve et al. 1986).

Mountain plover: The mountain plover is a small bird associated with shortgrass prairie, plains, alkali flats, agricultural lands, cultivated lands, sod farms, prairie dog towns, and shrub-stepped landscapes at both breeding and wintering locales. Plovers may nest on sites where vegetation is sparse or absent, or near closely cropped areas, manure piles or rocky areas. Mountain plovers are rarely found near water and show a preference for previously disturbed areas or modified habitat. The birds occupy suitable breeding habitat in many of the great Plains states from Canada south to Texas from late March through July.

Mountain plovers may occur within the project area. If plovers are found in the area, we ask that you coordinate with this office to discuss whether the proposed project is likely to cause jeopardy to the species, and identify measures that would minimize or eliminate any proposed adverse effect. The Service recommends surveys for plovers (Mountain Plover Survey Guidelines, USFWS, March 2002) in all suitable habitat as well as avoidance of nesting areas to minimize adverse impacts to plovers within a project site. In some cases, project activities can be conducted between August 15 and March 15 to avoid affecting this species.

CONSULTATION

Section 7(c) of the Act requires that a biological assessment be prepared for any Federal action that is a major construction activity to determine the effects of the proposed action on listed and proposed species. If a biological assessment is not required (i.e., all other actions), the lead Federal agency is responsible for review of proposed activities to determine whether listed species will be affected. The U.S. Fish and Wildlife Service (Service) would appreciate the opportunity to review any such determination document. If it is determined that the proposed activities may affect a listed species, you should contact this office to discuss consultation requirements. If it is determined that any Federal agency program or project "is likely to adversely affect" any listed species, formal consultation should be initiated with this office. Alternatively, informal consultation can be continued so we can work together to determine how the project could be modified to reduce impacts to listed species to the "not likely to adversely affect" threshold. If it is concluded that the project "is not likely to adversely affect" listed species, we should be asked to review the assessment and concur with the determination of not likely to adversely affect.

For those actions where a biological assessment is necessary, it should be completed within 180 days of receipt of a species list, but can be extended by mutual agreement between the lead agency and the Service. If the assessment is not initiated within 90 days of receipt of a species list, the list of threatened and endangered species should be verified with me prior to initiation of the assessment. The biological assessment may be undertaken as part of the agency's compliance of section 102 of the National Environmental Policy Act (NEPA), and incorporated into the NEPA documents. The Service recommends that biological assessments include:

1. a description of the project;
2. a description of the specific area potentially affected by the action;
3. the current status, habitat use, and behavior of threatened and endangered species in the project area;
4. discussion of the methods used to determine the information in item 3;
5. direct and indirect impacts of the project to threatened and endangered species, including impacts of interrelated and interdependent actions;
6. an analysis of the effects of the action on listed and proposed species and their habitats including cumulative impacts from Federal, State, or private projects in the area;
7. measures that will reduce or eliminate adverse impacts to threatened and endangered species;
8. the expected status of threatened and endangered species in the future (short and long term) during and after project completion;
9. determination of "is likely to adversely affect" or "is not likely to adversely affect" for listed species;
10. determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species;
11. alternatives to the proposed action considered, a summary of how impacts of those alternatives on listed and proposed species would differ from the proposed action, and the reasons for not selecting those alternatives.
12. citation of literature and personal contacts used in the assessment.

MIGRATORY BIRDS

Under the Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA) the Bureau of Indian Affairs has a mandatory obligation to protect the many species of migratory birds, including eagles and other raptors which may occur on lands under their jurisdiction. The MBTA, 16 U.S.C. 703, enacted in 1918, prohibits the taking of any migratory birds, their parts, nests, or eggs except as permitted by regulations and does not require intent to be proven. Section 703 of the Act states, "Unless and except as permitted by regulations ... it shall be unlawful at any time, by any means or in any manner, to ... take, capture, kill, attempt to take, capture, or kill, or possess ... any migratory bird, any part, nest, or eggs of any such bird..." The BGEPA, 16 U.S.C. 668, prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagles or their body parts, nests, or eggs, which includes collection, molestation, disturbance, or killing.

Work that could lead to the take of a migratory bird including an eagle, their young, eggs, or nests should be coordinated with our office before any actions are taken. Removal or destruction of such nests, or causing abandonment of a nest could constitute violation of one or both of the

above statutes. Removal of any active migratory bird nest or nest tree is prohibited. Permits for nest manipulation, including removal or relocation may, under certain circumstances, be issued for inactive nests only. For golden eagles, inactive nest permits are limited to activities involving resource extraction or human health and safety. Mitigation, as determined by the local Ecological Services field office, may be required for loss of these nests. No permits will be issued for an active nest of any migratory bird species, unless removal of an active nest is necessary for reasons of human health and safety. Therefore, if nesting migratory birds are present on, or near the project area, timing is a significant consideration and needs to be addressed in project planning.

If nest manipulation is proposed for this project, the project proponent should contact the Service's Migratory Bird Office in Denver at 303-236-8171 to see if a permit can be issued for this project. No nest manipulation is allowed without a permit. If a permit cannot be issued, the project may need to be modified to ensure take of a migratory bird or eagle, their young, eggs or nest will not occur.

Sage Grouse: Greater sage grouse (*Centrocercus urophasianus*) are declining throughout their range. Anecdotal information, from several sources in Wyoming, suggests that sage grouse populations are negatively affected by construction activities, especially those that degrade important sagebrush habitat, even when mitigative measures are implemented (Braun 1998, Lyon 2000). There is some evidence that grouse populations do repopulate oil and gas developed areas (Braun 1987). However, there is no evidence that populations attain their previous levels and reestablishment of sage grouse in a reclaimed area may take as long as 20-30 years (Braun 1998). Please consider the importance of crucial wintering habitat for sage grouse during project planning by minimizing loss of sage brush.

We encourage the Bureau of Indian Affairs to take all necessary measures allowable to protect the sage grouse in the project area to ensure this project does not exacerbate factors contributing to this species' decline. We recommend avoidance of any activity that would disrupt brood rearing during the period June 1 through July 31. In addition, we recommend that you contact the local Wyoming Game and Fish biologist to more accurately determine the local hatch dates, areas of nesting and brood rearing, and crucial winter habitat within the project boundaries.

WETLANDS/RIPARIAN AREAS

Project activities may impact wetlands or riparian areas. The Service recommends measures be taken to avoid any wetland losses in accordance with Section 404 of the Clean Water Act, Executive Order 11990 (wetland protection) and Executive Order 11988 (floodplain management) as well as the goal of "no net loss of wetlands." If wetlands may be destroyed or degraded by the proposed action, those (wetlands) in the project area should be inventoried and fully described in terms of functions and values. Acreage of wetlands, by type, should be disclosed and specific actions outlined to minimize impacts and compensate for all unavoidable wetland impacts.

Riparian or streamside areas are a valuable natural resource and impacts to these areas should be avoided whenever possible. Riparian areas are the single most productive wildlife habitat type in

North America. They support a greater variety of wildlife than any other habitat. Riparian vegetation plays an important role in protecting streams, reducing erosion and sedimentation as well as improving water quality, maintaining the water table, controlling flooding, and providing shade and cover. In view of their importance and relative scarcity, impacts to riparian areas should be avoided. Any potential, unavoidable encroachment into these areas should be minimized and quantitatively assessed in terms of functions and values, areas and vegetation type lost, potential effects on wildlife, and streams (bank stability and water quality). Measures to compensate for unavoidable losses of riparian areas should be developed and implemented as part of the project.

Plans for mitigating unavoidable impacts to wetland and riparian areas should include mitigation goals and objectives, methodologies, time frames for implementation, success criteria, and monitoring to determine if the mitigation is successful. The mitigation plan should also include a contingency plan to be implemented should the mitigation not be successful.

We appreciate the opportunity to comment on the proposed project. These preliminary scoping comments are made pursuant to the National Environmental Policy Act, the Endangered Species Act and Fish and Wildlife Coordination Act. Please keep this office informed of any developments or decisions concerning this project. If you have further questions on these subjects or our comments, please contact Kathleen Erwin of my staff at the letterhead address or phone (307) 772-2374, extension 28.

References

Braun, C.E. 1998. Sage grouse declines in western North America: What are the problems? Proceedings of the Western Association of Fish and Wildlife Agencies 78:139-156

_____. 1987. Current issues in sage grouse management. Proc. West. Assoc. Fish and Wildlife Agencies 67:134-144

Lyon, A.G. 2000. The potential effects of natural gas development on sage grouse (*Centrocercus urophasianus*) near Pinedale, Wyoming. Thesis, University of Wyoming, Laramie, USA.

cc: Endangered Species Coordinator, State of Wyoming, Cheyenne, WY
Statewide Habitat Protection Coordinator, WFGD, Cheyenne, WY
Nongame Coordinator, WGFD, Lander, WY

United States Department of the Interior

FISH AND WILDLIFE SERVICE
170 North First
Lander, Wyoming 82520

307-332-2159

October 9, 2003

Ray Nation
Environmental Coordinator
Bureau of Indian Affairs
P.O. Box 158
Ft. Washakie, WY 82514

Dear Ray,

As per your request, I am sending an update to our comments dated October 31, 2002, regarding Tom Brown, Inc.'s proposal to drill 325 new gas wells in the Muddy Ridge and Pavilion Fields. Our comments in the original letter are still pertinent. However, as you know, the Fish and Wildlife Service recently withdrew its proposal to list the Mountain Plover as a threatened species. The Mountain Plover is still a species of concern as it is rare (only 5,000 to 11,000 birds are thought to exist) and nearly all birds winter in only 2 places in California. Plover prefer open, flat areas with little to no brush cover. Drilling in these habitats during the nesting period (late May to early July) may displace adults, destroy nests and/or kill chicks.

With that said, current information indicates that threats to the plover are not as significant as first believed when the listing process began in 1999. The Service believes the population is not declining and is not in danger of becoming endangered in the foreseeable future.

Please contact me at the number above if you have any questions or comments. We thank you for the opportunity to provide input into this proposal.

Sincerely,

Pat Hnilicka
Wildlife Biologist

cc: Dave Skates

WYOMING
GAME AND FISH DEPARTMENT

Jim Geringer, Governor | Dr. Tom Thorne, Acting Director

"Conserving Wildlife - Serving People"

October 28, 2002

WER 9835.01
Bureau of Indian Affairs
Scoping Statement
Wind River Natural Gas Development Project
Tom Brown Inc.
State Identifier Number: 2002-152
Fremont County

Art Reese, Director
Office of Federal Land Policy
Herschler Building, 1W
122 W. 25th Street
Cheyenne, WY 82002

Dear Mr. Reese:

These comments regarding the scoping statement for the Wind River Natural Gas Development Project by Tom Brown Inc. have been approved by the Director and are specific to this agency's statutory mission within State government which is "Conserving Wildlife, Serving People". In that regard, these comments are meant to, in association with all other agency comments, assist in defining the Official State Position. These comments defer to and are subordinate to the Official State Position.

Terrestrial Considerations:

We are generally satisfied with the issues identified in the scoping document for impacts of this project to wildlife habitat and recreation. The Environmental Assessment should also include a cumulative impacts analysis detailing the effects of the additional wells on big game forage/browse, sage grouse habitat, and future hunting opportunities in the area.

Part of the Sand Mesa Wildlife Habitat Unit is within the project area. It is unknown if any of the wells would occur on unit lands. We wish to be notified if any wells are drilled on our Unit.

These comments are reflective of a specific agency mission only. These comments defer to and are subordinate to the Official State Position.

Headquarters: 5400 Bishop Boulevard, Cheyenne, WY 82006-0001
Fax: (307) 777-4610 Web Site: http://gf.state.wy.us

Aquatic Considerations:

This development could potentially impact the following waters that involve our management:

- Muddy Creek and Fivemile Creek Drainages that flow into Boysen Reservoir.
- Several of the drains that flow into Ocean Lake.
- Middle Depression Reservoir.
- Lake Cameahwait is just below the project area and receives water from within the project area.
- Cottonwood Drain flows through the project area and provides water to Middle Depression Reservoir and Lake Cameahwait.

The Environmental Assessment should address water quality, water quantity, and sediment input in relation to these waters.

Sincerely,

Tom Collins
for

BILL WICHERS
DEPUTY DIRECTOR

BW:TC:as

These comments are reflective of a specific agency mission only. These comments defer to and are subordinate to the Official State Position.

APPENDIX L – BIOLOGICAL ASSESSMENT

Replace Appendix L from the DEIS with Appendix H in this FEIS.

APPENDIX M – CULTURAL RESOURCES DATA

There were no changes to Appendix M text.

APPENDIX N – SEDIMENT YIELD EVALUATION

Replace Appendix N from the DEIS with the revised Appendix N

APPENDIX N

SEDIMENT YIELD EVALUATION

1.0 SEDIMENT YIELD EVALUATION

1.1 METHODOLOGY FOR ESTIMATING SOIL LOSSES FOR WRPA

This section provides the assumptions used to estimate potential soil losses from well pads, roads, pipelines, and other activities that would be involved in the development of the Pavillion, Muddy Ridge, Sand Mesa, Sand Mesa South, and Coastal Extension well fields. Sediment yield was calculated by well field as well as by watershed. Areas of disturbance, the timing of operations, and the distribution of wells used in the calculations were based on values presented in Chapter 2. Soil loss rates were based on erosion rates for the site-specific soils presented in Chapter 3.3, Soils, as well as work done by researchers in Wyoming. Factors that control the erodibility of soils are discussed in Appendix F.

For this analysis, the following assumptions were made:

- During periods of well pad construction, road building, and pipeline installation, it is assumed that higher erosion rates apply. During this period of time, temporary berms, topsoil stockpiles, and other steep banks will be present during construction activities. It is, therefore, assumed that steeper slopes will be present (up to 20%). Erosion rates for disturbed, post-disturbance (up to 4 yrs), and natural rates were based on estimated slopes and the physical nature of the soils. For the Pavillion well field, erosion rates were based on a 50-50 split between sandy-clay loam to sandy loam and for the Muddy Ridge field, 50% of soil was considered to be sandy clay loam with the remainder being clay loam.
- Total erosion rates were based on staging of activities over a 14-year period. Rates for the first year are proportioned based on construction disturbance and post-construction disturbance.
- Auxiliary facilities such as compressor stations, 8-inch/6-inch line loops, and underground injection wells would also be constructed. It was assumed that these facilities would be constructed during the first year of operation.
- During the first year, construction, completion, and testing operations will take place during at least part of the year. During the remainder of the year, the site would be reclaimed and erosion rates would be reduced. In Year 3, it is assumed that the number of well sites would be reduced by 10%, based on a 75% success rate for the Proposed Action and 90% success rate for Alternatives A and B.

1.2 ESTIMATED SOIL LOSS RATES FOR THE WRPA

Table N-1 provides the calculation worksheet used to estimate soil losses from the Proposed Action. Tables N-2 and N-3 summarize the estimated soil erosion rates over a 14-year period for the Proposed Action by well field and watershed, respectively, and Table N-4 provides estimates of the sediment loading that would occur in these watersheds based on the calculated soil loss rates and a sediment delivery ratio of 5%. Inspection of Table N-2 reveals that the estimated soil loss rates are highest for the Muddy Ridge well field and lowest for the South Sand Mesa well field. Total annual soil losses are estimated to range from 592 to 3,087 tons/acre/year for the Proposed Action. Soil losses would be largest in the Fivemile Creek and Muddy Creek watersheds (Table N-3). Total sediment loading to Fivemile, Cottonwood, and Muddy Creeks would range from 29.6 tons in year 1 to 127.3 tons in year 10 (Table N-4).

Table N-5 provides the calculation worksheet used to estimate soil losses from Alternative A. Tables N-6, N-7, and N-8 provide the estimated soil losses by well field and watershed, and sediment loading to the creeks for Alternative A. The total estimated soil losses for Alternative

A are approximately 48% higher than for the Proposed Action, due to the greater number of wells and associated facilities that would be constructed. Sediment loading to Fivemile, Cottonwood, and Muddy Creeks would be greater by a similar amount.

Table N-9 provides the calculation worksheet used to estimate soil losses from Alternative N. Tables N-10, N-11, and N-12 provide the estimated soil losses by well field and watershed, and sediment loading to the creeks for Alternative B. The total estimated soil losses for Alternative B are approximately 17% lower than for the Proposed Action, due to the lesser number of wells and associated facilities that would be constructed. Sediment loading to Fivemile, Cottonwood, and Muddy Creeks would be lower by a similar amount.

Table N-13 provides the calculation worksheet used to estimate soil losses from Alternative C. Tables N-14, N-15, and N-15 provide the estimated soil losses by well field and watershed, and sediment loading to the creeks for Alternative C. The total estimated soil losses for Alternative C are approximately 42% lower than for the Proposed Action, due to the limited number of wells and associated facilities that would be constructed. Sediment loading would occur only to Fivemile Creek for this alternative.

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Table N-1: Proposed Action – Yearly Soil Loss Calculation Sheet

Field	No. of Wells	Well Pad Disturbed Area (acres)	Road Disturbed Area (acres)	Pipeline Disturbed Area (acres)	Auxiliary Facilities (acres)	SOIL LOSS (TONS)						
						Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total Wells, Roads, & Pipelines
YEAR 1												
Pavillion (Irrigated)	5	11.50	1.45	2.05	0.00	25.21	4.20	33.63	0.00	0.09	15.98	63.03
Pavillion (Dry Land)	6	12.06	3.84	2.46	1.40	26.43	6.09	36.43	3.07	54.61	49.28	71.01
Muddy Ridge	12	60.24	7.68	29.79	4.00	204.38	47.64	95.09	7.57	47.66	53.48	354.67
Sand Mesa	8	40.16	5.12	15.45	6.00	86.59	11.27	2.06	2.39	0.25	0.33	102.32
South Sand Mesa	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coastal Extension	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.44	0.00
YEAR 2												
Pavillion (Irrigated)	5	11.50	1.45	2.05	0.00	116.15	14.65	20.27	0.00	0.01	4.44	151.52
Pavillion (Dry Land)	7	14.07	4.48	2.87	0.00	138.49	44.10	28.27	0.00	6.07	13.69	210.86
Muddy Ridge	12	60.24	7.68	29.79	0.00	530.11	67.58	262.18	0.00	6.15	17.25	859.88
Sand Mesa	8	40.16	5.12	15.45	0.00	266.38	33.96	102.51	0.00	1.53	5.00	402.85
South Sand Mesa	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coastal Extension	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.00
YEAR 3												
Pavillion (Irrigated)	6	13.80	1.74	2.46	0.00	155.94	19.66	27.82	0.00	0.01	4.44	203.42
Pavillion (Dry Land)	7	14.07	4.48	2.87	0.00	163.32	52.16	33.44	0.00	6.07	13.69	249.42
Muddy Ridge	12	60.24	7.68	29.79	0.00	623.48	79.49	308.36	0.00	6.15	17.25	1011.34
Sand Mesa	8	40.16	5.12	15.45	0.00	279.63	35.65	107.61	0.00	1.53	5.00	422.89
South Sand Mesa	3	15.06	1.92	16.18	2.90	99.40	12.67	106.79	1.24	0.00	0.00	220.10
Coastal Extension	1	5.02	0.64	14.19	2.00	33.13	4.22	93.65	0.85	0.00	0.56	131.86
YEAR 4												
Pavillion (Irrigated)	6	13.80	1.74	2.46	0.00	182.85	23.06	32.62	0.00	0.01	4.44	238.53
Pavillion (Dry Land)	6	12.06	3.84	2.46	0.00	168.41	40.49	32.62	0.00	6.07	13.69	241.51
Muddy Ridge	12	60.24	7.68	29.79	0.00	716.86	91.39	259.47	0.00	6.15	17.25	1067.72
Sand Mesa	8	40.16	5.12	15.45	0.00	280.96	35.82	140.46	0.00	1.53	5.00	457.24
South Sand Mesa	3	15.06	1.92	16.18	0.00	99.89	12.74	146.48	0.00	0.00	0.00	259.11
Field	No. of	Well Pad	Road	Pipeline	Auxiliary	SOIL LOSS (TONS)						

	Wells	Disturbed Area (acres)	Disturbed Area (acres)	Disturbed Area (acres)	Facilities (acres)	Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total Wells, Roads, & Pipelines
Coastal Extension	1	5.02	0.64	14.19	0.00	44.18	5.63	129.96	0.00	0.00	0.56	179.77
YEAR 5												
Pavillion (Irrigated)	6	13.80	1.74	2.46	0.00	207.69	26.19	37.05	0.00	0.01	4.44	270.93
Pavillion (Dry Land)	7	14.07	4.48	2.87	0.00	209.93	48.93	40.46	0.00	6.07	13.69	299.32
Muddy Ridge	2	10.04	1.28	4.97	0.00	446.28	50.94	178.36	0.00	6.15	17.25	675.58
Sand Mesa	8	40.16	5.12	15.45	0.00	282.28	35.99	108.63	0.00	1.53	5.00	426.90
South Sand Mesa	3	15.06	1.92	16.18	0.00	100.39	12.80	107.86	0.00	0.00	0.00	221.05
Coastal Extension	1	5.02	0.64	14.19	0.00	55.22	7.04	156.09	0.00	0.00	0.56	218.35
YEAR 6												
Pavillion (Irrigated)	8	18.40	2.32	3.28	0.00	270.71	34.13	48.29	0.00	0.01	4.44	353.14
Pavillion (Dry Land)	9	18.09	5.76	3.69	0.00	268.14	62.89	51.70	0.00	6.07	13.69	382.52
Muddy Ridge	0	0.00	0.00	0.00	0.00	289.05	43.65	150.05	0.00	6.15	17.25	582.75
Sand Mesa	8	40.16	5.12	15.45	0.00	283.61	36.16	109.14	0.00	1.53	5.00	428.91
South Sand Mesa	3	15.06	1.92	16.18	0.00	100.89	12.86	108.39	0.00	0.00	0.00	222.14
Coastal Extension	1	5.02	0.64	14.19	0.00	66.26	8.45	187.31	0.00	0.00	0.56	262.02
YEAR 7												
Pavillion (Irrigated)	8	18.40	2.32	3.28	0.00	303.83	38.31	54.20	0.00	0.01	4.44	396.34
Pavillion (Dry Land)	9	18.09	5.76	3.69	0.00	301.26	66.86	57.61	0.00	6.07	13.69	425.73
Muddy Ridge	0	0.00	0.00	0.00	0.00	389.05	49.60	192.42	0.00	6.15	17.25	631.07
Sand Mesa	8	40.16	5.12	15.45	0.00	284.94	36.33	109.65	0.00	1.53	5.00	430.91
South Sand Mesa	0	0.00	0.00	0.00	0.00	101.38	0.25	108.93	0.00	0.00	0.00	210.56
Coastal Extension	1	5.02	0.64	14.19	0.00	77.31	9.86	218.53	0.00	0.00	0.56	305.69
YEAR 8												
Pavillion (Irrigated)	9	20.70	2.61	3.69	0.00	360.18	45.41	64.26	0.00	0.01	4.44	469.85
Pavillion (Dry Land)	9	18.09	5.76	3.69	0.00	338.52	71.56	64.26	0.00	6.07	13.69	474.33
Muddy Ridge	0	0.00	0.00	0.00	0.00	389.05	49.60	192.42	0.00	6.15	17.25	631.07
Sand Mesa	8	40.16	5.12	15.45	0.00	286.26	36.50	110.16	0.00	1.53	5.00	432.91
South Sand Mesa	0	0.00	0.00	0.00	0.00	1.99	0.25	2.14	0.00	0.00	0.00	4.38
Coastal Extension	1	5.02	0.64	14.19	0.00	88.35	11.26	249.74	0.00	0.00	0.56	349.36
YEAR 9												
Field	No. of	Well Pad	Road	Pipeline	Auxiliary	SOIL LOSS (TONS)						

	Wells	Disturbed Area (acres)	Disturbed Area (acres)	Disturbed Area (acres)	Facilities (acres)	Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total Wells, Roads, & Pipelines
Pavillion (Irrigated)	7	16.10	2.03	2.87	0.00	354.56	50.97	64.09	0.00	0.01	4.44	469.62
Pavillion (Dry Land)	8	16.08	5.12	3.28	0.00	354.40	76.62	67.50	0.00	6.07	13.69	498.51
Muddy Ridge	0	0.00	0.00	0.00	0.00	389.05	49.60	192.42	0.00	6.15	17.25	631.07
Sand Mesa	8	40.16	5.12	15.45	0.00	287.59	36.66	110.67	0.00	1.53	5.00	434.92
South Sand Mesa	0	0.00	0.00	0.00	0.00	1.99	0.25	2.14	0.00	0.00	0.00	4.38
4.38Coastal Extension	1	15.02	0.64	14.19	0.00	99.40	0.00	280.96	0.00	0.00	0.56	380.36
YEAR 10												
Pavillion (Irrigated)	8	18.40	2.32	3.28	0.00	402.63	57.03	45.42	0.00	0.01	4.44	505.08
Pavillion (Dry Land)	9	18.09	5.76	3.69	0.00	400.06	85.58	45.42	0.00	6.07	13.69	531.06
Muddy Ridge	0	0.00	0.00	0.00	0.00	389.05	49.60	192.42	0.00	6.15	17.25	631.07
Sand Mesa	8	40.16	5.12	15.45	0.00	288.91	36.83	111.18	0.00	1.53	5.00	436.92
South Sand Mesa	0	0.00	0.00	0.00	0.00	1.99	0.25	2.14	0.00	0.00	0.00	4.38
Coastal Extension	1	5.05	0.64	14.19	0.00	110.44	14.08	312.18	0.00	0.00	0.56	436.70
YEAR 11												
Pavillion (Irrigated)	5	11.50	1.45	2.05	0.00	378.48	53.89	68.36	0.00	0.01	4.44	500.83
Pavillion (Dry Land)	5	10.05	3.20	2.05	0.00	366.45	68.51	68.36	0.00	6.07	13.69	503.32
Muddy Ridge	0	0.00	0.00	0.00	0.00	389.05	49.60	192.42	0.00	6.15	17.25	631.07
Sand Mesa	8	40.16	5.12	15.45	0.00	290.24	37.00	111.69	0.00	1.53	5.00	438.93
South Sand Mesa	0	0.00	0.00	0.00	0.00	1.99	0.25	2.14	0.00	0.00	0.00	4.38
Coastal Extension	0	0.00	0.00	0.00	0.00	88.35	11.26	249.74	0.00	0.00	0.56	349.36
Year 12												
Pavillion (Irrigated)	0	0.00	0.00	0.00	0.00	303.73	44.56	55.02	0.00	0.01	4.44	403.32
Pavillion (Dry Land)	0	0.00	0.00	0.00	0.00	303.73	44.56	55.02	0.00	6.07	13.69	403.32
Muddy Ridge	0	0.00	0.00	0.00	0.00	389.05	49.60	192.42	0.00	6.15	17.25	631.07
Sand Mesa	8	40.16	5.12	15.45	0.00	291.56	37.17	112.20	0.00	1.53	5.00	440.93
South Sand Mesa	0	0.00	0.00	0.00	0.00	1.99	0.25	2.14	0.00	0.00	0.00	4.38
Coastal Extension	0	0.00	0.00	0.00	0.00	88.35	11.26	249.74	0.00	0.00	0.56	349.36
YEAR 13												
Pavillion (Irrigated)	0	0.00	0.00	0.00	0.00	303.73	44.56	55.02	0.00	0.01	4.44	403.32
Field	No. of	Well Pad	Road	Pipeline	Auxiliary	SOIL LOSS (TONS)						

	Wells	Disturbed Area (acres)	Disturbed Area (acres)	Disturbed Area (acres)	Facilities (acres)	Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total Wells, Roads, & Pipelines
Pavillion (Dry Land)	0	0.00	0.00	0.00	0.00	303.73	44.56	55.02	0.00	6.07	13.69	403.32
Muddy Ridge	0	0.00	0.00	0.00	0.00	389.05	49.60	192.42	0.00	6.15	17.25	631.07
Sand Mesa	8	40.16	5.12	15.45	0.00	292.89	28.28	112.71	0.00	1.53	5.00	433.87
South Sand Mesa	0	0.00	0.00	0.00	0.00	1.99	0.25	2.14	0.00	0.00	0.00	4.38
Coastal Extension	0	0.00	0.00	0.00	0.00	88.35	11.26	249.74	0.00	0.00	0.56	349.36
YEAR 14												
Pavillion (Irrigated)	0	0.00	0.00	0.00	0.00	303.73	44.56	55.02	0.00	0.01	4.44	403.32
Pavillion (Dry Land)	0	0.00	0.00	0.00	0.00	303.73	44.56	55.02	0.00	6.07	13.69	403.32
Muddy Ridge	0	0.00	0.00	0.00	0.00	389.05	49.60	192.42	0.00	6.15	17.25	631.07
Sand Mesa	0	0.00	0.00	0.00	0.00	29.16	3.72	11.22	0.00	1.53	5.00	44.09
South Sand Mesa	0	0.00	0.00	0.00	0.00	1.99	0.25	2.14	0.00	0.00	0.00	4.38
Coastal Extension	0	0.00	0.00	0.00	0.00	88.35	11.26	249.74	0.00	0.00	0.56	349.36

Table N-2: Proposed Action – Soil Loss by Well Field

Field	SOIL LOSS BY FIELD (TONS)													
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Pavillion (Irrigated)	63.03	151.52	215.87	238.53	270.93	353.14	396.34	469.85	469.62	505.08	500.83	403.32	403.32	403.32
Pavillion (Dry Land)	72.01	210.86	236.72	241.51	299.32	382.52	425.73	474.33	498.51	531.06	503.32	403.32	403.32	403.32
Muddy Ridge	354.67	859.88	1011.34	1067.72	675.58	582.75	631.07	631.07	631.07	631.07	631.07	631.07	631.07	631.07
Sand Mesa	102.32	402.85	422.89	457.24	426.90	428.91	430.91	432.91	434.92	436.92	438.93	440.93	433.87	44.09
South Sand Mesa	0.00	0.00	220.10	259.11	221.05	222.14	210.56	4.38	4.38	4.38	4.38	4.38	4.38	4.38
Coastal Extension	0.00	0.00	131.86	179.77	218.35	262.02	305.69	349.36	380.36	436.70	349.36	349.36	349.36	349.36
Total	**592.03**	**1625.10**	**2238.78**	**2443.88**	**2112.13**	**2231.48**	**2400.30**	**2361.90**	**2418.85**	**2545.21**	**2427.87**	**2232.37**	**2225.31**	**1835.53**

Table N-3: Proposed Action – Soil Loss by Watershed

Watershed	SOIL LOSS BY WATERSHED (TONS)													
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Cottonwood Creek	12.28	48.34	177.34	227.45	260.84	303.01	345.17	387.34	417.33	471.66	388.06	388.30	387.45	340.68
Fivemile Creek	262.72	671.93	816.67	864.42	813.46	945.45	1049.25	1171.37	1195.32	1263.33	1231.33	1033.81	1033.81	1033.81
Muddy Creek	317.03	904.83	1234.66	1352.01	1037.83	983.02	1005.88	803.20	806.20	810.22	808.49	810.25	804.04	461.04
Total	**592.03**	**1625.10**	**2228.67**	**2443.88**	**2112.13**	**2231.48**	**2400.30**	**2361.90**	**2418.85**	**2545.21**	**2427.87**	**2232.37**	**2225.31**	**1835.53**

Table N-4: Proposed Action – Sediment Loading

Watershed	SEDIMENT LOADING (TONS)													
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Cottonwood Creek	0.61	2.42	8.87	11.37	13.04	15.15	17.26	19.37	20.87	23.58	19.40	19.41	19.37	17.03
Fivemile Creek	13.14	33.60	40.83	43.22	40.67	47.27	52.46	58.57	59.77	63.17	61.57	51.69	51.69	51.69
Muddy Creek	15.85	45.24	61.73	67.60	51.89	49.15	50.29	40.16	40.31	40.51	40.42	40.51	40.20	23.05
Total	**29.60**	**81.26**	**111.43**	**122.19**	**105.61**	**111.57**	**120.02**	**118.10**	**120.94**	**127.26**	**121.39**	**111.62**	**111.27**	**91.78**

Table N-5: Alternative A – Yearly Soil Loss Calculation Sheet

Field	ALTERNATIVE A -SOIL LOSS (Tons)											
	No. of Wells	Well Pad Disturbed Area (acres)	Road Disturbed Area (acres)	Pipeline Disturbed Area (acres)	Auxiliary Facilities (acres)	Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total Wells, Roads, & Pipelines
Year 1												
Pavillion (Irrigated)	6	13.80	1.74	2.12	0.00	30.25	4.46	40.35	0.00	0.09	15.98	75.06
Pavillion (Dry Land)	8	16.08	5.12	2.83	6.00	35.24	7.34	48.57	13.14	54.61	49.28	104.30
Muddy Ridge	12	60.24	7.68	24.73	6.00	204.38	42.32	95.09	11.35	47.66	53.48	353.14
Sand Mesa	8	40.16	5.12	12.99	6.00	86.59	11.21	2.06	2.39	0.25	0.33	102.26
South Sand Mesa	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coastal Extension	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.44	0.00
YEAR 2												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	158.47	19.98	24.35	0.00	0.01	4.44	202.80
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	145.73	46.40	25.62	0.00	6.07	13.69	217.75
Muddy Ridge	12	60.24	7.68	24.73	0.00	530.11	67.58	217.60	0.00	6.15	17.25	815.30
Sand Mesa	8	40.16	5.12	12.99	0.00	266.38	33.96	86.14	0.00	1.53	5.00	386.48
South Sand Mesa	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coastal Extension	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.00
YEAR 3												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	187.45	23.64	28.80	0.00	0.01	4.44	239.89
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	171.05	54.46	30.07	0.00	6.07	13.69	255.59
Muddy Ridge	12	60.24	7.68	24.73	0.00	623.48	79.49	255.93	0.00	6.15	17.25	958.90
Sand Mesa	8	40.16	5.12	12.99	6.00	279.63	35.65	90.42	0.20	1.53	5.00	405.90
South Sand Mesa	3	15.06	1.92	7.95	4.00	99.40	12.67	52.48	1.71	0.00	0.00	166.25
Coastal Extension	2	10.04	1.28	8.13	4.00	66.26	8.45	53.64	1.71	0.00	0.56	130.06
YEAR 4												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	216.43	27.29	33.25	0.00	0.01	4.44	276.97
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	199.58	47.62	33.25	0.00	6.07	13.69	280.46
Muddy Ridge	12	60.24	7.68	24.73	0.00	716.86	91.39	217.96	0.00	6.15	17.25	1026.21
Sand Mesa	8	40.16	5.12	12.99	0.00	280.96	35.82	120.51	0.00	1.53	5.00	437.28

Field	ALTERNATIVE A -SOIL LOSS (Tons)											
	No. of Wells	Well Pad Disturbed Area (acres)	Road Disturbed Area (acres)	Pipeline Disturbed Area (acres)	Auxiliary Facilities (acres)	Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total Wells, Roads, & Pipelines
South Sand Mesa	3	15.06	1.92	7.95	0.00	99.89	12.74	78.72	0.00	0.00	0.00	191.35
Coastal Extension	2	10.04	1.28	8.13	0.00	88.35	11.26	80.18	0.00	0.00	0.56	179.80
YEAR 5												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	245.41	30.94	37.71	0.00	0.01	4.44	314.06
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	228.56	51.28	37.71	0.00	6.07	13.69	317.55
Muddy Ridge	12	60.24	7.68	24.73	0.00	810.23	98.34	298.09	0.00	6.15	17.25	1206.65
Sand Mesa	8	40.16	5.12	12.99	0.00	282.28	35.99	93.28	0.00	1.53	5.00	409.55
South Sand Mesa	3	15.06	1.92	7.95	0.00	100.39	12.80	53.00	0.00	0.00	0.00	166.19
Coastal Extension	2	10.04	1.28	8.13	0.00	110.44	14.08	89.40	0.00	0.00	0.56	213.92
YEAR 6												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	274.39	34.60	42.16	0.00	0.01	4.44	351.15
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	257.54	54.93	42.16	0.00	6.07	13.69	354.63
Muddy Ridge	6	30.12	3.84	12.36	0.00	685.23	82.40	246.78	0.00	6.15	17.25	1014.41
Sand Mesa	8	40.16	5.12	12.99	0.00	283.61	36.16	91.71	0.00	1.53	5.00	411.47
South Sand Mesa	3	15.06	1.92	7.95	0.00	100.89	12.86	53.27	0.00	0.00	0.00	167.01
Coastal Extension	2	10.04	1.28	8.13	0.00	132.53	16.90	107.28	0.00	0.00	0.56	256.71
YEAR 7												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	303.37	38.25	46.61	0.00	0.01	4.44	388.23
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	286.52	58.59	46.61	0.00	6.07	13.69	391.72
Muddy Ridge	0	0.00	0.00	0.00	0.00	513.55	65.47	210.80	0.00	6.15	17.25	789.82
Sand Mesa	8	40.16	5.12	12.99	0.00	284.94	36.33	92.13	0.00	1.53	5.00	413.40
South Sand Mesa	3	15.06	1.92	7.95	0.00	101.38	12.93	53.53	0.00	0.00	0.00	167.84
Coastal Extension	2	10.04	1.28	8.13	0.00	154.62	19.71	125.16	0.00	0.00	0.56	299.49
YEAR 8												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	332.35	41.91	51.07	0.00	0.01	4.44	425.32
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	315.50	62.24	50.07	0.00	6.07	13.69	428.81
Muddy Ridge	0	0.00	0.00	0.00	0.00	513.55	65.47	210.80	0.00	6.15	17.25	789.82
Sand Mesa	8	40.16	5.12	12.99	0.00	286.26	36.50	92.56	0.00	1.53	5.00	415.32

Field	ALTERNATIVE A -SOIL LOSS (Tons)											
	No. of Wells	Well Pad Disturbed Area (acres)	Road Disturbed Area (acres)	Pipeline Disturbed Area (acres)	Auxiliary Facilities (acres)	Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total Wells, Roads, & Pipelines
South Sand Mesa	3	15.06	1.92	7.95	0.00	101.88	12.99	53.79	0.00	0.00	0.00	168.66
Coastal Extension	2	10.04	1.28	8.13	0.00	176.70	22.53	143.04	0.00	0.00	0.56	342.28
YEAR 9												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	357.68	49.97	55.52	0.00	0.01	4.44	463.16
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	340.83	70.30	55.52	0.00	6.07	13.69	466.65
Muddy Ridge	0	0.00	0.00	0.00	0.00	513.55	65.47	210.80	0.00	6.15	17.25	789.82
Sand Mesa	8	40.16	5.12	12.99	0.00	287.59	36.66	92.99	0.00	1.53	5.00	417.24
South Sand Mesa	3	15.06	1.92	7.95	0.00	102.38	13.05	54.05	0.00	0.00	0.00	169.48
Coastal Extension	2	10.04	1.28	8.13	0.00	198.79	0.00	160.92	0.00	0.00	0.56	359.72
YEAR 10												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	386.66	53.62	39.44	0.00	0.01	4.44	479.72
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	689.81	73.96	39.44	0.00	6.07	13.69	483.20
Muddy Ridge	0	0.00	0.00	0.00	0.00	513.55	65.47	210.80	0.00	6.15	17.25	789.82
Sand Mesa	8	40.16	5.12	12.99	0.00	288.91	36.83	98.42	0.00	1.53	5.00	419.16
South Sand Mesa	3	15.06	1.92	7.95	0.00	102.87	13.12	54.31	0.00	0.00	0.00	170.31
Coastal Extension	2	10.04	1.28	8.13	0.00	220.88	28.16	178.81	0.00	0.00	0.56	427.85
YEAR 11												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	415.64	57.28	64.42	0.00	0.01	4.44	537.34
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	398.79	77.61	64.42	0.00	6.07	13.69	540.82
Muddy Ridge	0	0.00	0.00	0.00	0.00	513.55	65.47	210.80	0.00	6.15	17.25	789.82
Sand Mesa	8	40.16	5.12	12.99	0.00	290.24	37.00	93.85	0.00	1.53	5.00	421.09
South Sand Mesa	3	15.06	1.92	7.95	0.00	103.37	13.1/8	54.58	0.00	0.00	0.00	171.13
Coastal Extension	2	10.04	1.28	8.13	0.00	242.97	30.98	196.69	0.00	0.00	0.56	470.63
YEAR 12												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	444.62	60.93	68.88	0.00	0.01	4.44	574.42
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	427.77	81.27	68.88	0.00	6.07	13.69	577.91
Muddy Ridge	0	0.00	0.00	0.00	0.00	513.55	65.47	210.80	0.00	6.15	17.25	789.82
Sand Mesa	8	40.16	5.12	12.99	0.00	291.56	37.17	94.28	0.00	1.53	5.00	423.01

Field	ALTERNATIVE A -SOIL LOSS (Tons)											
	No. of Wells	Well Pad Disturbed Area (acres)	Road Disturbed Area (acres)	Pipeline Disturbed Area (acres)	Auxiliary Facilities (acres)	Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total Wells, Roads, & Pipelines
South Sand Mesa	3	15.06	1.92	7.95	0.00	103.87	13.24	54.84	0.00	0.00	0.00	171.95
Coastal Extension	2	10.04	1.28	8.13	0.00	265.06	33.79	214.57	0.00	0.00	0.56	513.41
YEAR 13												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	473.60	64.59	73.33	0.00	0.01	4.44	611.51
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	456.75	84.92	73.33	0.00	6.07	13.69	615.00
Muddy Ridge	0	0.00	0.00	0.00	0.00	513.55	65.47	210.80	0.00	6.15	17.25	789.82
Sand Mesa	8	40.16	5.12	12.99	0.00	292.89	28.28	94.71	0.00	1.53	5.00	415.87
South Sand Mesa	3	15.06	1.92	7.95	0.00	104.37	13.31	55.10	0.00	0.00	0.00	172.77
Coastal Extension	2	10.04	1.28	8.13	0.00	287.14	36.61	232.45	0.00	0.00	0.56	556.20
YEAR 14												
Pavillion (Irrigated)	7	16.10	2.03	2.47	0.00	502.58	68.24	77.78	0.00	0.01	4.44	648.60
Pavillion (Dry Land)	7	14.07	4.48	2.47	0.00	485.73	88.57	77.78	0.00	6.07	13.69	652.08
Muddy Ridge	0	0.00	0.00	0.00	0.00	513.55	65.47	210.80	0.00	6.15	17.25	789.82
Sand Mesa	8	40.16	5.12	12.99	0.00	294.21	37.51	95.13	0.00	1.53	5.00	426.86
South Sand Mesa	3	15.06	1.92	7.95	0.00	104.86	13.37	2.89	0.00	0.00	0.00	121.12
Coastal Extension	2	10.04	1.28	8.13	0.00	309.23	39.42	250.33	0.00	0.00	0.56	598.98
YEAR 15												
Pavillion (Irrigated)	5	11.50	1.45	1.77	0.00	464.40	63.43	71.92	0.00	0.01	4.44	599.74
Pavillion (Dry Land)	5	10.05	3.20	1.77	0.00	452.36	77.95	71.92	0.00	6.07	13.69	602.23
Muddy Ridge	0	0.00	0.00	0.00	0.00	513.55	65.47	210.80	0.00	6.15	17.25	789.82
Sand Mesa	8	40.16	5.12	12.99	0.00	294.21	37.51	95.13	0.00	1.53	5.00	426.86
South Sand Mesa	3	15.06	1.92	7.95	0.00	104.86	13.37	2.89	0.00	0.00	0.00	121.12
Coastal Extension	2	10.04	1.26	8.13	0.00	309.23	39.42	250.33	0.00	0.00	0.56	598.98
YEAR 16												
Pavillion (Irrigated)	0	0.00	0.00	0.00	0.00	368.95	51.39	57.25	0.00	0.01	4.44	477.59
Pavillion (Dry Land)	0	0.00	0.00	0.00	0.00	368.95	51.39	57.25	0.00	6.07	13.69	477.59
Muddy Ridge	0	0.00	0.00	0.00	0.00	513.55	65.47	210.80	0.00	6.15	17.25	789.82
Sand Mesa	8	40.16	5.12	12.99	0.00	294.21	37.51	95.13	0.00	1.53	5.00	426.86

Field	ALTERNATIVE A -SOIL LOSS (Tons)											
	No. of Wells	Well Pad Disturbed Area (acres)	Road Disturbed Area (acres)	Pipeline Disturbed Area (acres)	Auxiliary Facilities (acres)	Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total Wells, Roads, & Pipelines
South Sand Mesa	3	15.06	1.92	7.95	0.00	104.86	13.37	2.89	0.00	0.00	0.00	121.12
Coastal Extension	2	10.04	1.28	8.13	0.00	303.23	39.42	250.33	0.00	0.00	0.56	598.98
YEAR 17												
Pavillion (Irrigated)	0	0.00	0.00	0.00	0.00	368.95	51.39	57.25	0.00	0.01	4.44	477.53
Pavillion (Dry Land)	0	0.00	0.00	0.00	0.00	368.95	51.39	57.25	0.00	6.07	13.69	477.59
Muddy Ridge	0	0.00	0.00	0.00	0.00	513.55	65.47	210.80	0.00	6.15	17.25	789.82
Sand Mesa	5	25.10	3.20	8.12	0.00	194.82	24.84	62.99	0.00	1.53	5.00	282.65
South Sand Mesa	3	15.06	1.92	7.95	0.00	104.86	13.37	2.89	0.00	0.00	0.00	121.12
Coastal Extension	2	10.04	1.28	8.13	0.00	309.23	39.42	250.33	0.00	0.00	0.56	598.98
YEAR 18												
Pavillion (Irrigated)	0	0.00	0.00	0.00	0.00	368.95	51.39	57.25	0.00	0.01	4.44	477.59
Pavillion (Dry Land)	0	0.00	0.00	0.00	0.00	368.95	51.39	57.25	0.00	6.07	13.69	477.59
Muddy Ridge	0	0.00	0.00	0.00	0.00	513.55	65.47	210.80	0.00	6.15	17.25	789.82
Sand Mesa	0	0.00	0.00	0.00	0.00	29.16	3.72	9.43	0.00	1.53	5.00	42.30
South Sand Mesa	3	15.06	1.92	7.95	0.00	104.86	13.37	2.89	0.00	0.00	0.00	121.12
Coastal Extension	2	10.04	1.28	8.13	0.00	309.23	39.42	250.33	0.00	0.00	0.56	598.98

Table N-6: Alternative A – Soil Loss by Field

Field	SOIL LOSS BY FIELD (TONS)																	
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Year 17**	**Year 18**
Pavillion (Irrigated)	75	203	240	277	314	351	388	425	463	480	537	574	612	649	600	478	478	478
Pavillion (Dry Land)	104	218	256	280	318	355	392	429	467	483	541	578	615	652	602	478	478	478
Muddy Ridge	353	815	959	1026	1207	1014	790	790	790	790	790	790	790	790	790	790	790	790
Sand Mesa	102	386	406	437	410	411	413	415	417	419	421	423	416	427	427	427	283	42
South Sand Mesa	0	0	166	191	166	167	168	169	169	170	171	172	173	121	121	121	121	121
Coastal Extension	0	0	130	180	214	257	299	342	360	428	471	513	556	599	599	599	599	599
Total	**635**	**1622**	**2157**	**2392**	**2628**	**2555**	**2450**	**2570**	**2666**	**2770**	**2931**	**3051**	**3161**	**3237**	**3139**	**2892**	**2748**	**2507**

Table N-7: Alternative A – Soil Loss by Watershed

Watershed	SOIL LOSS BY WATERSHED (TONS)																	
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	**Year 17**	**Year 18**
Cottonwood Creek	**12**	**46**	**174**	**225**	**255**	**296**	**337**	**378**	**395**	**461**	**502**	**544**	**584**	**626**	**626**	**626**	**609**	**580**
Muddy Creek	**306**	**714**	**841**	**927**	**1066**	**1071**	**1064**	**1138**	**1214**	**1247**	**1362**	**1437**	**1511**	**1585**	**1486**	**1240**	**1240**	**1240**
Fivemile Creek	**316**	**862**	**1133**	**1240**	**1307**	**1189**	**1049**	**1053**	**1057**	**1062**	**1066**	**1070**	**1066**	**1026**	**1026**	**1026**	**899**	**688**
Total	**635**	**1622**	**2147**	**2392**	**2628**	**2555**	**2450**	**2570**	**2666**	**2770**	**2931**	**3051**	**3161**	**3237**	**3139**	**2892**	**2748**	**2507**

Table N-8: Alternative A – Sediment Loading by Watershed

Watershed	SEDIMENT LOADING (TONS)																	
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Year 17**	**Year 18**
Cottonwood Creek	1	2	9	11	13	15	17	19	20	23	25	27	29	31	31	31	30	29
Fivemile Creek	15	36	42	46	53	54	53	57	61	62	68	72	76	79	74	62	62	62
Muddy Creek	16	43	57	62	65	59	52	53	53	53	53	54	53	51	51	51	45	34
Total	**32**	**81**	**107**	**120**	**131**	**128**	**123**	**129**	**133**	**139**	**147**	**153**	**158**	**162**	**157**	**145**	**137**	**125**

Table N-9: Alternative B - Yearly Soil Loss Calculation Sheet

						SOIL LOSS (TONS)						
	No. of Wells	Well Pad Disturbed Area (acres)	Road Disturbed Area (acres)	Pipeline Disturbed Area (acres)	Auxiliary Facilities (acres)	Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total Wells, Roads, & Pipelines
Year 1												
Pavillion (Irrigated)	7	16.10	2.03	3.86	0.00	35.29	7.55	47.08	0.00	0.09	15.98	89.92
Pavillion (Dry Land)	7	14.07	4.48	3.86	1.40	30.84	8.78	42.50	3.07	54.61	49.28	85.18
Muddy Ridge	12	60.24	7.68	36.69	4.00	204.38	54.87	95.09	7.57	47.66	53.48	361.91
Sand Mesa	8	40.16	5.12	17.93	0.00	86.59	11.32	2.06	0.00	0.25	0.33	99.98
South Sand Mesa	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coastal Extension	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.44	0.00
YEAR 2												
Pavillion (Irrigated)	7	16.10	2.03	3.86	0.00	162.61	20.50	39.02	0.00	0.01	4.44	222.13
Pavillion (Dry Land)	7	14.07	4.48	3.86	0.00	142.11	45.25	39.02	0.00	6.07	13.69	226.37
Muddy Ridge	12	60.24	7.68	36.69	0.00	530.11	67.58	322.87	0.00	6.15	17.25	920.57
Sand Mesa	8	40.16	5.12	17.93	0.00	266.38	33.96	188.94	0.00	1.53	5.00	419.29
South Sand Mesa	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coastal Extension	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.00
YEAR 3												
Pavillion (Irrigated)	7	16.10	2.03	3.86	0.00	191.59	24.16	45.97	0.00	0.01	4.44	261.72
Pavillion (Dry Land)	7	14.07	4.48	3.86	0.00	167.43	53.31	45.97	0.00	6.07	13.69	266.72
Muddy Ridge	12	60.24	7.68	36.69	0.00	623.48	79.49	379.74	0.00	5.15	17.25	1082.71
Sand Mesa	8	40.16	5.12	17.93	0.00	279.63	35.65	124.86	0.00	1.53	5.00	440.15
South Sand Mesa	3	15.06	1.92	30.21	2.00	99.40	12.67	199.39	0.85	0.00	0.00	312.31
Coastal Extension	1	5.02	0.64	16.11	2.00	33.13	4.22	106.34	0.85	0.00	0.56	144.55
YEAR 4												
Pavillion (Irrigated)	7	16.10	2.03	3.86	0.00	220.57	27.81	52.92	0.00	0.01	4.44	301.31
Pavillion (Dry Land)	7	14.07	4.48	3.86	0.00	203.72	48.15	52.92	0.00	6.07	13.69	304.79
Muddy Ridge	4	20.08	2.56	12.23	0.00	425.70	54.27	122.37	0.00	5.15	17.25	602.34
Sand Mesa	8	40.16	5.12	17.93	0.00	280.96	35.82	169.70	0.00	1.53	5.00	486.48
						SOIL LOSS (TONS)						

	No. of Wells	Well Pad Disturbed Area (acres)	Road Disturbed Area (acres)	Pipeline Disturbed Area (acres)	Auxiliary Facilities (acres)	Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total Wells, Roads, & Pipelines
South Sand Mesa	3	15.06	1.92	30.21	0.00	99.89	12.74	271.60	0.00	0.00	0.00	384.23
Coastal Extension	1	5.02	0.64	16.11	0.00	44.18	5.63	154.60	0.00	0.00	0.56	204.41
YEAR 5												
Pavillion (Irrigated)	7	16.10	2.03	3.86	0.00	249.55	31.47	59.88	0.00	0.01	4.44	340.89
Pavillion (Dry Land)	7	14.07	4.48	3.86	0.00	232.70	51.80	59.88	0.00	6.07	13.69	344.38
Muddy Ridge	0	0.00	0.00	0.00	0.00	311.24	42.66	176.60	0.00	5.15	17.25	530.49
Sand Mesa	8	40.16	5.12	17.93	0.00	382.28	35.99	126.04	0.00	1.53	5.00	444.32
South Sand Mesa	3	15.06	1.92	30.21	0.00	100.39	12.80	201.38	0.00	0.00	0.00	314.57
Coastal Extension	1	5.05	0.64	16.11	0.00	55.11	7.04	177.24	0.00	0.00	0.56	239.50
YEAR 6												
Pavillion (Irrigated)	7	16.10	2.03	3.86	0.00	278.53	35.12	66.83	0.00	0.01	4.44	380.48
Pavillion (Dry Land)	7	14.07	4.48	3.86	0.00	261.68	55.45	66.83	0.00	6.07	13.69	383.97
Muddy Ridge	0	0.00	0.00	0.00	0.00	311.24	42.66	176.60	0.00	5.15	17.25	530.49
Sand Mesa	8	40.16	5.12	17.93	0.00	283.61	36.16	126.64	0.00	1.53	5.00	446.40
South Sand Mesa	0	0.00	0.00	0.00	0.00	1.49	0.19	2.99	0.00	0.00	0.00	4.67
Coastal Extension	1	5.02	0.64	16.11	0.00	66.26	8.45	212.69	0.00	0.00	0.56	287.40
YEAR 7												
Pavillion (Irrigated)	6	13.80	1.74	3.31	0.00	288.42	36.37	69.21	0.00	0.01	4.44	393.99
Pavillion (Dry Land)	6	12.06	3.84	3.31	0.00	273.98	53.80	69.21	0.00	6.07	13.69	396.98
Muddy Ridge	0	0.00	0.00	0.00	0.00	311.24	39.68	189.57	0.00	5.15	17.25	540.49
Sand Mesa	8	40.16	5.12	17.93	0.00	284.94	36.33	127.23	0.00	1.53	5.00	448.49
South Sand Mesa	0	0.00	0.00	0.00	0.00	100.89	0.19	202.38	0.00	0.00	0.00	303.45
Coastal Extension	1	5.02	0.64	16.11	0.00	77.31	9.86	248.14	0.00	0.00	0.56	335.30
YEAR 8												
Pavillion (Irrigated)	0	0.00	0.00	0.00	0.00	173.88	21.92	41.72	0.00	0.01	4.44	237.53
Pavillion (Dry Land)	0	0.00	0.00	0.00	0.00	173.88	21.92	41.72	0.00	6.07	13.69	237.53
Muddy Ridge	0	0.00	0.00	0.00	0.00	311.24	39.68	189.57	0.00	5.15	17.25	540.49
Sand Mesa	8	40.16	5.12	17.93	0.00	286.26	36.50	127.82	0.00	1.53	5.00	450.58
South Sand Mesa	0	0.00	0.00	0.00	0.00	1.49	0.19	2.99	0.00	0.00	0.00	4.67
						SOIL LOSS (TONS)						

	No. of Wells	Well Pad Disturbed Area (acres)	Road Disturbed Area (acres)	Pipeline Disturbed Area (acres)	Auxiliary Facilities (acres)	Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total Wells, Roads, & Pipelines
Coastal Extension	1	5.02	0.64	16.11	0.00	88.35	11.26	283.59	0.00	0.00	0.56	383.20
YEAR 9												
Pavillion (Irrigated)	0	0.00	0.00	0.00	0.00	195.59	28.84	47.68	0.00	0.01	4.44	275.11
Pavillion (Dry Land)	0	0.00	0.00	0.00	0.00	195.59	28.84	47.68	0.00	6.07	13.69	272.11
Muddy Ridge	0	0.00	0.00	0.00	0.00	311.24	39.68	189.57	0.00	5.15	17.25	540.49
Sand Mesa	8	40.16	5.12	17.93	0.00	287.59	36.66	128.41	0.00	1.53	5.00	452.66
South Sand Mesa	0	0.00	0.00	0.00	0.00	1.49	0.19	2.99	0.00	0.00	0.00	4.67
Coastal Extension	1	5.02	0.64	16.11	0.00	99.40	0.00	319.09	0.00	0.00	0.56	418.43
YEAR 10												
Pavillion (Irrigated)	0	0.00	0.00	0.00	0.00	195.59	28.84	47.68	0.00	0.01	4.44	272.11
Pavillion (Dry Land)	0	0.00	0.00	0.00	0.00	195.59	28.84	47.68	0.00	6.07	13.69	272.11
Muddy Ridge	0	0.00	0.00	0.00	0.00	311.24	39.68	189.57	0.00	5.15	17.25	540.49
Sand Mesa	8	40.16	5.12	17.93	0.00	288.91	36.83	129.00	0.00	1.53	5.00	454.75
South Sand Mesa	0	0.00	0.00	0.00	0.00	1.49	0.19	2.99	0.00	0.00	0.00	4.67
Coastal Extension	0	0.00	0.00	0.00	0.00	77.31	9.86	248.14	0.00	0.00	0.56	335.30

Table N-10: Alternative B – Soil Loss by Field

Field	SOIL LOSS BY FIELD (TONS)									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Pavillion (Irrigated)	89.92	222.13	261.72	301.31	340.89	380.48	393.99	237.53	272.11	272.11
Pavillion (Dry Land)	85.18	226.37	266.72	304.79	344.38	383.97	396.98	237.53	272.11	272.11
Muddy Ridge	361.91	920.57	1082.71	602.34	530.49	530.49	540.49	540.49	540.49	540.49
Sand Mesa	99.98	419.29	440.51	486.48	444.32	446.40	448.49	450.58	452.66	454.75
South Sand Mesa	0.00	0.00	312.31	384.23	314.57	4.67	303.45	4.67	4.67	4.67
Coastal Extension	0.00	0.00	144.55	204.41	239.50	287.40	335.30	383.20	418.43	335.30
Total	**636.98**	**1788.36**	**2508.16**	**2283.55**	**2214.15**	**2033.42**	**2418.70**	**1853.99**	1960.46	1879.42

Table N-11: Alternative B – Soil Loss by Watershed

Watershed	SOIL LOSS BY WATERSHED (TONS)									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cottonwood Creek	12.00	50.31	191.59	254.61	283.24	329.47	375.71	421.94	456.01	376.46
Fivemile Creek	305.38	779.91	918.21	822.94	876.25	955.43	985.54	669.63	738.79	738.79
Muddy Creek	319.60	958.13	1387.53	1206.00	1054.66	748.52	1057.45	762.42	765.66	764.17
Total	**636.98**	**1788.36**	**2497.33**	**2283.55**	**2214.15**	**2033.42**	**2418.70**	**1853.99**	**1960.46**	**1879.42**

Table N-12: Alternative B – Sediment Loading by Watershed

Watershed	SEDIMENT LOADING (TONS)									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cottonwood Creek	0.60	2.52	9.58	12.73	14.16	16.47	18.79	21.10	22.80	18.82
Fivemile Creek	15.27	39.00	45.91	41.15	43.81	47.77	49.28	33.48	36.94	36.94
Muddy Creek	15.98	47.91	69.38	60.30	52.73	37.43	52.87	38.12	38.28	38.21
Total	31.85	89.42	124.87	114.18	110.71	101.67	120.94	92.70	98.02	93.97

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Table N-13: Alternative C – Yearly Soil Loss Calculation Sheet

						SOIL LOSS (TONS)						
	No. of Wells	Well Pad Disturbed Area (acres)	Road Disturbed Area (acres)	Pipeline Disturbed Area (acres)	Auxiliary Facilities (acres)	Well Pads	Roads	Pipelines	Auxiliary Facilities	Existing Pads	Existing Roads	Total
Year 1												
Pavillion (Irrigated)	7	16.10	2.03	3.76	0.00	35.29	7.37	47.08	0.00	0.09	15.98	89.74
Tribal Protection	7	14.07	4.48	3.76	1.40	30.84	8.60	42.50	3.07	54.61	49.28	85.00
YEAR 2												
Pavillion (Irrigated)	7	16.10	2.03	3.76	0.00	162.61	20.50	37.97	0.00	0.01	4.44	221.08
Tribal Protection	7	14.07	4.48	3.76	0.00	142.11	45.25	37.97	0.00	6.01	13.69	225.32
YEAR 3												
Pavillion (Irrigated)	7	16.10	2.03	3.76	0.00	191.59	24.16	44.73	0.00	0.01	4.44	260.48
Tribal Protection	7	14.07	4.48	3.76	0.00	167.43	53.31	44.73	0.00	6.07	13.69	265.48
YEAR 4												
Pavillion (Irrigated)	7	16.10	2.03	3.76	0.00	220.57	27.81	51.50	0.00	0.01	4.44	299.88
Tribal Protection	7	14.07	4.48	3.76	0.00	203.72	48.15	51.50	0.00	6.07	13.69	303.37
YEAR 5												
Pavillion (Irrigated)	7	16.10	2.03	3.76	0.00	249.55	31.47	58.26	0.00	0.01	4.44	339.28
Tribal Protection	7	14.07	4.48	3.76	0.00	232.70	51.80	58.26	0.00	6.07	13.69	342.77
YEAR 6												
Pavillion (Irrigated)	7	16.10	2.03	3.76	0.00	278.53	35.12	65.03	0.00	0.01	4.44	378.68
Tribal Protection	7	14.07	4.48	3.76	0.00	261.68	55.45	65.03	0.00	6.07	13.69	382.17
YEAR 7												
Pavillion (Irrigated)	7	16.10	2.03	3.76	0.00	307.51	38.77	71.80	0.00	0.01	4.44	418.08
Tribal Protection	7	14.07	4.48	3.76	0.00	290.66	59.11	71.80	0.00	6.07	13.69	421.57
YEAR 8												
Pavillion (Irrigated)	1	2.30	0.29	0.54	0.00	197.11	24.85	46.02	0.00	0.01	4.44	267.98
Tribal Protection	1	2.01	0.64	0.54	0.00	194.70	27.76	46.02	0.00	6.07	13.69	268.48

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Table N-14: Alternative C – Soil Loss by Well Field

Field Name	SOIL LOSS BY FIELD (TONS)							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Pavillion (Irrigated)	89.74	221.08	260.48	299.88	339.28	378.68	418.08	267.98
Tribal Protection	85.0	225.32	265.48	303.37	342.77	382.17	421.57	268.48
Total	**174.74**	**446.40**	**525.96**	**603.24**	**682.05**	**760.85**	**839.65**	**536.47**

Table N-15: Alternative C – Soil Loss by Watershed

Watershed	SOIL LOSS BY WATERSHED (TONS)							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Fivemile Creek	174.74	446.40	525.96	603.24	682.05	760.85	839.65	536.47
Total	174.74	446.40	525.96	603.24	682.05	760.85	839.65	536.47

Table N-16: Alternative C – Sediment Loading by Watershed

Watershed	SEDIMENT LOAD (TONS)							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Fivemile Creek	8.74	22.32	26.30	30.16	34.10	38.04	41.98	26.82
Total	**8.74**	**22.32**	**26.30**	**30.16**	**34.10**	**38.04**	**41.98**	**26.82**

APPENDIX O- STORM WATER MANAGEMENT PLAN

There were no changes to Appendix O text.

APPENDIX P – WILDLIFE MONITORING/PROTECTION PLAN

Replace Appendix P from the DEIS with Appendix F in this FEIS.

APPENDIX Q – VISUAL RESOURCES

The following pages of Appendix Q appeared in the Hard Copy of the DEIS issued July, 2004, but were inadvertently omitted from the CD version of the DEIS. They are included here for completeness.

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 8/14/03
District Wind River Indian Res.
Resource Area Wind River EIS
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Wind River EIS Visual Resources
2. Key Observation Point: #1
3. VRM Class: III/IV
4. Location
Township _____
Range _____
Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat, rolling with mesas.	Upright oval massing mounded, rounded.	Cylindrical, rectangular, cubical.
LINE	Horizontal to undulating.	Horizontal, curvilinear and angular.	Vertical, horizontal and angular.
COLOR	Brown, tan.	Green, yellow, blue-green.	White, brown, tan, grey.
TEXTURE	Smooth to coarse.	Fine to coarse.	Coarse.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Not affected.	Not affected.	Structures match existing structures.
LINE	Not affected.	Not affected.	
COLOR	Not affected.	Not affected.	
TEXTURE	Not affected.	Not affected.	

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	X				X						X	
Line	X				X							X
Color		X			X							X
Texture		X			X							X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
(see section 4.11.7)

Evaluator's Names — Date 8/14

Jon Fredericks, John McCarty, Louis Wilsher

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 8/14/03
District Wind River Indian Res.
Resource Area Wind River EIS
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Wind River EIS Visual Resources
2. Key Observation Point: #2
3. VRM Class: IV
4. Location
Township _____
Range _____
Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to rolling.	Low profile, upright rounded-oval massing	Cylindrical, rectangular, rounded, peaked.
LINE	Horizontal, curvilinear, angular	Horizontal in ag lands with angled and curvilinear masses.	Vertical, horizontal and angular.
COLOR	Brown, tan.	Green, yellow, grey.	White, blue, brown, tan, grey.
TEXTURE	Medium.	Fine to coarse.	Medium.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Not affected.	Not affected.	Structures match existing structures.
LINE	Not affected.	Not affected.	
COLOR	Not affected.	Not affected.	
TEXTURE	Not affected.	Not affected.	

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	X				X					X		
Line	X				X						X	
Color		X			X					X		
Texture		X			X						X	

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names — Date 8/14

Jon Fredericks, John McCarty, Louis Wilsher

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 8/14/03
District Wind River Indian Res.
Resource Area Wind River EIS
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Wind River EIS Visual Resources
2. Key Observation Point: #3
3. VRM Class: IV
4. Location
Township _____
Range _____
Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to small ridges.	Low profile with areas of upright oval massing.	Rectangular.
LINE	Horizontal, angular, curvilinear.	Curvilinear and horizontal, some angular.	Angular, vertical, horizontal.
COLOR	Water-grey, blue, green Land-tan, brown.	Green, grey-green, brown.	White,brown, grey.
TEXTURE	Medium.	Fine to coarse.	Medium.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Not affected.	Not affected.	Structures match existing structures.
LINE	Not affected.	Not affected.	
COLOR	Not affected.	Not affected.	
TEXTURE	Not affected.	Not affected.	

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	X				X					X		
Line	X				X						X	
Color		X			X					X		
Texture		X			X						X	

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names — Date 8/14

Jon Fredericks, John McCarty, Louis Wilsher

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 8/14/03
District Wind River Indian Res.
Resource Area Wind River EIS
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Wind River EIS Visual Resources
2. Key Observation Point: #4
3. VRM Class: IV
4. Location
Township _____
Range _____
Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to hilly mesas.	Some upright rounded, oval some low profile agricultural.	Rectangular.
LINE	Horizontal, angular.	Horizontal and undulating, some angular.	Horizontal,, vertical.
COLOR	Water-grey, blue, green Land-tan, brown.	Green, brown yellow.	White, tan, red, yellow, green, grey.
TEXTURE	Fine to medium.	Fine to coarse.	Medium.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Not affected.	Not affected.	Structures match existing structures.
LINE	Not affected.	Not affected.	
COLOR	Not affected.	Not affected.	
TEXTURE	Not affected.	Not affected.	

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	X				X							X
Line	X				X							X
Color			X		X							X
Texture		X			X							X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names — Date 8/14

Jon Fredericks, John McCarty, Louis Wilsher

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 8/14/03
District Wind River Indian Res.
Resource Area Wind River EIS
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Wind River EIS Visual Resources
2. Key Observation Point: #5
3. VRM Class: IV
4. Location
Township _____
Range _____
Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to rolling.	Mostly round, some upright round clusters.	Cylindrical, rectangular.
LINE	Horizontal, angular.	Horizontal and angular.	Vertical, horizontal, angular.
COLOR	Brown, tan, reddish-brown.	Grey, brown, green, blue-grey.	White, red, tan.
TEXTURE	Fine to medium to coarse.	Fine and medium to coarse.	Medium.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Not affected.	Not affected.	Cylindrical and rectangular.
LINE	Not affected.	Not affected.	vertical, horizontal and angular.
COLOR	Not affected.	Not affected.	Tan, reflective, smooth.
TEXTURE	Not affected.	Not affected.	Medium.

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form			X		X							X
Line			X		X							X
Color			X		X							X
Texture		X			X							X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names — Date 8/14

Jon Fredericks, John McCarty, Louis Wilsher

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 8/14/03
District Wind River Indian Res.
Resource Area Wind River EIS
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Wind River EIS Visual Resources
2. Key Observation Point: #6
3. VRM Class: III/IV
4. Location
Township _____
Range _____
Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat water, rolling and flat land.	Low, some massing, some rounded.	Cylindrical, rectangular.
LINE	Horizontal, curvilinear.	Curvilinear, vertical and horizontal.	Vertical, horizontal, angular.
COLOR	Blue-grey water, brown land.	Green, brown, yellow, grey.	Brown/tan and white.
TEXTURE	Smooth to fine, or medium.	Fine.	Medium.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Not affected.	Not affected.	Cylindrical and rectangular.
LINE	Not affected.	Not affected.	vertical, horizontal and angular.
COLOR	Not affected.	Not affected.	Tan, reflective, smooth.
TEXTURE	Not affected.	Not affected.	Medium.

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	X				X							X
Line	X				X							X
Color		X				X						X
Texture		X				X						X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)
(see section 4.11.7)

Evaluator's Names: Jon Fredericks, John McCarty, Louis Wilsher
Date 8/14

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 8/14/03
District Wind River Indian Res.
Resource Area Wind River EIS
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Wind River EIS Visual Resources
2. Key Observation Point: #7
3. VRM Class: IV
4. Location
Township _____
Range _____
Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to rolling with mesas.	Low, rounded, clustered.	Jumbled, square, rectangular.
LINE	Horizontal and angular.	Horizontal/angular.	Horizontal/vertical, undulating.
COLOR	Brown, red, tan.	Brown, green, yellow.	Brown, green, grey, white.
TEXTURE	Fine/smooth.	Medium.	Medium to coarse.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Not affected.	Not affected.	Cylindrical, square with curvilinear roads.
LINE	Not affected.	Not affected.	Vertical, horizontal and angular.
COLOR	Not affected.	Not affected.	Tan, red, refelective.
TEXTURE	Not affected.	Not affected.	Medium.

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form		X			X					X		
Line		X				X				X		
Color			X			X				X		
Texture			X			X			X			

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names: Jon Fredericks, John McCarty, Louis Wilsher
Date 8/14

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 8/14/03
District Wind River Indian Res.
Resource Area Wind River EIS
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Wind River EIS Visual Resources
2. Key Observation Point: #8
3. VRM Class: IV
4. Location
   Township _____
   Range _____
   Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat.	Flat, continuous, some massed rounding.	Cylindrical, cubical, rectangular, linear.
LINE	Horizontal.	Horizontal.	Horizontal and vertical.
COLOR	Suble and muted tan.	Brown, green.	Brown, red, grey, white.
TEXTURE	Smooth.	Smooth/fine.	Medium.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Not affected.	Not affected.	Cylindrical, square with curvilinear roads.
LINE	Not affected.	Not affected.	Vertical and horizontal.
COLOR	Not affected.	Not affected.	Tan, red, refelective.
TEXTURE	Not affected.	Not affected.	Medium.

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	X				X						X	
Line	X				X							X
Color		X				X					X	
Texture		X				X						X

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names — Date 8/14

Jon Fredericks, John McCarty, Louis Wilsher

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 8/14/03
District Wind River Indian Res.
Resource Area Wind River EIS
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Wind River EIS Visual Resources
2. Key Observation Point: #9
3. VRM Class: IV
4. Location
Township _____
Range _____
Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat to rolling.	Flat, continuous, some upright rounding.	Open ribbon (fence).
LINE	Horizontal and curvilinear.	Vertical grasses, horizontal banding, upright angular riparian	Horizontal and vertical.
COLOR	Brown.	Brown, green and yellow.	Brown/black.
TEXTURE	Smooth.	Fine with pockets of coarse.	Medium to fine.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Not affected.	Not affected.	Cylindrical, square with curvilinear roads.
LINE	Not affected.	Not affected.	Vertical and horizontal.
COLOR	Not affected.	Not affected.	Tan, red, refelective.
TEXTURE	Not affected.	Not affected.	Medium.

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form	X				X				X			
Line	X				X					X		
Color		X				X				X		
Texture		X				X					X	

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names: Jon Fredericks, John McCarty, Louis Wilsher
Date 8/14

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 8/14/03
District Wind River Indian Res.
Resource Area Wind River EIS
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Wind River EIS Visual Resources
2. Key Observation Point: #10
3. VRM Class: IV
4. Location
Township _____
Range _____
Section _____
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Flat.	Predominantly low, subtle, with some upright/rounded.	Rectangular, cylindrical, with open ribbon (fence).
LINE	Horizontal with banding.	Horizontal with some vertical and curvilinear.	Horizontal and vertical.
COLOR	Brown, tan and yellow.	Brown and green.	Tan with white.
TEXTURE	Fine/smooth.	Fine with pockets of medium.	Medium.

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Not affected.	Not affected.	Same as existing structures.
LINE	Not affected.	Not affected.	
COLOR	Not affected.	Not affected.	
TEXTURE	Not affected.	Not affected.	

SECTION D. CONTRAST RATING ☐ SHORT TERM ☒ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	FEATURES: LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form		X			X							X
Line		X			X							X
Color			X			X						X
Texture		X				X					X	

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☐ Yes ☒ No (Explain on reverse side)

Evaluator's Names — Date 8/14

Jon Fredericks, John McCarty, Louis Wilsher

VOLUME III

AIR QUALITY TECHNICAL SUPPORT DOCUMENT

Emissions Inventory

There were no changes to the Emissions Inventory text.

Near-Field Air Quality Technical Report

1.0 INTRODUCTION

p. NF-2, Table 1-1, revise the text as shown: " Note: ~~The U. S. Supreme Court upheld the proposed 8-hour ozone and PM2.5 standards on February 27, 2001. The State of Wyoming will not enforce compliance with these standards until an implementation rule is issued by the EPA (Cara Casten, WDEQ, personal communication, February 2004).~~ Measured background…"

Section 4.1.1, Model Setup, Page NF-11, first paragraph, third sentence, change as shown: "Therefore, the short-term impacts associated with development activities would be nearly identical for all alternatives."

5.2 WRPA PROPOSED ACTION EMISSION SOURCES

5.2.1 Compressor Stations

p. NF-32, add the following note to the end of Table 5-2:
"NO_x emission rate: 1.0 grams/horsepower-hour
CO emission rate: 2.0 grams/horsepower-hour."

5.2.3 Drilling Rigs

p. NF-34 and -35, replace Tables 5-3 and 5-4 with the following tables:

Table 5-3. WRPA Proposed Action Well Pad Separator Emissions.

Development Area	Number of Separators	UTM Easting (meters)	UTM Northing (meters)	Annual NOx (tons/yr/location)	NO_x Emission Rate (g/sec/location)	CO Emission Rate $(g/sec)_1$
Pavillion	15	691190	4794488	0.84863	0.02363	0.01984
Pavillion	15	693227	4794493	0.84863	0.02363	0.01984
Pavillion	15	691185	4792857	0.84863	0.02363	0.01984
Pavillion	15	693275	4792812	0.84863	0.02363	0.01984
Pavillion	15	695716	4792110	0.84863	0.02363	0.01984
Pavillion	15	698089	4792933	0.84863	0.02363	0.01984
Pavillion	15	690875	4791131	0.84863	0.02363	0.01984
Pavillion	15	698133	4791426	0.84863	0.02363	0.01984
Pavillion	15	692612	4789574	0.84863	0.02363	0.01984
Pavillion	15	694993	4789635	0.84863	0.02363	0.01984
Muddy Ridge	5	695478	4802496	0.41063	0.011813	0.00992
Muddy Ridge	5	697056	4802538	0.41063	0.011813	0.00992
Muddy Ridge	5	695521	4800938	0.41063	0.011813	0.00992
Muddy Ridge	5	697102	4800997	0.41063	0.011813	0.00992
Muddy Ridge	5	695572	4799333	0.41063	0.011813	0.00992
Muddy Ridge	5	697154	4799383	0.41063	0.011813	0.00992
Muddy Ridge	5	695618	4797721	0.41063	0.011813	0.00992
Muddy Ridge	5	697208	4797784	0.41063	0.011813	0.00992
Muddy Ridge	5	695664	4796123	0.41063	0.011813	0.00992
Muddy Ridge	5	697256	4796176	0.41063	0.011813	0.00992
Sand Mesa	6	715530	4800860	0.54750	0.015764	0.01588
Sand Mesa	6	717090	4800936	0.54750	0.015764	0.01588
Sand Mesa	6	713978	4799180	0.54750	0.015764	0.01588
Sand Mesa	6	715574	4799259	0.54750	0.015764	0.01588
Sand Mesa	6	717146	4799331	0.54750	0.015764	0.01588
Sand Mesa	6	718742	4799382	0.54750	0.015764	0.01588
Sand Mesa	6	714024	4797569	0.54750	0.015764	0.01588
Sand Mesa	6	715630	4797643	0.54750	0.015764	0.01588
Sand Mesa	6	717188	4797717	0.54750	0.015764	0.01588
Sand Mesa	6	718795	4797771	0.54750	0.015764	0.01588
Sand Mesa South	6	716024	4795329	0.32850	0.009458	0.01588
Sand Mesa South	6	719368	4796197	0.32850	0.009458	0.01588
Coastal Extension	4	704344	4800430	0.21900	0.006306	0.01058
Coastal Extension	4	707475	4800613	0.21900	0.006306	0.01058

[1] **Based on maximum hourly and 8-hourly rate for one rig**

Table 5-4. WRPA Proposed Action Drill Rig Emissions.

Development Area	Rigs per location	UTM Easting (meters)	UTM northing (meters)	Annual NOx (tons/yr/location)	NO_X Emission Rate (g/sec)	CO Emission Rate [1] (g/sec)
Pavillion	1.4	691190	4794488	0.798336	0.02297	0.15246
Pavillion	1.4	693227	4794493	0.798336	0.02297	0.15246
Pavillion	1.4	691185	4792857	0.798336	0.02297	0.15246
Pavillion	1.4	693275	4792812	0.798336	0.02297	0.15246
Pavillion	1.4	695716	4792110	0.798336	0.02297	0.15246
Pavillion	1.4	698089	4792933	0.798336	0.02297	0.15246
Pavillion	1.4	690875	4791131	0.798336	0.02297	0.15246
Pavillion	1.4	698133	4791426	0.798336	0.02297	0.15246
Pavillion	1.4	692612	4789574	0.798336	0.02297	0.15246
Pavillion	1.4	694993	4789635	0.798336	0.02297	0.15246
Muddy Ridge	1.2	695478	4802496	6.2208	0.1789	0.4158
Muddy Ridge	1.2	697056	4802538	6.2208	0.1789	0.4158
Muddy Ridge	1.2	695521	4800938	6.2208	0.1789	0.4158
Muddy Ridge	1.2	697102	4800997	6.2208	0.1789	0.4158
Muddy Ridge	1.2	695572	4799333	6.2208	0.1789	0.4158
Muddy Ridge	1.2	697154	4799383	6.2208	0.1789	0.4158
Muddy Ridge	1.2	695618	4797721	6.2208	0.1789	0.4158
Muddy Ridge	1.2	697208	4797784	6.2208	0.1789	0.4158
Muddy Ridge	1.2	695664	4796123	6.2208	0.1789	0.4158
Muddy Ridge	1.2	697256	4796176	6.2208	0.1789	0.4158
Sand Mesa	0.8	715530	4800860	6.912	0.1988	0.4158
Sand Mesa	0.8	717090	4800936	6.912	0.1988	0.4158
Sand Mesa	0.8	713978	4799180	6.912	0.1988	0.4158
Sand Mesa	0.8	715574	4799259	6.912	0.1988	0.4158
Sand Mesa	0.8	717146	4799331	6.912	0.1988	0.4158
Sand Mesa	0.8	718742	4799382	6.912	0.1988	0.4158
Sand Mesa	0.8	714024	4797569	6.912	0.1988	0.4158
Sand Mesa	0.8	715630	4797643	6.912	0.1988	0.4158
Sand Mesa	0.8	717188	4797717	6.912	0.1988	0.4158
Sand Mesa	0.8	718795	4797771	6.912	0.1988	0.4158
Sand Mesa South	1.5	716024	4795329	12.96	0.3728	0.4158
Sand Mesa South	1.5	719368	4796197	12.96	0.3728	0.4158
Coastal	1	704344	4800430	8.640	0.2485	0.4158
Coastal	1	707475	4800613	8.640	0.2485	0.4158

[1] **Based on maximum hourly and 8-hourly rate for one rig**

Section 5.3, WRPA ALTERNATIVE A EMISSIONS SOURCES,

p. NF-36, last two sentences in the section, revise text as shown: “Finally, the annual drilling rage for Alternative A would be nearly identical to the Proposed Action. Therefore, the Alternative A drilling emissions are nearly identical to those shown on Table 5-7.”

p. NF-38, replace Table 5-6 with the following table:

Table 5-6. WRPA Alternative A Compressor Engines Modeling Parameters.

Source	Stack Height (meters)	Exhaust Temperature (K)	Exhaust Velocity (m/s)	Stack Diameter (meters)	NO_X Emission Rate (tons/yr)	NO_X Emission Rate (g/sec)	CO Emission Rate (tons/yr)	CO Emission Rate (g/sec)
WRPA Alternative A								
South Pavillion	9.144	811	35	0.3048	44.90	1.29	89.80	2.58
Muddy Ridge	9.144	811	35	0.3048	60.83	1.75	121.67	3.50
Sand Mesa Upgrade	9.144	811	35	0.3048	139.05	4.00	278.10	8.00
Sand Mesa South	9.144	811	35	0.3048	51.66	1.88	130.36	3.75
Coastal	9.144	811	35	0.3048	36.69	1.06	73.39	2.11
Pavillion Plant Upgrade	9.144	811	35	0.3048	23.17	0.67	46.35	1.33
Shoshoni	9.144	811	35	0.3048	51.66	1.49	103.32	2.97
Hidden Valley Upgrade	9.144	811	35	0.3048	23.17	0.67	46.35	1.33

Add the following tables after Table 5-6:

Table 5-6a. WRPA Alternative B Compressor Engines Modeling Parameters.

Source	Stack Height (meters)	Exhaust Temperature (K)	Exhaust Velocity (m/s)	Stack Diameter (meters)	NO_X Emission Rate (tons/yr)	NO_X Emission Rate (g/sec)	CO Emission Rate (tons/yr)	CO Emission Rate (g/sec)
WRPA Alternative B								
South Pavillion	9.144	811	35	0.3048	21.98	0.63	44.00	1.267
Muddy Ridge	9.144	811	35	0.3048	29.91	0.86	59.81	1.722
Sand Mesa Upgrade	9.144	811	35	0.3048	68.79	1.98	137.57	3.961
Sand Mesa South	9.144	811	35	0.3048	32.13	0.93	64.25	1.85
Coastal	9.144	811	35	0.3048	17.85	0.51	35.70	1.028
Pavillion Plant Upgrade	9.144	811	35	0.3048	11.57	0.33	23.17	0.667
Shoshoni	9.144	811	35	0.3048	25.37	0.73	50.74	1.461
Hidden Valley Upgrade	9.144	811	35	0.3048	11.38	0.33	22.78	0.656

Table 5-6b. WRPA Alternative C Compressor Engines Modeling Parameters.

Source	Stack Height (meters)	Exhaust Temperature (K)	Exhaust Velocity (m/s)	Stack Diameter (meters)	NO_X Emission Rate (tons/yr)	NO_X Emission Rate (g/sec)	CO Emission Rate (tons/yr)	CO Emission Rate (g/sec)
WRPA Alternative C								
South Pavillion	9.144	811	35	0.3048	20.14	0.58	40.63	1.17
Hidden Valley Upgrade	9.144	811	35	0.3048	10.76	0.31	21.17	0.61

p. NF-39, replace Table 5-7 with the following table:

Table 5-7 WRPA Alternative A Well Pad Separator Emissions

Development Area	Number Of Separators	UTM Easting (meters)	UTM Northing (meters)	Annual NOx (tons/yr/location)	NO_X Emission Rate (g/sec)	CO Emission Rate (g/sec)[1]
Pavillion	20.6	691190	4794488	1.12785	0.03244	0.03622
Pavillion	20.6	693227	4794493	1.12785	0.03244	0.03622
Pavillion	20.6	691185	4792857	1.12785	0.03244	0.03622
Pavillion	20.6	693275	4792812	1.12785	0.03244	0.03622
Pavillion	20.6	695716	4792110	1.12785	0.03244	0.03622
Pavillion	20.6	698089	4792933	1.12785	0.03244	0.03622
Pavillion	20.6	690875	4791131	1.12785	0.03244	0.03622
Pavillion	20.6	698133	4791426	1.12785	0.03244	0.03622
Pavillion	20.6	692612	4789574	1.12785	0.03244	0.03622
Pavillion	20.6	694993	4789635	1.12785	0.03244	0.03622
Muddy Ridge	6.6	695478	4802496	0.54203	0.01559	0.01729
Muddy Ridge	6.6	697056	4802538	0.54203	0.01559	0.01729
Muddy Ridge	6.6	695521	4800938	0.54203	0.01559	0.01729
Muddy Ridge	6.6	697102	4800997	0.54203	0.01559	0.01729
Muddy Ridge	6.6	695572	4799333	0.54203	0.01559	0.01729
Muddy Ridge	6.6	697154	4799383	0.54203	0.01559	0.01729
Muddy Ridge	6.6	695618	4797721	0.54203	0.01559	0.01729
Muddy Ridge	6.6	697208	4797784	0.54203	0.01559	0.01729
Muddy Ridge	6.6	695664	4796123	0.54203	0.01559	0.01729
Muddy Ridge	6.6	697256	4796176	0.54203	0.01559	0.01729
Sand Mesa	6.7	715530	4800860	0.73365	0.02111	0.02375
Sand Mesa	6.7	717090	4800936	0.73365	0.02111	0.02375
Sand Mesa	6.7	713978	4799180	0.73365	0.02111	0.02375
Sand Mesa	6.7	715574	4799259	0.73365	0.02111	0.02375
Sand Mesa	6.7	717146	4799331	0.73365	0.02111	0.02375
Sand Mesa	6.7	718742	4799382	0.73365	0.02111	0.02375
Sand Mesa	6.7	714024	4797569	0.73365	0.02111	0.02375
Sand Mesa	6.7	715630	4797643	0.73365	0.02111	0.02375
Sand Mesa	6.7	717188	4797717	0.73365	0.02111	0.02375
Sand Mesa	6.7	718795	4797771	0.73365	0.02111	0.02375
Sand Mesa South	24	716024	4795329	1.314	0.07560	0.25400
Sand Mesa South	24	719368	4796197	1.314	0.07560	0.25400
Coastal	6	704344	4800430	0.3285	0.01890	0.02380
Coastal	6	707475	4800613	0.3285+	0.01890	0.02380

[1] **Based on maximum hourly and 8-hour rate for one rig**

5.4 MODELING RESULTS

p. NF-39, revise the text as shown:

Total impacts from the Project only for the Proposed Action and Alternatives within the near-field analysis area were modeled. ~~Cumulative i~~ Impacts from the Project and modeled cumulative sources were also modeled.

Results of the near-field Project modeling for each of the highest value of the 5 years of meteorological data, with the added background pollutant concentrations, are presented in Table 5-8 for NO_X and Tables 5-9 and 5-10 for CO, and compared to applicable State and NAAQS and PSD Class II increments for NO_x. Figure 5-3 shows the concentration contours for the highest impacts for NO_X under Alternative A along with cumulative sources.

FAR-FIELD AIR QUALITY IMPACT ASSESSMENT

5.1 APPEND, CALSUM AND POSTUTIL PROGRAMS.

p. FF-25, revise text and table as shown: "Quarterly background ammoniuma concentrations as monitored at three CASTNET sites were utilized to estimate forammonia concentrations for the repartition calculations. The CASTNET sites and monitoring years were as follows: Centennial, WY – 1989 through 2001, Pinedale, Wyoming – 1989 through 2001, and Yellowstone – 1996 through 2000. The following table (5-1) summarizes the ammoniuma data utilized for in the repartition calculations.

Table 5-1. Background Ammoniuma Concentrations.

Quarter	Ammoniuma (NH_4) Concentration ($\mu g/m^3$)	Ammoniuma (NH_4) Concentration (ppb*)
1	0.197	0.268
2	0.293	0.398
3	0.350	0.475
4	0.192	0.261

* ppb = parts per billion3

5.2.3 Terrestrial Deposition Calculations

p. FF-44, delete the paragraph: "Total Terrestrial deposition levels……applied for all areas of special concern."

p. FF-46 and -47, replace Figures 5-13, 5-14, 5-15, and 5-16 with the following figures:

Figure 5-13. Total Nitrogen Deposition at Pinedale, Wyoming.

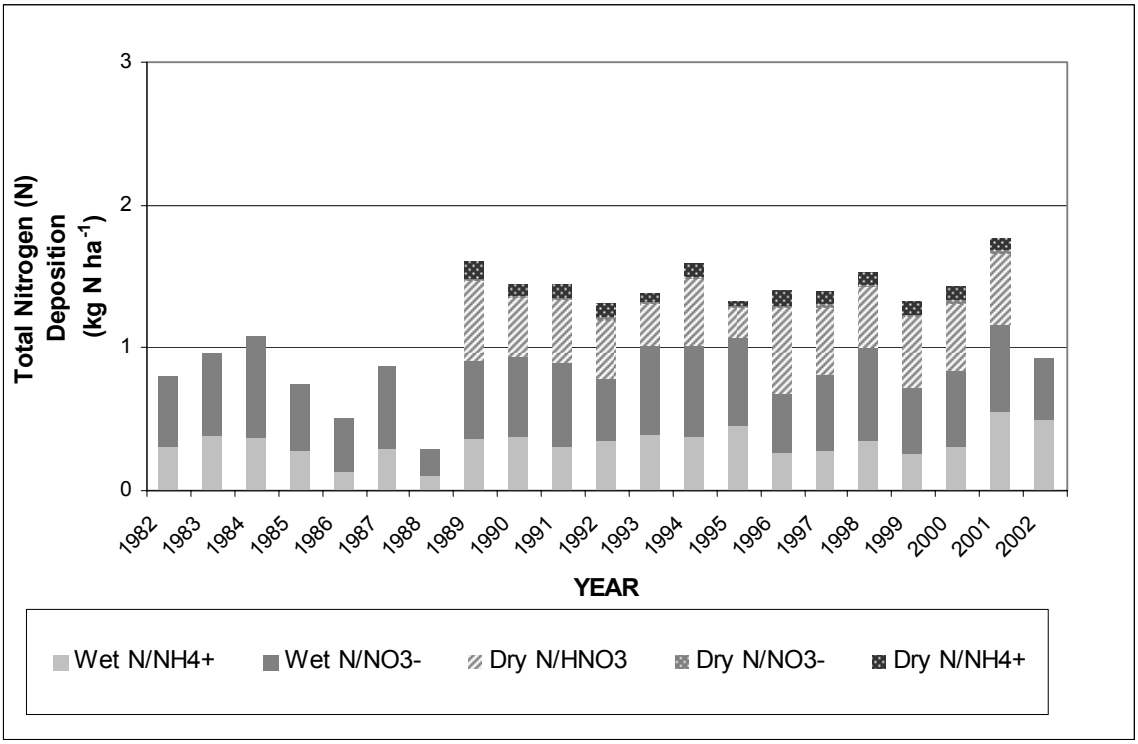


Figure 5-14. Total Sulfur Deposition at Pinedale, Wyoming.

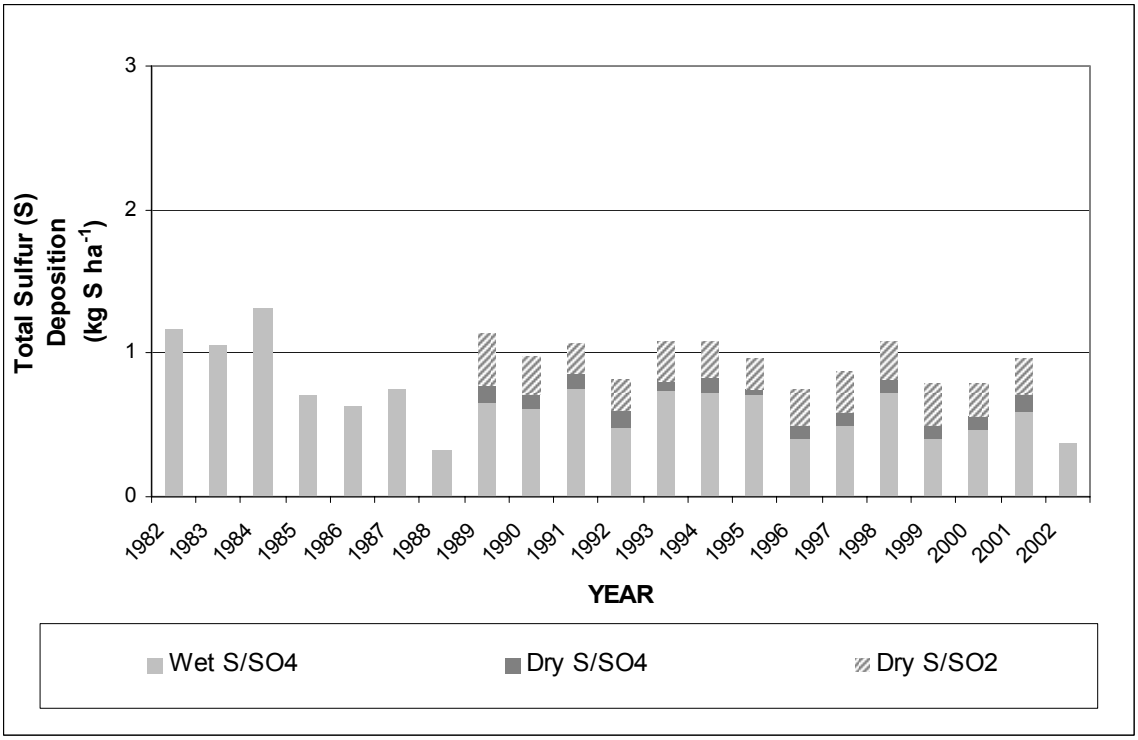


Figure 5-15. Total Nitrogen Deposition at Yellowstone National Park

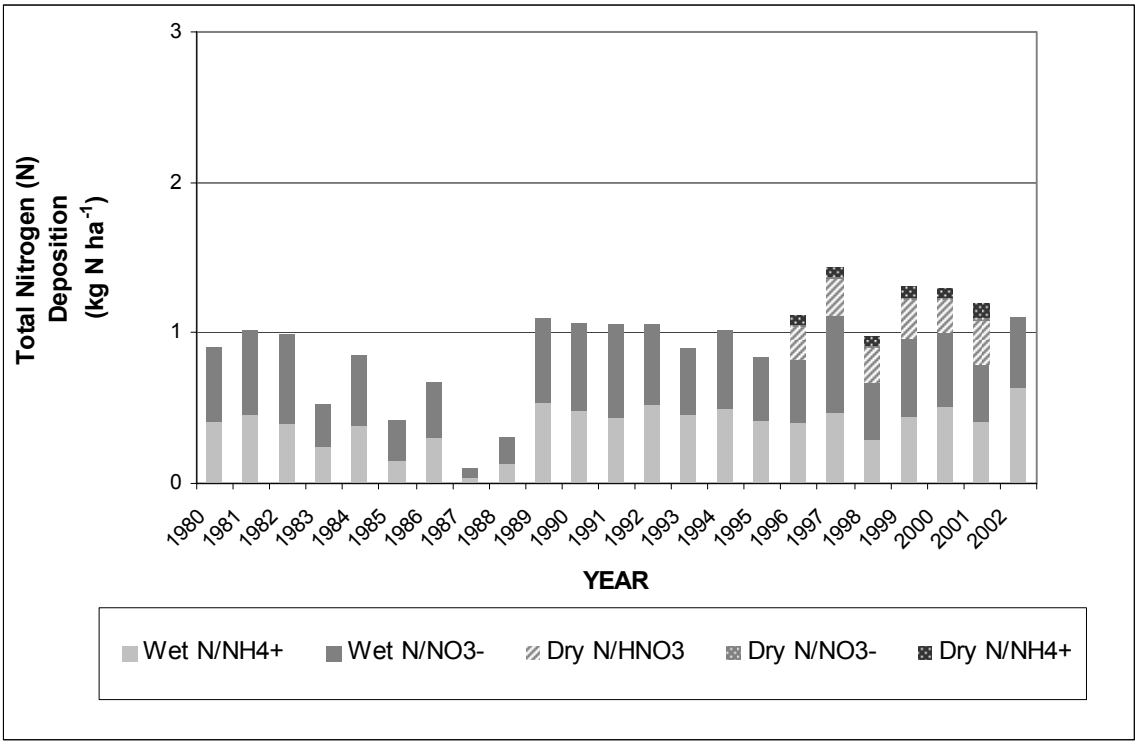
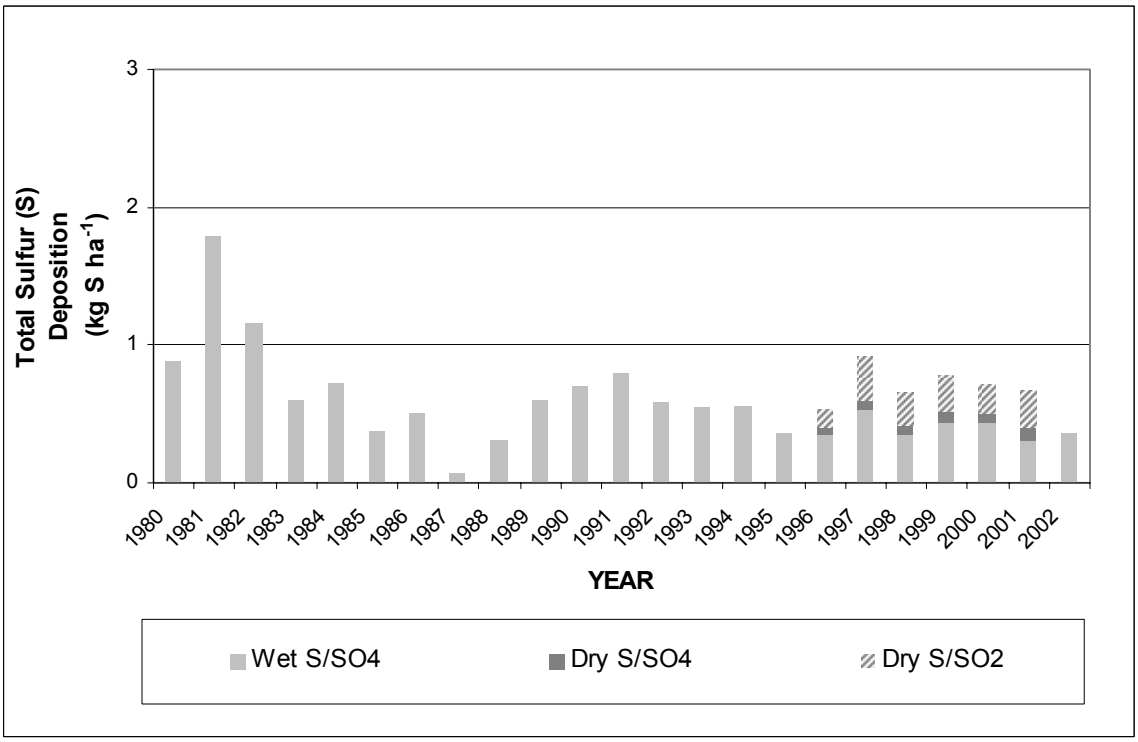


Figure 5-16. Total Sulfur Deposition at Yellowstone National Park



SECTION 3: CONSULTATION AND COORDINATION

3.1 SCOPING PROCESS

On September 30, 2002, a scoping notice was prepared and distributed to Federal, tribal, state and local governments, conservation groups, industry groups, and individuals. The notice requested input and comments to the proposed Wind River Natural Gas Field Development Project. Public meetings to discuss the proposal were held in Pavillion (October 22, 2002), and Ft. Washakie (October 23, 2002), Wyoming. This scoping period ended on October 30, 2002. Additionally, on January 24, 2003 the BIA published in the Federal Register a notice of intent to prepare an Environmental Impact Statement, with comments to this notice due February 25, 2003. During the dates described above, 42 written responses were received by the BIA. These comments were used to determine the extent of analysis, issues and concerns, and to develop alternatives to the Proposed Action.

During preparation of the EIS, the BIA and the consultant interdisciplinary team (IDT) have communicated with, and received or solicited input from various federal, State, county, and local agencies, elected representatives, environmental and citizens groups, industries, and individuals potentially concerned with issues regarding the Proposed Action. The contacts made are summarized in the following sections.

3.2 DRAFT EIS CONSULTATION AND COORDINATION

The BIA consulted with various agencies on issues related to the Wind River EIS. The U.S. Fish and Wildlife Service was consulted on avoidance and minimization measures for the threatened and endangered species, raptors, and migratory birds that could potentially occur within the Wind River Project Area (WRPA). The Wyoming Game and Fish Department was consulted on issues, impacts and mitigation for large and small game species and their habitats and other fish and wildlife species within the WRPA.. The BIA also consulted with the U.S. Environmental Protection Agency, the U.S. Forest Service, and Wyoming Department of Environmental Quality on issues, impacts and mitigation for air and water quality.

The Cooperating Agencies involved in the preparation of this EIS included the Bureau of Land Management, Fremont County Commissioners, and the Wind River Environmental Quality Commission, representing the Shoshone and Arapaho Tribes. The Cooperating Agencies provided valuable input to the BIA from the scoping process through preparation of the Final EIS.

3.3 PUBLIC REVIEW OF DRAFT EIS

The Notice of Availability of the Draft Environmental Impact Statement for the Wind River Natural Gas Field Development Project was published in the Federal Register July 16, 2004, which initiated the public comment period. The comment period ended on August 30, 2004. Public meetings to discuss the DEIS were held in Pavillion (August 10, 2004), and Ft. Washakie (August 11, 2004), Wyoming. The meeting in Pavillion was attended by 17 persons and the meeting in Ft. Washakie was attended by 20 persons.

All of the written and oral comments received during the public comment period and during the public meeting have been considered in the preparation of the final EIS. Responses to all the comments expressed during the public meeting can be found in FEIS Section 5, entitled *Response to Public Comments on the Draft EIS*

3.4 DRAFT EIS COMMENTS

A total of 18 comment letters were received on the draft EIS. Oral comments were received during the two public meetings. Responses to written and oral comments received on the draft EIS are included in Section 5 of the final EIS. Some comments received were similar or identical to other comments received. Rather than repeating a response to a comment, the reader may be referred to an earlier response. Reference to a previous response in no way reflects upon the value of the later comment. The comment letters and written transcripts of the oral comments are contained in Section 4 entitled *Comment Letters Received on the Draft EIS.* Each comment letter and transcript of oral comments was assigned a number. Comments within a letter are numbered sequentially and correspond to the numbered response in Section 5 (Responses to Comments).

Comments were received from interested State and Federal agencies, private landowners, other members of the public, oil and gas advocacy groups, and oil and gas companies. The BIA prepared detailed responses to each commenter's issues and concerns. Comments were carefully reviewed for items to correct or add to the final environmental impact statement.

Specific changes made to the draft EIS based on the comments received are found in Section 2 of the final EIS. Where a response to a comment indicates "see Errata or Addenda", Section 2 of the final EIS should be consulted for the specific rewording or clarification of the text, or additions to the document.

3.5 COMMON CONCERNS

Respondents shared several common issues about the proposed Wind River Natural Gas Development Project. The issues raised included the following:

- Direct, indirect, and cumulative impacts of the action alternatives would adversely affect soil, water, agriculture, roads, air quality, and fish and wildlife.
- Surface impacts on private surface/tribal minerals.
- Suitability of analysis, since details of development have not been specifically determined.
- Development of a Landowners' Alternative
- Require that the least environmentally damaging types of drilling be utilized.
- Cumulative impacts on wildlife (especially game species) would be significant.
- Cumulative air quality impacts would be significant.
- Reclamation on agricultural lands.
- A 45-day comment period for the DEIS is too short for the public to prepare meaningful comments.

1. *Direct, indirect, and cumulative impacts of the action alternatives would adversely affect soils, water, agriculture, air quality, wildlife and roads.*

Direct and indirect impacts are addressed in Chapter 4 of the DEIS "Analysis of Environmental Consequences", in the appropriate resource category. Cumulative impacts are addressed in Chapter 5 of the DEIS "Cumulative Impacts Analysis", at the resource level. Cumulative impacts analysis area (CIAA) varies for each resource assessed.

2. *Minimize surface impacts on private surface.*

Prior to the initiation of construction and drilling activities on private surface, an agreement

would be reached between the private landowner and the Operators on actions that would take place on private property. With the concurrence of the private landowner, avoidance and minimization measures would be implemented on private surface, especially irrigated lands. These measures are discussed in Chapter 2 of the DEIS. On irrigated lands in the Pavillion Field initial disturbance from well pads would be reduced from 270 x 185 feet to 8 x 8 feet upon completion of a well. In addition, production facilities would be placed adjacent to roads to avoid irrigated lands. Construction and drilling activities would be conducted between November and April to minimize impact to croplands. Additional meetings would be held between the Operators and landowner during the gas field development, as needed.

3. *Develop Landowners' Alternative.*

As described by the commenters, the BIA does not have enough information to determine if a separate "landowners' alternative" would be reasonable. To the extent that the BIA can determine the contours of such an alternative from the commenters' descriptions, furthermore, a "landowners' alternative" would be largely encompassed by other alternatives analyzed in detail, and so is not required to be part of the range of reasonable alternatives. First, the CEQ Regulations require the analysis of "reasonable" alternatives. 40 C.F.R. § 1502.14. CEQ has stated in guidance 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." Question 2a, "Forty Most Asked Questions Concerning the NEPA Regulations", 46 Fed. Reg. 18026, 18027 (March 23, 1981). The courts have ruled that a reasonable alternative must also respond to the purpose and need for agency action. *See*, *e.g.*, *Citizens Against Burlington v. Busey*, 938 F.2d 190 (D.C. Cir. 1991), and *City of Angoon v. Hodel*, 803 F.2d 1016 (9th Cir. 1986). To the extent that a "landowners alternative" would rely largely on directional drilling (unclear from the commenters descriptions), that alternative has already been eliminated from further study in Section 2.9.2 of the EIS precisely because it is not practical or feasible. If the "landowners alternative" would not allow for such development, it would not meet the purpose and need for agency action (Section 1.2 of the EIS), and would not, therefore, be reasonable.

Second, "[an] agency's consideration of alternatives is sufficient if it considers an appropriate range of alternatives, even if it does not consider every available alternative." *Headwaters, Inc., v. BLM, Medford District*, 914 F.2d 1174, 1180 (9th Cir. 1990). This emphasis on a bounding range of alternatives is especially important where, as in this case, there is potentially an infinite number of alternatives, depending on the number of wells proposed to be drilled. *Surfrider Foundation v. Dalton*, 989 F. Supp. 1309, 1326-27 (S.D. Cal. 1998); *see also*, Question 1b, "Forty Most Asked Questions Concerning the NEPA Regulations", 46 Fed. Reg. 18026, 18027 (March 23, 1981) ("When there are potentially a very large number of alternatives, only a reasonable number of examples, covering the full spectrum of alternatives, must be analyzed and compared in the EIS."). There are currently two alternatives in the EIS, Alternative B (Decrease the Number of New Wells Drilled in the WRPA to 233) and Alternative C (No Action), that examine the reduction of drilling with a concomitant decrease in surface impacts, presumably what the "landowners' alternative" would accomplish. In addition, every alternative includes the option of directional drilling in certain circumstances and the possible mitigation measures, including those for particular resources, emphasize that the Operators will work with the surface owners to minimize impacts. For example, Section 2.8.2.13 specifically states the following:

> [The Operators should]coordinate project activities with agricultural operations to minimize conflicts involving agricultural operations. Project activities would be

scheduled to minimize the potential disturbance during planting and harvesting of crops. Frequent communication with farmers during the construction and development phase would minimize potential impacts to farming.

Thus, the existing range of alternatives, together with the existing mitigation measures, encompass the "landowners' alternative", to the extent that the BIA understands its parameters. "NEPA does not require a separate analysis of alternatives which are not significantly distinguishable from alternatives actually considered, or which have substantially similar consequences." *Headwaters*, 914 F.2d at 1181; *see also*, *Kuff v. U.S. Forest Service*, 22 F. Supp. 2d 987, 994 (W.D. Ark. 1998). The BIA does not, therefore, need to consider a "landowners' alternative".

4. *Suitability of analysis while details of development are not known.*

At the present time, the location of all future well sites and other disturbance has not been determined by the Operators. Identifying specific well locations in the EIS would require predicting well locations with incomplete information, and ignoring the fact that development of each well provides additional information that is utilized to help determine future actions, including the number of wells and well site locations. Currently, generalized areas of interest are being explored through the interim drilling process to further develop our knowledge of the geology and potential of the WRPA. Adaptive management of oil and gas resource development is very much a reality in that new information produces more effective drilling programs with correspondingly reduced effects upon the environment. The number of wells, well locations, timing of drilling, and construction is controlled in part by the location of gas and oil resources as they are found and developed, within the context of BIA's responsibility to ensure surface disturbance is managed in accordance with statutory requirements and sound resource management.

The Wind River Gas Field Development Project EIS is not a project level document; it is a programmatic document. Site-specific impacts will be thoroughly reviewed under the NEPA Council of Environmental Quality regulations by tiering site-specific environmental analyses to the Wind River Gas Field Development Record of Decision (ROD). The regulations for implementing the procedural provisions of the National Environmental Policy Act, issued by the CEQ are found in 40 CFR Parts 1500-1508. Part 1502.2 of the regulation states that:

> *"Agencies are encouraged to tier their environmental impact statements to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review (1508.28). Whenever a broad environmental impact statement has been prepared (such as a program or policy statement) and a subsequent statement or environmental assessment is then prepared on an action included within the entire program or policy (such as a site-specific action) the subsequent statement or environmental assessment need only summarize the issues discussed in the broader statement by reference and shall concentrate on the issues specific to the subsequent action. The subsequent document shall state where the earlier document is available. Tiering may also be appropriate for different stages of actions. (40 CFR 1508.28)"*

The tiered EIS approach used with the Wind River Gas Field Development Project is consistent with 40 CFR. Section 1508.28 states in part:

> *"Tiering is appropriate when the sequence of statements or analyses is:*
> *(a) From a program, plan, or policy environmental impact statement to a program, plan, or policy statement or analysis of lesser scope or to a site-specific statement or analysis.*

The tiered approach used with this EIS is consistent with BIA direction in the BIA NEPA Handbook**.** The BIA NEPA Handbook BIAM Release No. 9303 states in part, in 6.3 E (2):

> *"(c) EISs on Broad Actions. It may be appropriate to define in broad terms the action for which an EIS is prepared…..agencies shall reduce excessive paperwork by using program, policy, or plan EISs and tiering from statements of broad scope to those of narrower scope in order to eliminate repetitive discussions of the same issues."*

5. *Require that the least environmentally damaging types of drilling are utilized.*

Chapter 2, page 2-74 to 2-76 Section 2.9 of the DEIS entitled "Alternatives Considered but Eliminated from Detailed Study" has details on why mandating directional drilling for all wells is not an alternative considered in detail.

6. *Cumulative impacts on wildlife would be significant.*

The direct and indirect impacts of wildlife species from the proposed gas development project are discussed in Chapter 4, Section 4.8 in the DEIS. The initial habitat disturbance from the proposed development varies from 1,610 acres (Alternative B) to 2,819 acres (Alternative A), which is 1.8 to 3.1 percent of the WRPA or 4.2 to 7.4 percent of the five development areas. Reclamation is initiated immediately upon completion of each well that is drilled, in accordance with the Reclamation Plan (Appendix D of the DEIS) and BIA and BLM requirements. After reclamation, the residual habitat disturbance is only about 20 percent of the initial disturbance. However, the direct and indirect impacts to wildlife from the proposed development vary with the species evaluated. Wildlife species that utilize sagebrush and desert shrub habitats for nesting, shelter, and forage would be subjected to greater impacts than species that utilize riparian areas or croplands for food and shelter. Therefore, those species that feed on vegetation that has a long recovery period (i.e., sagebrush), would be subjected to greater impacts than species that feed on other vegetation and utilize other habitats for breeding and shelter. Based on the food and habitat requirements of the wildlife species, it was determined that the impacts to raptors would be minor, whereas the impacts to game species, such as the white-tailed deer, would be greater (i.e., moderate). Hence the determination in Table 2-17 of the DEIS of minor to moderate direct and indirect impacts, depending on the species.

Cumulative wildlife impacts were determined based on information received from the BIA, BOR, and land developers on past, present, and reasonably foreseeable future activities within the WRIR and the BOR Riverton Reclamation Area (see Chapter 5 in the DEIS). Little change in residential development, agriculture, and livestock grazing is anticipated. Additional oil and gas development and sand and gravel mining is expected to occur within the WRIR and BOR surface, but the level of activity is not expected to be high. The Boysen Reservoir Watershed, including Fivemile Creek, Muddy Creek and Cottonwood Creek and Drain, was chosen as the Cumulative Impact Analysis Area (CIAA) for fish and wildlife evaluated in this DEIS. The cumulative impacts to wildlife in this area vary with the species evaluated. Wildlife species that utilize sagebrush and desert shrub habitats for nesting shelter and forage would be subjected to

greater cumulative impacts than species that utilize riparian areas or croplands for food, breeding, and shelter. Based on the above, the cumulative impacts to raptors were determined to be minor, whereas the impacts to game species, such as the white-tailed deer, would be greater (i.e., moderate). The lack of quantitative data on past, present, and future development within the CIAA make it difficult to determine the extent of cumulative impacts. However, with the implementation of Operator-committed and agency-required mitigation measures the cumulative impacts to fish and wildlife from the proposed development project are not anticipated to be significant.

7. *Cumulative air quality impacts would be significant.*

As an unavoidable result of project-related activities, additional pollutants would be emitted to the atmosphere. Emissions generated from project activities would act in concert with emissions generated from other cumulative sources, both existing and future. Predicted impacts would not exceed the ambient standards or PSD Class I or Class II increments. However, moderate impacts upon NO_2 and PM_{10} concentrations are predicted. The duration of the PM_{10} impacts would be short-term, occurring predominately during the development phase of the project. Following the completion of construction activities, PM_{10} impacts would be reduced to minor levels. The moderate NO_2 impacts would be long-term, existing for the duration of the project.

Total terrestrial deposition rates resulting from cumulative and project sources would be acceptable. Impacts upon total sulfur deposition would be negligible. Minor long-term nitrogen deposition impacts are predicted to occur at Could Peak Wilderness as a result of cumulative sources. The Wind River Project would not substantially contribute to the Cloud Peak deposition impacts. Nitrogen deposition impacts are predicted to be negligible for the remaining areas of special concern.

As a result of cumulative sources impacts are predicted to occur at two lakes located in Cloud Peak Wilderness. Moderate long-term impacts are predicted to occur at Florence Lake, where changes in ANC are predicted to exceed the level of acceptable change. Minor long-term impacts are predicted to occur at Emerald Lake where changes in ANC levels would be detectable. The contribution of Project sources upon these cumulative impacts would be negligible. Impacts to ANC at the remaining lakes of special concern would be negligible.

Cumulative and Project sources would contribute to regional visibility impacts. Moderate long-term visibility impacts are predicted to occur at Cloud Peak Wilderness as a result of cumulative sources. However, the contribution from Project sources to the Cloud Peak impacts would be negligible. Moderate short-term visibility impacts are predicted to occur at Wind River Canyon and the Owl Creek Range, which includes Phlox Mountain. However impacts at these areas would be reduced to minor levels following the completion of project construction activities. Minor long-term visibility impacts would also occur at Bridger Wilderness, Popo Agie Wilderness, and the Wind River Roadless Area.

8. *Reclamation on agricultural lands.*

In the summer of 2004 it was discovered by private landowners that there are areas within the WRPA where toxic levels of hydrocarbon and high levels of salt are present in the soil and have adversely affected the agricultural production. It is believed that this contamination is from old unlined petroleum waste pits that were not reclaimed by previous Operators. The extent of this soil contamination is unknown and it is beyond the scope of this EIS to determine the extent of the contamination on private lands. The present Operators are working closely with the affected landowners to clean up the contamination from existing petroleum waste pits. Such contamination would not result from the proposed gas development project, since the lining of reserve pits is now required by law. In addition, Operator-committed and agency required mitigation measures would prevent soil contamination from occurring on agricultural land. Section 2.8, Mitigation Measures, and Appendix D, Reclamation Plan detail the Operators' plans for reclamation of disturbed areas.

9. *Comment period for the DEIS is too short (45 days) for the public to give meaningful specific comments.*

The BIA has closely followed the requirements of the Council of Environmental Quality regulations in preparing this Draft EIS. The BIA has, in accordance with Section 1501.7 of the CEQ regulations, invited participation of all potentially affected parties during the scoping process to determine the scope of issues to be addressed and to identify the significant issues related to the Proposed Action.

The BIA has considered the need for the Proposed Action (or alternatives) and the consequences of delay, as identified in Section 1501.8(b)(1)(iv) of the CEQ regulations. The BIA, as trustee for the Shoshone and Arapaho Tribes, is charged with maximizing the economic benefit of the Tribes, and any delay in implementing the Proposed Action or an alternative would have serious economic consequences to the Tribes.

The BIA believes that a 45-day review period, as established by Section 1501.8(b)(2) of the CEQ regulations, is adequate time for the public to comment on the DEIS, especially those sections that may be of particular concern. As stated in Section 1506.10(d), failure to file timely comments shall not be sufficient reason for extending a comment period.

In accordance with Section 1503.1(b), the BIA may consider comments from the public after the close of the 45-day comment period, and prior to the publication of the final decision. However, the ability of the BIA to incorporate comments received after the close of the official comment period is contingent upon the timing for the preparation of the Final EIS. The BIA will also provide the public with an opportunity to comment on the Final EIS during a 30-day comment period, in accordance with Section 1503.1(b) of the CEQ regulations.

LETTER 1

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
Federal Building
100 East B Street, Room 3124
Casper, WY 82601

RECEIVED
JUL 29 2004
BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

Date: July 28, 2004

United States Department of the Interior
BUREAU OF INDIAN AFFAIRS
Wind River Agency
George E. Gover, Superintendent
P. O. Box 158
Fort Washakie, Wyoming 82514-015

Dear Mr. Gover,

The Natural Resources Conservation Service has reviewed the "Draft Environmental Impact Statement (DEIS) on the proposed Wind River Natural Gas Field Development Project".

We do not have any comments on the draft environmental impact statement that has been developed for the Wind River Natural Gas field development.

4-1

1

If you have any questions, or need to discuss this comment with us, please contact either myself at 307-261-6453 or please contact Doug Gasseling, Conservation Agronomist, Cheyenne, Wyoming, at 307-772-2015, ext. 116.

Sincerely,

Bruce Burton acting

LINCOLN "ED" BURTON
State Conservationist

The Natural Resources Conservation Service works hand-in-hand with the American people to conserve natural resources on privatelands.

USDA IS AN EQUAL OPPORTUNITY PROVIDER AND EMPLOYER

LETTER 2

State Engineer's Office

HERSCHLER BUILDING, 4-E CHEYENNE, WYOMING 82002
(307) 777-7354 FAX (307) 777-5451
seoleg@state.wy.us

DAVE FREUDENTHAL
GOVERNOR

PATRICK T. TYRRELL
STATE ENGINEER

August 20, 2004

RECEIVED
AUG 24 2004
BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

To: Mr. Ramon A. Nation
Bureau of Indian Affairs
Wind River Agency
P.O. Box 158
Fort Washakie, WY 82514

From: Jodee G. Pring, Water Planning Coordinator
For
Patrick T. Tyrrell, Wyoming State Engineer

RE: Draft Environmental Impact Statement – Wind River Natural Gas Field Development Project

The State Engineer's Office appreciates the opportunity to comment on the above referenced dEIS. The role of the Wyoming State Engineer's Office and Board of Control is to provide for the general supervision of the waters of the state, and of its appropriation, distribution, and application to beneficial use as provided under the prior appropriation doctrine.

On page 3.5-38 of the dEIS, the second and third sentences of that paragraph should be re-written to read, "Pre-1950 water rights are recognized by the compact. This arrangement indicates that there is significant available water for new consumptive uses in Wyoming, given that the Bighorn River discharges approximately 2.3 million acre-feet of flow from Wyoming in an average year."

1

We look forward to seeing these amendments reflected in the Final Environmental Impact Statement.

Thank you again for the opportunity to review this notice. If you have any questions or concerns, please contact me at 777-7803.

Cc: Mike O'Donnell, Governor's Planning Office

LETTER 3

WYOMING
GAME AND FISH DEPARTMENT

Dave Freudenthal, Governor | Terry Cleveland, Director

"Conserving Wildlife - Serving People"

August 20, 2004

RECEIVED
AUG 24 2004
BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

WER 9835.01
Bureau of Indian Affairs
Shoshone and Arapahoe Tribes
Bureau of Land Management
Draft Environmental Impact Statement
Wind River Natural Gas Field Development Project
Fremont County

George E. Gover
Superintendent
Bureau of Indian Affairs
Wind River Agency
1st and Washakie
Fort Washakie , WY 82514

Dear Mr. Gover:

The staff of the Wyoming Game and Fish Department has reviewed the Draft Environmental Impact Statement dealing with development of the Wind River Natural Gas Field. We offer the following comments.

Terrestrial Considerations:

Page X: Under the "Wildlife" heading, the authors state this project will result in minor and short-term impacts to wildlife. Our Department strongly disagrees with this conclusion and does not believe the abbreviated analyses presented in this document support the statement. First, the 20-40 year time frame for the project is certainly not short-term from the perspective of wildlife utilizing the area. Second, the loss of 1,982 acres of open space/wildlife habitat to direct development, and additional human-related disturbance on many additional acres associated with development, cannot be considered a minor disturbance. Numerous other statements regarding "minor and short-term" impacts scattered throughout the text of this document need further analysis. **1**

Page XI: Our Department does not agree that loss of recreational opportunity resulting from this project will be minor and short-term when future well locations and density are unknown (page 5.1-46). The Department believes the potential exists for significant, long-term impacts to recreation depending on well placement and total development activity throughout the project area. In addition, if wells pads are sited on the Department's Sand **2**

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Fax: (307) 777-4610 Web Site: http://gf.state.wy.us

Mesa Wildlife Habitat Management Area (WHMA), impacts to recreation will be significant.

Page XVI: The authors state that quantitative data on past disturbances in the area are unavailable. These types of data are essential to properly evaluate cumulative impacts to wildlife. Aerial photographs, historic maps, and other resources should be available to assess how habitat disturbances have increased above past levels. The lack of this type of analysis supports our skepticism that cumulative impacts to wildlife will be minor (page XIX). **3**

Page 2.1-6: Total disturbance within the proposed project area was estimated at 1,982 acres and will impact approximately 2.15% of the Wind River Planning Area (WRPA). Although this seems an insignificant percentage of the overall planning area, it does not reveal the amount of wildlife habitat that will actually be lost. Since buildings, roads, and other facilities already occupy much of the total planning area, we believe this document should provide information on the percentage of existing undeveloped lands that will be lost, and the significance of that loss. **4**

Page 3.8-2: Under the Mule Deer heading, the document states that no mule deer herd units are contained within the project area. The project area is located within the Project Mule Deer Herd Unit. **5**

Page 3.8-3: Under the White-tailed Deer heading, the document states there are only incidental observations of white-tailed deer in the project area. In fact, white-tailed deer are common and our Department issued 150 white-tailed deer hunting licenses in 2004 within Hunt Area 157. Of these licenses, hunters will definitely utilize habitats with the proposed project area to hunt white-tailed deer, especially within the Sand Mesa WHMA. Statements concerning white-tailed deer abundance and how disturbance resulting from gas development will impact deer, their habitats, and future recreational pursuit of these big game animals should be included in the document. **6**

Page 4.8-3: It is stated that more consideration will be given to mitigating impacts in areas where 4-5 wildlife species are present. The document should also recognize there are areas where only one or two species may be present, but are present at very high densities, indicating habitat importance. Mitigation measures should be implemented when these areas are impacted, including possibly off-site mitigation to improve habitat for affected species. **7**

Page 4.8-5: Under the Habitats heading, the statement regarding limited seasonal use of habitat by big game species is erroneous. In fact, most big game habitats throughout the WRPA are classified as yearlong range. The document should also provide some data on local reclamation efforts in order to support the conclusion that impacts to wildlife habitats will be minor and short-term. We believe habitat impacts will be long-term based on our difficulty in re-establishing vegetation following disturbance on the Sand Mesa WHMA. **8**

LETTER 3 continued

Extremely dry conditions and sandy soils in this area make re-vegetation difficult and the potential for noxious weed invasion high. Re-establishment of sagebrush and other shrubs will be particularly difficult without irrigation or some other type of extraordinary effort. If the impacts of vegetation removal are to be labeled short-term, the document should contain examples of successful past re-vegetation efforts in this or similar areas. 8

Page 4.8-6: Under the Noise section, impacts to big game are again classified as minor and short-term. This statement is contradicted in the preceding two sentences where the authors state big game will avoid areas with increased human activity. Impacts due to noise should be classified as significant and long-term based, on the information provided in the same paragraph. 9

Page 4.8-6: Impacts from increased traffic in the area are classified as negligible. Since the document estimates habitat values will be reduced up to ½ mile away from new roads (cited from the same paragraph), we disagree with the conclusion that this impact will be negligible. The impacts due to traffic should be changed to "significant", based on the information provided in this section. 10

Page 4.8-12: If impacts of the project are confined to 422.7 acres following reclamation, documentation should be included to insure reclamation efforts will be successful. Department personnel observed many examples across the project area where disturbance has resulted in noxious weed invasion. As stated earlier, dry, sandy conditions throughout this area are not conducive to re-vegetation, particularly for sagebrush. Lacking data on successful reclamation in the area, we believe residual impacts to wildlife habitat will include the entire 1,982 acres and will be significant. 11

Page 4.8-15: At the bottom of the Impacts Summary, bullet numbers 2, 3, and 4 are not supported by any data included in the document. In fact, habitat (and consequently recruitment and reproductive success) of many wildlife species is likely to be permanently altered and thus significantly impacted by the project. 12

Page 4.8-16: We believe impacts to wildlife and recreation are trivialized throughout this document. We feel the cursory mitigation measures presented in the document are insufficient, given the potential loss of up to 1,982 acres of wildlife habitat. We respectfully request the following mitigation measures be included in the Final EIS: 13

- There is a high potential for noxious weed invasion following disturbance in this area. We are especially concerned about control of noxious weeds on the Sand Mesa WHMA. We request that Companies be required to consult with local Department personnel to implement that control.
- There will likely be a loss of recreational hunting opportunity on the Sand Mesa WHMA due to development activities. We suggest additional hunting areas for public use be

acquired as mitigation. This could be done using our Department's Private Lands/Public Wildlife program, for example.

Page 5.1-46: See comments on Page XVI, above, regarding the lack of documentation of disturbance activities for cumulative impacts analyses. 14

Aquatic Considerations:

This project has the potential to affect fisheries and other aquatic life in Fivemile Creek, Muddy Creek, Cottonwood Creek, Upper Depression Reservoir, Middle Depression Reservoir, Lake Cameahwait, Ocean Lake, and Boysen Reservoir. The fisheries in these waters are noted in the DEIS.

Chapter 2, section 2.8.2.5, Water Resources:

This section contains several mitigation measures to protect surface and ground water resources. In addition to the mitigation measures provided in the DEIS, we recommend the following measures: 15

- This project should incorporate the use of a closed mud system (recirculation of drilling muds).
- A spill prevention control and countermeasure plan should be fully developed and approved before drilling begins.
- If and when an artesian water source becomes available as a result of development, options to utilize that water for fish and wildlife enhancement should be considered and coordinated with our fisheries biologist (Dave Dufek, 332-7723) in the Lander Regional Office.
- Where pipeline crossings of streams will be done by boring underneath the stream, boring pits should be located far enough back from the channel that stream bank stability is not reduced.
- Where pipeline crossings of streams (perennial or intermittent) will be done by trenching, stream banks should be re-estabilized with large angular rock (greater than 2 feet in one dimension) or wire enclosed riprap structures. Riprap should be placed from the channel bottom to the top of the normal high water line on the bank.
- Riparian areas and floodplains should not be used as staging or refueling areas. All chemicals, solvents and fuels should be kept at least 150 feet away from streams and riparian areas.

LETTER 3 continued

- Any pipelines that parallel drainages should be located outside the 100-year floodplain. Pipeline crossings of riparian areas and streams should be at right angles to minimize the area of disturbance. **15**

- Right-of-way widths should be minimized where the pipeline crosses riparian areas and streams.

Chapter 3, section 3.10.3.2, Fishing:

In the table, sauger should be included in managed species list for Boysen Reservoir.

This section discusses the low numbers of sport fish in Fivemile and Muddy Creeks, but there is no mention of the importance of nongame fish in the system. This should be corrected. The species of nongame fish are listed later in the report. **16**

Chapter 3, Table 3.8-4:

Our Department sampled near the lower end of both Muddy and Fivemile Creeks with electrofishing gear the spring of 2004. In Muddy Creek, we collected burbot, white sucker, longnose sucker, flathead chub, longnose dace, sand shiner and emerald shiner. In Fivemile Creek, we collected rainbow trout, walleye, burbot, white sucker, and carp. **17**

Thank you for the opportunity to comment.

Sincerely,

BILL WICHERS
DEPUTY DIRECTOR

BW:VS:as
cc: Mary Flanderka-Governor's Planning Office
USFWS

LETTER 4

United States Department of the Interior
NATIONAL PARK SERVICE
INTERMOUNTAIN REGION
Intermountain Support Office
12795 West Alameda Parkway
PO Box 25287
Denver, Colorado 80225-0287

RECEIVED
AUG 27 2004
BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

August 24, 2004

Ray A. Nation
Environmental Coordinator
Bureau of Indian Affairs
Wind River Agency
P.O. Box 158
Fort Washakie, WY 82514

Subject: Comments on the Draft Environmental Impact Statement for the Wind River Gas Field Development Project, Fremont County, Wyoming

Dear Mr. Nation:

The National Park Service has reviewed the Draft Environmental Impact Statement for the Wind River Gas Field Development Project, and hereby submits these comments as an indication of our thoughts concerning the project.

Our primary concern is with regards to the cumulative effects that this and other energy development projects have on the air quality in Wyoming and the surrounding states. We encourage the document to thoroughly evaluate the cumulative impacts on Class I and Class II air sheds, specifically those that may affect national park units. Similarly, cumulative effects to other resources should be analyzed thoroughly and adequately, to a level of detail that considers all of the energy development projects in this general area. **1**

We would also like to verify that all Land and Water Conservation Fund resources have been considered. We recommend you consult directly with the official who administers the L&WCF program in the State of Wyoming to determine any potential conflicts with section 6(f)(3) of the L&WCF Act (Public Law 88-578, as amended). This section states: **2**

> "No property acquired or developed with assistance under this section shall, without the approval of the Secretary [of the Interior], be converted to other than public outdoor recreation uses. The Secretary shall approve such conversion only if he finds it to be in accord with the ten existing comprehensive statewide outdoor recreation plan and only upon such conditions as he deems necessary to assure the substitution of other recreation properties of at least equal fair market value and of reasonably equivalent usefulness and location."

The administrator for the L&WCF program in Wyoming is Ms. Mary Moore, Grants Specialist, Division of State Parks and Historic Sites, 2301 Central Avenue, Barrett Building, Cheyenne, Wyoming 82002. Ms. Moore's phone number is 307-777-5598.

TAKE PRIDE IN AMERICA

LETTER 4 continued

Thank you again for the opportunity to comment on this project. If you have any questions, please contact Dan Foster (cumulative impacts) at 605.745.1190 or Terree Klanecky (L&WCF) at 402.661.1556.

Sincerely,

Cheryl Eckhardt
NEPA/106 Specialist

LETTER 5

TOM BROWN, INC.

RECEIVED
AUG 3 1 2004
BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

August 24, 2004

Bureau of Indian Affairs
Wind River Agency
1st and Washakie
Fort Washakie, WY 82514

Please accept the following comments on the Draft Environmental Impact Statement for the Wind River Natural Gas Field Development Project.

General Statements

Tom Brown, Inc. (TBI) is please to comment on the Wind River Natural Gas EIS. TBI supports the Proposed Action with the following comments. While we feel the document is well done a couple of issues need further clarification. TBI was clear in the proposed action that pace of development will be controlled by factors such as commodity price and rig availability. While I believe the proposed action does not dictate pace, it is not clearly outlined that it does not. The socio economics clearly show that any attempt to limit pace will cost the tribe revenue and will leave reserves in the ground that would otherwise be recovered.

Was a mandated pace of development the intent or is this an "assumed pace" to be used in the various levels of analysis? If this is a mandated pace of development, what justification was used in arriving at the particular level of activity? The pace of development should be left to the operator, taking into account such external factors as pipeline capacity, commodity prices, capital requirements, rig/service availability, etc.

Considering present value economic analysis, a slower pace of development not only impacts the return on investment for the operator, but also negatively impacts the financial benefits to the royalty and surface owners, the government, and all other parties identified to share in the socioeconomic benefits of this proposed development.

In addition, many surface owners might prefer to have all development activities and the associated disturbances confined to a shorter timeframe, rather than being drug out over 10 years.

Paragraph 2, Page 2-74

Tribal minerals within the WRPA are held in trust for the Tribes by the Department of the Interior (DOI). Under the 1916 Act, the IMLA, and the IMDA, the DOI has a fiduciary responsibility to assure that the Tribes receive the maximum economic benefit from the minerals on their lands. The reduction in both the absolute and present value revenue associated with LOP alternatives

1

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LETTER 5 continued

would clearly be contrary to this obligation. Please clarify in the Proposed Action that pace is not limited.

The document in several places refers to no activity within 1000' of a water body, this requirement is confusing. Midvale irrigation and TBI have an agreement to not drill within 500' of Midvale's main irrigation canal, and within 500' of Five Mile Creek. We do not believe there is any other regulatory authority to restrict drilling near any other water body. Please correct this in the document. 2

Selection and Analysis of Alternatives

Generally, the agency has made a good effort to analyze a full range of alternatives to the Proposed Action. Alternative A does a good job of analyzing the impacts of a scenario which is clearly possible for the reasonable and foreseeable future, where the natural gas price trend could result in higher levels which would make currently marginal gas resources economic.

Alternative B is intuitively understandable, as an environmental protection alternative, but as one studies it there appears to be little relevance or significance to many of the concerns raised during scoping. Table ES-1, which summarizes Impact Determinations for the Alternatives, compares the magnitude and duration of each described impact from each alternative. There are 106 categories of described categories. For comparison purposes, Alternative B and the Proposed Action only differ in 8 of the categories. For the 98 additional wells in the Proposed Action and the development timeline there are very few significant differences in impacts between the two alternatives. 3

Actually, if you go back to the concerns raised in scoping, e.g., wildlife, T&E, all of the impact categories, except one, are identical for the Proposed Action, Alternative A and B. Ostensibly there is little difference in the impacts of Alternative A and the Proposed Action. 4

Finally, it appears the Alternative B, as stated is a "phased development" scenario focusing upon well numbers, surface disturbance acreage and pace of development. Phased development and pace of development often come up on these EIS documents. While it may be intuitive that controlling pace and phases yields protection and benefits, it is usually clear, when rigorous analysis is applied to the details, that such a desire to control development is arbitrary. If one reads Chapter 4.13.6 Impacts Summary carefully it is obvious that the economic benefits of the Proposed Action, and Alternative A overwhelm those of B and C. Meanwhile, it appears that the environmental impacts of the Proposed Action are negligible compared to Alternative B. Additionally, Alternative B represents gas resources which will probably be left in the ground, which is waste. 5

Perhaps Alternative B must remain in the document as a stated alternative, but it would be arbitrary to consider it as viable for Record of Decision.

"Changing the Character of the Lands" and "Split Estate Impacts"

Perhaps the single most interesting media issue in Wyoming surrounding resources today is that of the so-called split estate. The surface and mineral estate have been joined geographically long before Wyoming became a state and the resources have been managed as a partnership for over 100 years. Such a positive nature between the two estates continues on every day, in every energy/food-producing basin in the state. However, that is not news, and does not create excitement. This document should be careful to not emphasize inherent "conflicts" of "split estate" issues. The BIA has very limited control over fee lands in the project area, and no jurisdiction over surface settlements with private property owners and private companies.

For this project the issue of impact upon the surface needs consideration, as any other project, but it does not deserve attention that goes beyond federal control. Oil and gas is a temporary use of the surface, i.e., the Life of Project for this is at a maximum of 40 years. Sometime, before the middle of this century this project will have exhausted the gas and the surface will be completely reclaimed to the agricultural and dry land character of today. The character will temporarily change.

Consider the same agricultural land today. It really is a permanent use of the land, once having been non-commercial habitat for Native Americans and wildlife. It will never be reclaimed to its original state, as such. The surface used for gas extraction can be returned to its current agricultural character, with no deleterious long term damage to the surrounding resource values.

While no one would deny that impact to the surface will occur, it should be emphasized that "voluntary mitigation actions" as listed in Chapter 2.3 have been implemented and will continue as the operators develop the field. Such mitigation actions reduce the impacts and accelerate the reclamation of the land to its agricultural character. This has been the practice of the partnership, and will continue that way in most of the reasonable cases. 6

Based upon a careful reading of this document it is clear that the Proposed Action provides the most prudent method of extracting the natural gas resource while balancing and mitigating the other community resource values. This letter supports the adoption of the Proposed Action by the BIA in the Record of Decision.

While balancing and mitigating the other community resource values. This letter supports the adoption of the Proposed Action by the BIA in the Record of Decision.

Below are line by line specific recommendations to the Wind River Gas Field Development Project.

LETTER 5 continued

EXECUTIVE SUMMARY:

ii Proposed Action – 325 New Gas Wells: Greka operates in W/2 Sec 4, Saba Energy is shown as operator of record. 7

iii Alternative A – 485 New Gas Wells: Clarify that interim development is allowed prior to the ROD. 8

iv Alternative B – 233 New Gas Wells: Clarify that interim development is allowed prior to the ROD. 9

vi Alternative C – No Action: Correct 2nd line to read … ~~a~~ "Communitization Agreements"… 10

vii Geology/Mineral Resource/Paleontology: Correct second sentence to last paragraph to …would be minor ~~and~~ **in the** short or long term… 11

xv Strike "hydrogen sulfide leaks" None have ever been encountered within EIS area, nor will zones capable of H2S production ever be drilled. 12

xix Wildlife: Correct 2nd sentence to …the amount of development… 13

Socioeconomics:

xx Correct 1st sentence regarding the casino to …construction in the spring summer of 2004.
xxi Correct reference to 8x8 feet to reflect "Pavillion irrigated lands". Include references to larger pad in Muddy Ridge or for wells drilled below a certain depth? 14

Please note that the operator committed mitigation for the 8' X 8' locations is only for the Pavillion Area.

Abbreviations, Add:

FONSI
HP
NO2
NOx
PM2.5
PM10
SO2
SOx 15

Executive Summary, Page ix, Paragraph 3: *"Impacts to groundwater from implementation of either the Proposed Action or alternatives could result in decrease in water levels, change in water quality and change in hydraulic properties. These impacts would be negligible under all alternatives."* 16

Groundwater is isolated by casing and cement therefore groundwater would be un-impacted.

Executive Summary, Page xv, Paragraph 2: *"Formation of a transportation planning committee would allow annual identification of intended transportation routes, proactive maintenance of affected roads and bridges and identification of alternative routes to avoid roads and bridges in poor condition."* 17

What agency would maintain jurisdiction for this transportation planning committee. Funding source?

Chapter 2 – Proposed Action and Alternatives

2.3 Proposed Action:

1st Sentence: Greka operates in W/2 Sec 4, Saba Energy is shown as operator of record.
3rd Paragraph: Clarify that interim development is allowed prior to the ROD. 18

Reserve pits on agriculture ground are referenced twice in this section. TBI under operator committed mitigation have agreed to closed mud systems during drilling. These references should be removed 19

Table 2-4:

Provides phased drilling limited to the annual well count per field.
Intended to vary by field up to annual well count for all fields.
This does not account for "the remainder" of the WRPA not identified as a field.
An annual well count for the WRPA does not appear to be well established. 20

1st Bullet Point: Correct to "On irrigated agricultural land..."
4th Bullet Point: "Fill material, purchased from the landowner…" appears too limiting. Subsequent reference is made to securing fill material from the landowner or elsewhere. 21

No mention of "removing and replacing topsoil" 22

2.4 Alternative A: Clarify that interim development is allowed prior to the ROD. 23

Table 2-5: Provides phased drilling limited to the annual well count per field.
Intended to vary by field up to annual well count for all fields. 24

LETTER 5 continued

This does not account for "the remainder" of the WRPA not identified as a field.
An annual well count for the WRPA does not appear to be well established.

2.5 Alternative B: Clarify that interim development is allowed prior to the ROD. 25

Table 2-6: Suggests phased drilling limited to the annual well count per field? 26
Intended to vary by field up to annual well count for all fields?
This does not account for "the remainder" of the WRPA not identified as a field.
An annual well count does not appear to be well established.

2.6 Alternative C: Correct the 1st sentence of the 2nd paragraph to "The No Action Alternative would allow wells to be developed on fee minerals (through individual APDs on a case-by-case basis, and on tribal minerals to offset potential drainage of adjacent fee tribal minerals. 27

Table 2-7: Suggests phased drilling limited to the annual well count per field. 28

2.7.1 Preconstruction Planning: Regarding the last bullet point, is a project-specific EA required if we have an EIS? 29

2.7.2.1 Access Road Construction: Strike the 4th sentence of the 2nd paragraph or correct to "Roads located on private lands/tribal minerals would be constructed in accordance with the standards imposed for the private landowner. 30

Does the road width reference in the 3rd paragraph refer only to "post construction" disturbance? 31

The 5th paragraph refers to the "Plan of Development (POD)". Is a POD applicable or should this reference be stricken? 32

2.7.2.2 Well Pad Design and Construction: To avoid limitation by reference the last sentence of the 1st paragraph be corrected to "Drilling activity under the Proposed Action is planned to include, but not be limited to, the Wind River, Fort Union, Lance Meeteetse, Mesaverde, and Cody formations."? 33

2.7.2.3 Drilling Operations: To avoid limitation by reference the 1st sentence of the 3rd paragraph be corrected to "...in the WRPA are will include, but not be limited to, the Wind River, Fort Union, Lance, Meeteetse, Mesaverde, and Cody Formations."? 34

The 4th paragraph addresses produced water used in drilling operations. Reference to how surface/subsurface water is acquired for drilling operations should be stricken. 35

Service Trailers also use the BLM/NIA approved envirotech system when not self contained. This should be included in the document. 36

2.7.2.11 Site Restoration and Abandonment: Correct the 3rd sentence of the 3rd paragraph beginning with Figure 2-12 to read "...reclaimed to 8x8 feet, unless a larger pad is requested by the landowner specified otherwise." 37

Adopt a different size for Muddy Ridge locations in irrigated fields or for wells drilled/completed below a certain depth? 38

2.8.1 Project-Wide Mitigation Measures: Strike the 1st sentence of the 2nd paragraph or correct to "……..applied on privately owned surface/tribal minerals, unless otherwise…….? 39

2.8.1.1 Pre-construction Planning and Design Measures: Correct the 2nd bullet to strike "or private" or correct to "...unless the surface owner, whether BIA, BOR, or private surface/tribal minerals, landowners whichever is applicable, specifies otherwise." 40

2.8.2.1 Geological and Mineral Resources: Strike the 2nd and 3rd sentences of the 2nd bullet point or correct the 2nd sentence to "...On fee surface lands overlying tribal minerals these activities...." 41

2.8.2.3 Soils: Correct the 6th bullet point to "...for construction of well pads and wellsites facilities. 42

2.9.3 Phased Development of Wells: Correct to reflect a limitation to the number of wells drilled annually in the WRPA. Correct Table 2-16 accordingly. 43

2.9.4 Natural Resource Protection: Strike the last sentence of the 1st paragraph or correct to "....on private surface/tribal minerals are established with the individual landowner surface owner." 44

2nd bullet: Reference should be to "irrigated" ag land and 8x8 to Pavillion with a larger pad for other wells completed below a specified depth. 45

3rd bullet: strike ", purchased from the landowner,". Add language regarding a barrier between field and fill material? 46

2.8.5 Fort-Acre Spacing: Insert 2.9.5 in lieu of 2.8.5. 47

Last paragraph refers to CFR applicable to federal lands. Add similar reference to State of Wyoming Regulations for patented lands? 48

LETTER 5 continued

Chapter 3 – Affected Environment

Table 3.5-17 Hydrogeologic Description: Correct the 3rd column heading to Stratigraphic. 49

Figure 3.6-1 Primary Land Cover Types: The depiction of irrigated crops appears overstated in the WRPA. 50

Figure 3.10-2 Hunting Areas: The legend for WY Game & Fish hunting areas should be qualified to include "Hunting on tribal lands is restricted to tribal members." 51

Figure 3.10-3 Waterfowl Hunting Areas: The legend for WY Game & Fish hunting areas should be qualified to include "Hunting on tribal lands is restricted to tribal members." 52

3.13.5.1 Population, Demographics: Include "Ethete is the headquarters of the Northern Arapaho tribal government" in the paragraph preceding Table 3.13.7. 53

There is no table summarizing the amount of taxes, including Tribal Tax or Wyoming Severance Tax, paid on oil and gas until Tables 4.13-8 and 4.13-9. 54

Chapter 4 – Analysis of Environmental Consequences

4.13 Socioeconomics: Change the page headers to reflect ANALYSIS OF ENVIRONMENTAL CONSEQUENCES in lieu of Affected Environment 55

4.13.1.1 Assumptions

The second paragraph under the Pavillion Field section and Figure 4.13-5 should be altered to delete reference to phased drilling. 56

The section on the Muddy Ridge Field and Figure 4.13-6 should be altered to delete reference to phased drilling. 57

The section on the Sand Mesa Field and Figure 4.13-7 should be altered to delete reference to phased drilling. 58

The section on the Sand Mesa South Field and Figure 4.13-8 should be altered to delete reference to phased drilling. 59

The section on the Coastal Extension Field and Figure 4.13-9 should be altered to delete reference to phased drilling. 60

4.13.2.2 Direct Economic Stimulus: Clarify that the phased drilling analogy is used as an assumption throughout this section. 61

Tables 4.13-8, -9, -10 and Figure 4.13-14: Should the reference to the Wyoming Oil & Gas Conservation Commission be changed to the State of Wyoming? 62

4.13.2.9 Split Estate Issues: The next to last sentence to the paragraph following Figure 4.13-17 refers to well pad reclamation of 64 square feet. Alter if sizes are different between Pavillion and wells completed below a specified depth (Muddy Ridge). 63

The second paragraph following Figure 4.13-17 refers to 116 private parcels in the Pavillion Field. This number seems high if you account for multiple surface owned by a single party. 64

4.13.2.10 Gas Development Agricultural Productivity…: This section addresses reclamation based upon the Pavillion model only. 65

4.13.2.11 Resource Extraction…: The first paragraph refers to phased drilling. 66

4.13.3 Alternative A: The first paragraph refers to phased drilling. 67

4.13.4 Alternative B: The first paragraph refers to phased drilling. 68

4.13.5 Alternative C: The first paragraph refers to phased drilling. 69

Table 4.13-41 Cumulative Tax….: Should the reference to the Wyoming Oil and Gas Commission by changed to the State of Wyoming? 70

4.13.7 Additional Mitigation Measures: The 3rd bullet refers to 8x8 well pad only. 71

4.13.8 Residual Impacts: Correct the punctuation at the end of the 1st sentence. 72

4.14.2.1 Development Phase Impacts:

Correct 1st sentence to …it is assumed likely that one rig would drill continuously in each….. 73

The 1st sentence under the section on Sand Mesa and Sand Mesa South fields should be corrected to …Proposed Action, drilling would would occur at the rate of……. 74

The 1st sentence under the section Pavillion Field should be corrected to …development phase traffic to the Pavillion field (assuming from 10 to 18 wells/year…….. 75

LETTER 5 continued

The 1st sentence under the section Muddy Ridge Field should be corrected to …the Muddy Ridge field (assuming 12 wells/year for 4 years……. 76

The 1st sentence under the section Coastal Extension Field should be corrected to …the Coastal Extension field (assuming one well/year for 8 years……. 77

Chapter 5 – Cumulative Impact Analysis

5.2.8 Past Environmental Assessments……..: Necessary to include any EA conducted for any of the incremental 3D activity or by Snyder Oil Corporation on the Alkali Butte Oil/Gas Lease Option? 78

5.3.12.2 Reasonably Foreseeable Future Activities…….: Correct the second sentence regarding the casino to spring of 2004. 79

5.3.12.4 Past, Present and…….: The 4th paragraph refers to a reclaimed well pad of 8x8 only. 80

Chapter 6 – Consultation and Coordination

No Comments

Appendix B

Correct the cover page to read GUIDELINES 81

Appendix B

Table C-1: Update with regard to size of Wellpad/ Production Facility? 82

Again Tom Brown, Inc. is happy to provide this comment to the document and we look forward to a timely review for inclusions into the FEIS and ROD. If you have any question or if we can provide any further clarifications please contact David Petire at (303-260-5048).

Respectfully Submitted

David S. Petrie

LETTER 6

PETROLEUM ASSOCIATION OF WYOMING

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August 30, 2004

Mr. Ramon A. Nation
Bureau of Indian Affairs
Winder River Agency
P.O. Box 158
Fort Washakie, Wyoming 82514

Re: Draft Environmental Impact Statement for the Wind River Gas Field Development Project, Fremont County, Wyoming

Dear Mr. Nation:

The Petroleum Association of Wyoming (PAW) would like to thank the Bureau of Indian Affairs (BIA) for the opportunity to comment on the referenced document. PAW is Wyoming's largest and oldest oil and gas organization, the members of which account for over ninety percent of the natural gas and over eighty percent of the crude oil produced in the State. This project will directly affect members of PAW.

PAW has the following comments regarding the above referenced document:

1. Phased Development:

   Phased development is discussed throughout the document as an option for managing the pace at which development should occur. The pace of development for any oil and/or gas project has an enormous impact on the economics of that project. Typically, significant cost and resources are employed in the exploration phase to attempt to delineate the viability of a project prior to drilling exploratory wells. Once exploratory wells are drilled, decisions are then made concerning development and how that development will occur as it pertains to timing and configuration. Even using advanced reservoir characterization techniques and models; there is enormous uncertainty in prediction reservoir performance. The full extent of the resource is not known until a significant number of wells are drilled and on production. Projects are also subject to constant evaluation as they develop and mature; and decisions concerning well densities, timing for drilling, etc., are continually refined. For these reasons, the pace of development cannot be prescribed based only on environmental concerns. The oil and gas industry must maintain flexibility concerning how it employs its capital based on reservoir performance and economics. PAW urges deletion of this recommended concept from the document. 1

LETTER 6 continued

2. Page 2-46, 2.7.2.10 Geophysical Operations

   Geophysical activity must be analyzed for exploration and development of oil and gas. New seismic technology (3D) allows for minimal surface disturbance while gathering adequate data to determine the best locations to drill for the oil and gas resource. This process provides the necessary information that can significantly reduce the number of unsuccessful exploration and development of wells drilled; thereby, significantly minimizing surface disturbance. Geophysical activity is consistent with the President's National Energy Policy and the Secretary of Interior's "4C's" philosophy to promote conservation practices with energy development and should be encouraged by BIA. BIA must also consider and provide adequate access to areas in order to obtain the valuable information that seismic activity provides. **2**

3. Page 2-58, 2.8.2 Resource-Specific Mitigation: "...Operator-committed mitigation measures are provided in Section 2.3..."

   The Applicant has agreed to numerous "Applicant Committed Measures" (ACM), which go beyond the required protective measures currently established by the agency. The Applicant has demonstrated their willingness to work with BIA in protecting the effects on the environment. The ACM's are voluntary actions agreed to by the individual companies and should not establish the precedent for future projects. ACM's should be applied on a case-by-case basis only and not as a blanket mitigation measure. **3**

4. Page 2-62, 2.8.2.7 Land Use

   BIA must continue to recognize that requirements on private surface need to be subject to the private landowner desires unless mandated by federal law. PAW stresses again that while BIA has the mandate under NEPA to analyze for impacts regardless of land ownership, it does not give BIA the authority to manage private property. PAW appreciates the agencies recognition of this issue and that it is consistently reflected in the document. **4**

5. Page 2-63, 2.8.2.8 Wildlife: "All drivers would undergo training describing the types of wildlife in the area that are susceptible to vehicular collisions..." **5**

   PAW requests clarification as to what agency would provide training and institute a program.

6. Page 2-66, 2.8.2.11 Visual Resources: "During well drilling, any lights on rigs would be down-lighted, shrouded and directed towards the drilling platform, where possible, in order to reduce glare and negative night lighting impacts..." **6**

   PAW agrees that this ACM can be exercised where possible; however, BIA must work closely with the operator when implementing this measure for safety reasons with the drilling crew.

7. Page 2.67, 2.8.2.14 Transportation: "Formation of a transportation planning committee to address natural gas access and road maintenance..."

   PAW supports this ACM as travel plans are regularly developed by industry to minimize transportation, share costs in maintaining roads, and to reduce the amount of new roads being built. These plans are amended as necessary throughout the life of the project. Advances in technology, such as remote monitoring, have assisted in reducing traffic in project areas. **7**

8. Page 2-68, 2.8.2.16 Noise: The noise levels from compressors near residences would be equal to or less than 55dBA..."

   While industry works to locate compression facilities at sites with the least noise impacts, this measure should not be imposed when construction of the facility predates the locating of a noise sensitive receptor. Additionally, the measure should be further amended to account for instances where background noise is already impacted by other activities (i.e. near communities or highways). PAW recommends that this measure be amended to limit noise increases to 5 dBA above background. **8**

9. Page 2-74, 2.9.2 Directional Drilling: "...A requirement to directionally drill all wells under the Proposed Action...was rejected...since it would not be technically and economically feasible..."

   PAW concurs with this decision. This exploration and development method is a process driven by subsurface geologic criteria and has little to do with surface resource protection. The application of directional drilling can be geologically and mechanically limited. For example, current technology only allows directional drilling to occur up to an average of ½ mile depending on geology. In most cases of multiple oil or gas zones, the hole must be vertical when it penetrates the zones of interest. When more than one hole per pad is drilled, the facilities necessary to handle the volume of production from the site must be adjusted accordingly. The size and number of tanks needed may increase as will the size of the dehydrator and separator. Multiple wells per pad may not translate into a direct reduction in total surface disturbance as other facility parameters may expand. **9**

   The potential risk for producers is higher with directional drilling. Directional drilling often greatly accelerates the cost of development, effectively shrinking exploration and drilling budgets. This translates into fewer wells being drilled; less seismic work being conducted and fewer resources are found and produced. In some cases, the gas may not be recovered because the cost of drilling directional wells renders the project uneconomic, which in-turn renders the lease valueless. At that point, the reserves are left in the ground, failing to achieve the mandate for BLM to maximize recovery of resources.

   While directional drilling may prove viable in some situations, it cannot be mandated by any agency as the primary extraction technique for development. As described above,

LETTER 6 continued

mandated directional drilling increases the cost and risk of development to such a degree that the lease may be rendered useless. Clearly, directional drilling does not always prove to be the most effective technique to maximize the resource recovery. Regulatory agencies must remain flexible by only considering directional drilling on a case-by-case basis.

10. Page 2-80, 2.9.4 Natural Resource Protection: "...a monitoring program would be undertaken during drilling and production for evaluating the potential effects of the Proposed Action..."

    PAW does not object to a sound, well-designed environmental monitoring program and recommends that BIA (the primary management agency) adopt monitoring protocols as part of its land management process. It is necessary for land management agencies' to monitor their mitigation measures in the field and quantify the effectiveness of the measure rather than imposing blanket, un-supported restrictive stipulations on industry. The intent of monitoring is to demonstrate the need for adjustments in mitigation, up or down as the situation and science dictate. Again, monitoring will require additional budget appropriations for agency manpower to avoid unfairly placing the entire burden on industry. **10**

11. Page 4.5-15, 4.5.6 Additional Mitigation Measures: "...drilling operations or other surface disturbances should be limited within 1,000 ft of flowing streams or surface water bodies..." **11**

    PAW requests that additional documentation be provided as to the supporting information requiring increased protection of water bodies from 500 ft to 1,000 ft.

12. Page 4.8-16, 4.8.8 Additional Mitigation Measures: "...In areas where four wildlife resources of concern overlap, the BIA may consider avoidance of these areas in order to reduce impacts."

    PAW opposes the extreme mitigation measure of avoidance where wildlife resources overlap. BIA should be required to monitor their mitigation measures in the field, quantify their effectiveness, and that should become the basis for adjustments to the mitigation measures. Avoidance or "no surface occupancy" affects lease rights. **12**

    Valid existing lease rights cannot be changed by a new plan. Voluntary compliance to the new plan may be sought from lessees if activities are initiated. Nevertheless, BIA needs to specify in the planning documents if and how valid existing lease rights could be impacted by the new decisions. Specifically, potential conditions of approval for operations and other changes should be identified. Avoidance of overlapping wildlife resources is a significant new stipulation that was not attached to current leases.

13. Page 4.9-13, 4.9.8 Additional Mitigation Measures: "Restore mountain plover habitat by using seed mixes and application rates for reclamation that produce stands of sparse, low-growing vegetation suitable for plover nesting..."

    The status of the mountain plover as "proposed for listing" allows for a certain amount of flexibility in developing measures protective of the species. Unless the U.S. Fish and Wildlife Service determines that the mountain plover should be listed under the Endangered Species Act as threatened or endangered, which it withdrew from consideration, BIA has certain discretionary authority and should consider the effects on the oil and gas operator as part of its adoption of reasonable and prudent mitigation measures necessary to minimize the impact on the species. **13**

    Managing strictly to enhance mountain plover habitat, as a single species most likely will conflict with the appropriate management techniques for other species. BIA must remain flexible in its management recommendations to accommodate overlapping habitats for different species that may not be consistent.

14. Page 4.9-13 Additional Mitigation Measures: "Restore habitat utilized by sage-grouse by using seed mixes to produce sagebrush vegetative communities..."

    Furthermore, BIA has significant flexibility in developing protective measures for Sensitive Species and Wyoming Species of Concern such as the sage-grouse. BLM has certain discretionary authority and should consider the effects of restrictions on the oil and gas operator as part of its adoption of reasonable and prudent mitigation measures necessary to minimize potential impacts on non-ESA listed Special Status Wildlife Species. **14**

    Managing strictly to enhance sage-grouse habitat, as a single species most likely will conflict with the appropriate management techniques for other species. BIA must remain flexible in its management recommendations to accommodate overlapping habitats for different species that may not be consistent.

15. Page 4.11-11, 4.11.7.4 Night-Lighting at Compressor Stations: "Lights that are uncovered and non-directional can cause light pollution in the night sky and can obscure stars, or impact local residences and properties..." **15**

    While this mitigation measure can be implemented where possible, BIA must work closely with the operator for safety reasons with the drilling crew.

16. Page 4.13-25 Split Estate Issues

    Regarding private property, should the company find it difficult to resolve issues with the landowner for the development of this pipeline, PAW recommends the services of the Wyoming Split Estate Initiative (WYSEI). It is a voluntary program that outlines options to be considered by both parties and if utilized, could minimize or prevent conflict. **16**

LETTER 6 continued

Information regarding this program can be found on the WYSEI website at www.wysei.com.

17. PAW recognizes that the social and economic opportunities generated from the project would continue to benefit the residents of Wyoming and the participating counties by directly creating new jobs and producing additional revenues. 17

18. In a time of uncertainty and with the projection of natural gas production being unable to meet demand during certain times of the year, Wyoming has the opportunity to provide much needed natural resources to markets throughout the nation and this proposal has the potential to assist in that effort. This proposal is consistent with President Bush's National Energy Policy. 18

In conclusion, PAW supports the Proposed Action with the modifications outlined above and the Final EIS should be prepared without delay.

Sincerely,

Dru Bower
Vice President

Cc: Dave Petrie
Steve Stacy
Bruce Hinchey

LETTER 7

United States Department of Agriculture | Forest Service | Rocky Mountain Region
P.O. Box 25127
Lakewood, CO 80401
Delivery: 740 Simms Street
Golden, CO 80401
Voice: 303-275-5350
TDD: 303-275-5367

File Code: 2580
Date: AUG 30 2004

Mr. Ray Nation
Natural Resource Director
Bureau of Indian Affairs
Wind River Agency
PO Box 158
Fort Washakie, WY 82514

Dear Mr. Nation:

We thank you for the opportunity to share our comments concerning the Draft Environmental Impact Statement (DEIS) for the Wind River Natural Gas Project. The following comments, observations, and suggested actions listed below are focused on the air quality sections of the document. Please accept this letter in the spirit of cooperation and assistance. Our intent is to provide comments on specific areas of interest and recommended actions to help you in your final deliberations and decision. We would be interested in meeting with you to discuss additional staff comments in the near future.

- As indicated in the tables and narrative in chapters 4 and 5, and in the emissions calculations –Volume 3 of the appendices, this project will affect air quality in Wyoming, and particularly in the Bridger, Popo Agie, Cloud Peak, and Fitzpatrick Wilderness areas. Measures suggested to ameliorate these impacts include: 1
  - Developing, implementing, and enforcing adequate mitigation and monitoring including, but not limited to mitigation measures presented in table 4.4-7.2.
  - Coordinating mitigation and monitoring efforts with other projects affecting these same wilderness areas (i.e., Powder River Basin, Jonah Infill, etc.)
  - Working with industry to find additional technologies or techniques to reduce potential impacts.
- The cumulative impacts associated with this proposed action must be assessed in light of other ongoing and proposed actions outlined in resource management plans and their associated projects, including the Powder River Basin Coalbed Methane project, Rawlins RMP, Pinedale RMP, Kemmerer RMP, Casper RMP, and other large proposed natural gas development projects in Southwest Wyoming. We recognize that the Wind River project is relatively small compared to these other projects and that cumulative sources contribute to the majority of projected impacts; however, we encourage all proposals to incorporate effective mitigation. Suggestions for addressing cumulative impacts include: 2

LETTER 7 continued

- Incorporating information from current and ongoing analyses to convey a best estimate of cumulative impacts.
- Working closely with the BLM state office in Cheyenne to assure consistency in information presented.
- Recognizing that the majority of cumulative impacts originate from projects initiated by the Bureau of Land Management, coordinate monitoring and mitigation with the BLM, State of Wyoming, NPS, EPA, and USFS.

2 con't

- As the Federal Land Managers (FLM) responsible for proposed impact determination to wilderness areas, we are bound by the Clean Air Act to maintain or enhance air quality in Class I areas. All additions to visibility impairment above the 1.0 deciview level in Class I wilderness areas are potentially significant. Specifically, we are concerned with the projected impacts to visibility displayed in chapter 5 and summarized in tables 5.3-11 and table 5.3-7. Mitigation measures suggested include:
  - Focused mitigation measures aimed at protecting visibility in nearby wilderness areas such as reducing Nitrogen Oxide emissions especially during the construction phase.
  - Utilization of best available control technologies and control of fugitive dust through established methodologies.
  - Integration with other mitigation and monitoring programs and the BLM's statewide air quality assessment.

3

- Objectives for the wilderness areas under our jurisdiction include: (1) "administered... in such a manner as will leave them "unimpaired for future use and enjoyment as wilderness" and (2) stewardship of "wilderness resources... managed to promote, perpetuate, and, where necessary restore the wilderness character of the land." To help meet these objectives, we request that mitigation and monitoring of projected impacts be considered for all wilderness areas including visibility impairment and acid deposition in Class II areas.

4

- The detailed analysis and modeling of air quality impacts from this project displayed the following specific trends for Air Quality Related Value (AQRV) impairment:
  - The proposed action, when added to the cumulative sources, increases the visibility impairment at the Bridger Wilderness by two days at the 1.0 dv level, and increases the magnitude of visibility impacts in the Popo Agie and Cloud Peak Wilderness areas.
  - The cumulative sources alone, excluding the proposed project, are predicted to contribute to visibility impairment above the 1.0 deciview level for 15 days in two nearby wilderness areas (Popo Agie, Cloud Peak.) When the proposed action is added, this visibility impairment is increased to 17 days in three wilderness areas (Bridger, Popo Agie, Cloud Peak.)

5

- Cumulative sources alone are predicted to contribute to a greater than 10 percent change in acid neutralizing capacity (ANC) at Emerald Lake in the Cloud Peak Wilderness area. At this level of impact, we are concerned about potential acidification of this sensitive lake and similar lakes in the area. Change in lake ANC is used as an indicator of potential ecological change throughout the ecosystem.
- Nitrogen Oxide levels are projected to be 94 percent of the Clean Air Act's Prevention of Significant Deterioration (PSD) increment standards. Additionally, ozone levels from the project, when added to background concentrations, are estimated at 93 percent of the National Ambient Air Quality Standards. These levels indicate that air quality is approaching a point of potential deterioration.
- To address these impacts, please consider the use of: (1) the best available control technologies including, but not limited to those stated in table 4.4-7.2; (2) the best management practices; and (3) other innovative mitigation measures (i.e., electrification of compressors with renewable energy sources such as wind power.) We stand ready to help with your coordination efforts among regulatory agencies such as the EPA for tribal actions and the State of Wyoming for actions on adjacent lands, and others (BLM, USFS, industry). We value your continued participation in the NEPA process for related projects, participation in statewide air quality discussions, participation with interagency committees, and participation as a member of the Federal Leadership Forum.

5 con't

- The predicted potential impacts underscore the need for sufficient mitigation measures, enforcement of those measures, and adequate air quality monitoring to provide feedback and validate model predictions. We would be pleased to work with you as you implement the appropriate mitigation measures, monitoring, and an evaluation program.

6

Thank you again for the opportunity to comment on this important project. Should you have any questions or comments regarding our review, please contact Intermountain Regional Director, Mike Dudley (801.625.5507) or Rocky Mountain Regional Director, Mark Boche (303.275.5736).

Sincerely,

/s/ Richard C. Stem
RICHARD C. STEM
Acting Regional Forester, R2

/s/ Jack Troyer
JACK TROYER
Regional Forester, R4

Wind River Gas Field Development - DEIS comments
US Forest Service – Air Resource Management Program
8/20/04

---	---	---	The USFS provides these comments in the spirit of cooperation. We affirm our earth stewardship responsibility, and specifically our responsibilities under the Clean Air Act and the Wilderness Act. Thank you again for the opportunity to express our comments and concerns. We look forward to working with you as you develop the final EIS and ROD.	
Exec Summary	xvii	5&6	In the discussion of impacts in wilderness areas, the determination of whether a potential impact is adverse or acceptable resides with the Federal Land Manager (FLM) responsible for that sensitive area. Federal land managers responsible for each Wilderness area should evaluate the significance of the impacts. The Forest Service generally believes that a long-term change in lake chemistry and visibility are significant impacts. Please clarify, discuss, and explain the role and responsibility of the FLMs in managing and protecting areas under their stewardship.	7
3	3.4-18	2	As a point of clarification, the Fox document is a guidance document and is not policy. The values mentioned are currently under review and will likely be reduced due to scientific research indicating that impacts occur at lower levels. The USFS does not use these red line/green values as a "threshold". The USFS Air Resource Management Program is in the process of temporarily suspending this guidance in Regions 2 and 4 so that it will not be used in future NEPA documents because current research suggests impacts are occurring at lower levels than indicated in the red-line / green-line graphs.	8
4	4.4-9	Table 4.4-11	Because ozone (O3) impacts from the proposed project are over 90% of the National Ambient Air Quality Standards (NAAQS), please discuss O3 monitoring opportunities, funding mechanisms, and how data would be used.	9
4	4.4-15	Table 4.4-21	The emissions for ALT B are different from the proposed project, however both drill the same number of wells per year. Please explain why this difference occurs and clarify this difference for the readers.	10
4	4.4-25	1	Please clarify if the deposition discussed here is just project related.	11

4	4.4-29	Table 4.4-37	The Forest Service uses the 0.5 dv level as an indicator to consider the timing, duration and magnitude of visibility impacts to wilderness areas. It would be helpful for us to have the 0.5 dv level shown here rather than in the appendices. It would also make it more apparent to the readers and decision makers that FLMs may have different criteria when assessing the significance of impacts. This comment applies to other visibility related tables as well.	12
4	4.4-31	Table 4.4-40	There appears to be an error related to the Sulfur at Owl Canyon and the DAT. Please correct and / or explain.	13
5	5.1-11	Table 5.3-1	Tables should reference the appendices that the numbers were pulled from in order to facilitate the reader in finding information. Table F-3 excludes approximately 178 wells from the analysis because they emit less that 3 tons/year of emissions. Please clarify and explain.	14
5	5.1-13	Table 5.3-2	O3 one-hour standards should also be considered in this table and other ambient air tables.	15
5	5.1.13	Table 5.3-3	The FS is concerned that projected NO2 levels for the cumulative sources are 94% of the PSD increment at the Cloud Peak Wilderness area, not including the addition of project related emissions. Though PSD Class I rules do not apply to this wilderness because it is defined as a PSD Class II area, the levels of impact are above what the USFS would typically consider to be acceptable under the Wilderness Act. The USFS requests adequate mitigation and monitoring be implemented including but not limited to those suggested in this document. Additionally, please clarify in the final EIS if the document includes all the sources that the State of Wyoming would include if they were doing an increment analysis.	16
5	5.1.16	Table 5.3-6	The FS is concerned that existing cumulative source impacts, without adding project related impacts, predict that the acid neutralizing capacity (ANC) at Florence Lake will exceed the established 10% Limit of Acceptable Change. At this level of impact, we are concerned about potential acidification of this sensitive lake and similar lakes in the area. Change in lake ANC is used as an indicator of potential ecological change throughout the ecosystem. Adding emissions from the proposed project will likely contribute to additional impacts. Please consider discussion of mitigation and monitoring measures coordinated with other projects affecting this Wilderness.	17

LETTER 7 continued

5	5.1-17	Table 5.3-7	The Forest Service is concerned that visibility is projected to be impaired in two Wilderness areas due to cumulative sources alone. Additions of emissions from this proposed project would likely increase the total impacts. Please consider discussion of mitigation and monitoring measures coordinated with other projects affecting this Wilderness.	18
5	5.1-21	Table 5.3-11	The USFS is concerned that the emission additions from the proposed project when added to the cumulative emissions will impair visibility at the Bridger Wilderness for two days above the 1.0 dv level. Please consider discussion of mitigation and monitoring measures coordinated with other projects affecting this Wilderness.	19
5	5.1-19	Table 5.3-9	See comment on page 5.1.13	20
5	5.1-20	Table 5.3-10	The Forest Service is concerned that the ANC at Florence lake is projected to decrease more that 10%. This exceeds the established USFS level of concern. At this level of impact, the USFS is concerned about potential acidification of this sensitive lake and similar lakes in the area. Change in lake ANC is used as an indicator of potential ecological change throughout the ecosystem. Please consider discussion of mitigation and monitoring measures coordinated with other projects affecting this Wilderness.	21
5	5.1-21	Table 5.3-11	The Forest Service is concerned that the proposed action when added to the cumulative sources increases the visibility impairment at the Bridger Wilderness by two days at the 1.0 dv level, and increases the magnitude of visibility impacts in the Popo Agie and Cloud Peak Wilderness areas. Please consider discussion of mitigation and monitoring measures coordinated with other projects affecting this Wilderness.	22
5	5.1-23	Table 5.4-13	Same as comment on table 5.3-3.	23
5	5.1-24	Table 5.3-14	Same as comment on Table 5.3-10.	24
5	5.1-25	Table 5.3-15	The Forest Service is concerned that visibility impairment above the 1.0 dv level is projected to occur in 3 Wilderness areas for 16 days. Please consider discussion of mitigation and monitoring measures coordinated with other projects affecting this Wilderness.	25
5	5.1-27	Table 5.3-17	Same as comment on table 5.3-3.	26
5	5.1-28	Table 5.3-18	Same as comment on Table 5.3-10.	27
5	5.1-29	Table 5.3-19	The Forest Service is concerned that visibility impairment above the 1.0 dv level is projected to occur in 3 Wilderness areas for 17 days. Please consider discussion of mitigation and monitoring measures coordinated with other projects affecting this	28

			Wilderness.	
5	5.1-31	Table 5.3-21	Same as comment on table 5.3-3.	29
5	5.1-32	Table 5.3-22	Same as comment on Table 5.3-10.	30
5	5.1-33	Table 5.3-23	The Forest Service is concerned that visibility impairment above the 1.0 dv level is projected to occur in 3 Wilderness areas for 17 days. Please consider discussion of mitigation and monitoring measures coordinated with other projects affecting this Wilderness.	31
5	5.1-35	Table 5.3-25	Same as comment on table 5.3-3.	32
5	5.1-36	Table 5.3-26	Same as comment on Table 5.3-10.	33
5	5.1-37	Table 5.3-27	The Forest Service is concerned that visibility impairment above the 1.0 dv level is projected to occur in 2 Wilderness areas for 15 days. Please consider discussion of mitigation and monitoring measures coordinated with other projects affecting this Wilderness.	34
5	5.1-38	Table 5.3-28	The background conditions found on table 3.4-6 have not been added to these numbers. Please correct this in the final EIS. The PM10 annual is shown as 0. Is this correct? Please verify and correct if needed, and / or explain.	35
5	5.1-39	1st paragraph	"Minor long-term nitrogen impacts...." Please explain that it is the role and responsibility of the FLM (in this case the USFS) to determine the significance of impacts on the lands they manage. Please also define "minor".	36
5	5.1-39	2nd paragraph	"Moderate long-term impacts...." Please explain that it is the role and responsibility of the FLM (in this case the USFS) to determine the significance of impacts on the lands they manage. Please also define "moderate."	37
5	5.1-40	Table 5.3-29	The USFS is concerned that changes to ANC at Florence Lake exceeds the 10% LAC for all alternatives and the cumulative sources alone. Therefore, all alternatives in this project could directly increase the magnitude of the change in ANC. Please disclose this in the final. Please consider discussion of mitigation and monitoring measures coordinated with other projects affecting this Wilderness.	38
5	5.1-40	1st paragraph	Regarding the discussion of minor and moderate long-term visibility impacts, please explain that it is the role and responsibility of the FLM (in this case the USFS) to determine the significance of impacts on the lands they manage. The USFS believes that impairment in Class I Wilderness areas above the 1.0 dv level is significant. The	39

LETTER 7 continued

			USFS also believes that degradation of visibility above the 1.0 dv level in Class II Wilderness areas is significant. Because all alternatives presented in Table 5.3-30, with the exception of Alt C, show projected visibility impairments in Class I areas above the 1.0 dv level, please discuss these concerns in the document. Please consider discussion of mitigation and monitoring measures coordinated with other projects affecting this Wilderness.	39 con't
nf	NF-4	list	For a more complete list, please include emissions from flaring.	40
nf	NF-11	Paragraph 1	As a point of clarification, these are similar, but not "identical". Road length, number of wells and number of pads differ.	41
nf	NF-13	Table 4-1	It is unclear if the 94.7% of the 24-hour standard for pad and road construction includes 50% dust suppression from watering roads and pads. Please clarify and explain assumptions.	42
nf	NF-36	1st paragraph	The word "identical" may not be appropriate as it indicates exactly the same. Since the number of wells being drilled is different (38 vs. 39 wells), the emissions may be similar, but not identical.	43
nf	NF-46	Table 5-11	The USFS is concerned that the Proposed Action and Alt A are approaching the NAAQS for O3.	44
EI	EI-6	2.2.4	Will the well venting occur for the life of the project? Please explain in more detail.	45
EI	EI-7	Table 2.1	Emissions from the existing development should be added to all of the alternatives to display the total impacts.	46
EI	EI-13	Text	"Production wells, not specifically associated with a previously approved NEPA action were included in the inventory." Please clarify the following: 1) are these wells on state and private lands? 2) were NEPA approved wells previously drilled accounted for? 3) is there a listing of how many for each project were drilled and counted? Also, to facilitate ease of review and provide clear disclosure, we suggest this information should be summarized and explained in the narrative of the EIS, not just the appendices.	47
Appendix F	1	Table F-3	187 wells in Sublette county were excluded because they emitted < 3 tpy. Please explain this more clearly in the final. Using the factor of .45 tpy/well emissions, this is over 8 tons per year that were not counted. We believe this is an omission. Please verify and correct as needed.	48
FF	FF-3	Last Paragraph	The document describes a tank for condensate; will there be a separate tank for the water produced? If not, what happens to it? Please explain.	49

FF	FF-23	1st paragraph	How does the 49 ppb compare to the background concentrations displayed in Table 3.4-6 in ug/m3? Please explain.	50
FF	FF-23	2nd paragraph	The document states that the background ammonia concentration was assumed to be 1ppb, but in Table 5-1 on page FF-25, the document indicates other values were used in the Cal Puff post processing with much lower concentrations (approx 20% of the 1ppb). Please explain the discrepancy and correct as needed.	51
FF	FF-41-42	Figures	The USFS is concerned that ANC at Hobbs, Lower Saddlebag, Stepping Stone and Ross lakes are decreasing over the period of lake water sampling, indicating the waters are becoming more acidic. Acidification of lakes is an indication of larger ecosystem change. Deposition from emissions related to this project are likely going to add to this decline in ANC. Please consider discussion of mitigation and monitoring measures coordinated with other projects affecting this Wilderness.	52
FF	FF-44	3rd paragraph	For clarification, recent literature in the West indicates that the levels cited in the Fox (et al) document may be too high, and that damage to AQRVs may be occurring at lower levels of deposition. The intent of that document was for guidance, and it was not intended to represent USFS policy. The USFS is reviewing these numbers, and will adjust these numbers in the future to be more protective against AQRV impacts. The USFS Air Resource Management Program is in the process of temporarily suspending this guidance in Regions 2 and 4 so that it will not be used in future NEPA documents because current research suggests impacts are occurring at lower levels than indicated in the red-line / green-line graphs.	53
			GENERAL COMMENTS	
1			Please consider this comment in regard to improving the effectiveness of the NEPA process: It would be helpful in the future if the transmittal letter to the reader clearly states who to send the comments to, a phone number and contact person for answering questions, and the date the comments are due.	54
2			Finally, we request the BIA send future NEPA documents in their entirety as a hard copy to facilitate a more thorough and effective review.	55

LETTER 7 continued

TEXT CHANGES

	Section/ Page	Line	Comment/Change	BIA Action
3	Exec. Summary p. viii	Par 3; s. 2	Please remove the term "exhaust" when speaking about emissions related to well operations.	
4	Exec. Summary p. viii	Par. 3; s. 4&5	Please remove the word "proportionally" from these sentences. "Proportionally" suggests that the impacts will be somewhat linear, which is a false assumption.	
5	Exec Summary	Table ES-1	The WDEQ-AQD questions the use of the terms "minor", "moderate" and "major" when describing the level of impacts. These terms, to our knowledge, are not defined in the significance criteria section. These terms should either be defined or the impacts should be described according to the significance criteria (e.g. significant or non-significant).	
	3.4.3.1 p. 3.4-11	Par.3; s.2	Please modify the sentence to read "... therefore subject to the Wyoming Air Quality Standards and Regulations (WAQSR)."	
6	3.4.3.1 p. 3.4-12	Par.2; s. 7	Please delete the "s" at the end of "Cloud Peak".	
7	3.4.3.1 p. 3.4-13	Table 3.4-6 (and all similar tables)	More recent SO_2 background data is available to represent central Wyoming. Data was collected at the Lost Cabin Gas Plant, Fremont County, Wyoming, from 1986-1987. The background concentrations are as follows: 3- hour : 93 ug/m^3 24- hour: 32 ug/m^3 Annual: 4 ug/m^3	
8				

Note: In the "Page" and "Line" columns above the following abbreviations apply: p. = page; par. = paragraph; s. = sentence

LETTER 8

The State of Wyoming

RECEIVED
SEP - 8 2004
BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

Dave Freudenthal, Governor

Department of Environmental Quality

Herschler Building • 122 West 25th Street • Cheyenne, Wyoming 82002

ADMIN/OUTREACH	ABANDONED MINES	AIR QUALITY	INDUSTRIAL SITING	LAND QUALITY	SOLID & HAZ. WASTE	WATER QUALITY
(307) 777-7758 FAX 777-3610	(307) 777-6145 FAX 777-6462	(307) 777-7391 FAX 777-5616	(307) 777-7368 FAX 777-6937	(307) 777-7756 FAX 777-5864	(307) 777-7752 FAX 777-5973	(307) 777-7781 FAX 777-5973

August 30, 2004

Mr. Ray Nation
Bureau of Indian Affairs
Wind River Agency
PO Box 158
Fort Washakie, WY 82514-0158

RE: Wind River Gas Field Development Draft EIS - Comments

Dear Mr. Nation:

The Air Quality Division of the Wyoming Department of Environmental Quality has reviewed the Draft Environmental Impact Statement for the Wind River Gas Field Development dated July 9, 2004. The Division's specific comments are attached. The Division would like to note that the State of Wyoming has been designated as attainment/non-classifiable for the 8-hour ozone standard and expects to see an analysis of 8-hour ozone concentrations related to the project included in the air quality analysis. Additionally, project and cumulative impacts modeled for PSD Class II areas are compared to PSD Class I increments in the document. The Division finds this comparison inappropriate and expects that the project and cumulative results will be compared to the appropriate increment in the Final EIS. 1 2

If you should have any questions regarding the comments, please feel free to contact this office.

Sincerely,

Dan Olson
Air Quality Division Administrator

Cc:
John Corra, Department of Environmental Quality Director
Cara Casten, Air Quality Division
Darla Potter, Air Quality Division
Ryan Lance, Governor's Planning Office

Wind River
PRELIMINARY DRAFT EIS
DOCUMENT REVIEW

Section/ Page	Line	Comment/Change	BIA Action
3.4.3.1 p. 3.4-13	Table 3.4-6 footnotes	The footnote regarding $PM_{2.5}$ and 8-hour O_3 is no longer correct. The State of Wyoming has been designated attainment / non-classifiable for the 8-hour O_3 standard and EPA has issued an implementation rule. Therefore, WDEQ-AQD is enforcing the 8-hour standard and expects to see impacts compared to the 8-hour standard as part of the air quality analysis. Additionally, the 1-hour O_3 NAAQS will no longer apply to an area 1 year after the effective date of the designation (for most areas this will be June 15, 2005). The State of Wyoming has submitted recommendations on $PM_{2.5}$ designation and is awaiting EPA's official designation. EPA is still developing the $PM_{2.5}$ implementation rule; therefore WDEQ-AQD does not expect impacts to be compared to the $PM_{2.5}$ standards as part of the air quality analysis until the implementation rule has been promulgated. Due to these changes, please delete this footnote on this and all related tables throughout the text.	
3.4.3.2 p. 3.4-15	Par.1; s.1	The WDEQ-AQD is not aware of any literature that includes nitrates as part of the broader category of "NO_x". Please cite the source of this information.	
3.4.3.3 p. 3.4-17	Par.2 and subsequent text	Jeff Sorkin and Terry Svalberg with the USDI Forest Service have indicated that the Fox 1989 "red-line" and "green-line" guidance is no longer being used by the Forest Service, as those parameters are being re-evaluated. We strongly suggest either removal of the comparisons or language reflecting the Forest Service's position on this issue. Please make this change throughout the document.	

Note: In the "Page" and "Line" columns above the following abbreviations apply: p. = page; par. = paragraph; s. = sentence

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Wind River
PRELIMINARY DRAFT EIS
DOCUMENT REVIEW

Section/ Page	Line	Comment/Change	BIA Action
3.4.3.3 p. 3.4-22	Par. 4	Please add a short explanation of how the 5-year averages are calculated and why they are used in Figures 3.4-8 and 3.4-9.	
4.4.1.1 p. 4.4-2	Par.1; s.3	Please modify the sentence to read as follows: "Within the remainder of the State of Wyoming, the WDEQ-AQD…"	
4.4.2 p. 4.4-6	Par.3; s.2	The statement "… [construction activities] would generally not occur simultaneously" is confusing, please clarify.	
4.4.2.1 p. 4.4-9	Par.1	Please analyze impacts for comparison to the 8-hour O_3 standard. The State of Wyoming has been designated attainment / non-classifiable for the 8-hour O_3 standard and EPA has issued an implementation rule. Therefore, WDEQ-AQD is enforcing the 8-hour standard and expects to see impacts compared to the 8-hour standard as part of the air quality analysis. Additionally, the 1-hour O_3 NAAQS will no longer apply to an area 1 year after the effective date of the designation (for most areas this will be June 15, 2004). Please consider this comment applicable to all Alternatives' air quality analyses.	
4.4.2.1 p. 4.4-10	Par.2; last 2 sentences	Please delete the last two sentences. The incremental cancer risks are within the acceptable range, there is no need for qualifying language.	
4.4.3	General	An explanation should be added to clarify the difference between the project impacts analysis and the "post-construction" impacts analysis (sections 4.4.3.1 and 4.4.3.2, respectively). Does the project impact analysis include	

Note: In the "Page" and "Line" columns above the following abbreviations apply: p. = page; par. = paragraph; s. = sentence

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LETTER 8 continued

Wind River
PRELIMINARY DRAFT EIS
DOCUMENT REVIEW

Section/ Page	Line	Comment/Change	BIA Action
		simultaneous construction and production emissions or solely construction emissions?	
4.4.3 4.4-21	Par.3; last full sentence	It is not acceptable to compare PSD Class II areas to PSD Class I increments. Rather than simplifying the document, it complicates the text by confusing and misleading the reader. Please delete this sentence.	
4.4.3.1 p. 4.4-24	Par. 3	Please modify this paragraph to include comparisons to Class II increments. Please change all subsequent text in the document that refers solely to Class I increments in the context of comparison of impacts in Class I and Class II areas.	
4.4.3.1 p. 4.4-25	Table 4.4-32	It is inappropriate to compare PSD Class II areas to PSD Class I increments. Please compare the maximum impacts to the appropriate increment (in this case, Class II increments). Comparisons of this type should be corrected for all alternatives and scenarios throughout the document.	
4.4.3.2 p.4.4-31	Par.1; last sentence	Should this sentence read "Total sulfur deposition…" rather than "Cumulative sulfur deposition…"?	
4.4.3.7 p. 4.4-65	Table 4.4-72	Under "Use of oxidation catalysts…" the potential limitations should read "…2-stroke engines or rich burn engines."	
5.3.3.1 p. 5.1-11	Bulleted items	Please clarify bullet #4, does this apply only to existing sources? Please clarify that bullet #5 only applies to sources from a NEPA project that have not yet been developed.	

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Note: In the "Page" and "Line" columns above the following abbreviations apply: p. = page; par. = paragraph; s. = sentence

Wind River
PRELIMINARY DRAFT EIS
DOCUMENT REVIEW

Section/ Page	Line	Comment/Change	BIA Action
5.3.3.7 p. 5.1-39-40	All paragraphs	The WDEQ-AQD questions the use of the terms "minor", "moderate" and "major" when describing the level of impacts. These terms, to our knowledge, are not defined in the significance criteria section. These terms should either be defined or the impacts should be described according to the significance criteria (e.g. significant or non-significant).	

24

Note: In the "Page" and "Line" columns above the following abbreviations apply: p. = page; par. = paragraph; s. = sentence

LETTER 8 continued

LETTER 9

United States Department of the Interior

FISH AND WILDLIFE SERVICE

RECEIVED
SEP - 2 2004
BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

AUG 3 1 2004

In Reply Refer To:
ES-6141/W.01/WY8663

Memorandum

To: George E. Gover, Superintendent, Bureau of Indian Affairs, Wind River Agency, Fort Washakie, Wyoming

From: Brian T. Kelly, Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Review of the Draft Environmental Impact Statement for the Proposed Wind River Natural Gas Field Development Project

This is regarding your July 15, 2004, request for comments for the Draft Environmental Impact Statement (DEIS) for the proposed Wind River Natural Gas Field Development Project (WRPA) located in T3-4N, R2-5W in Fremont County, Wyoming. The U.S. Fish and Wildlife Service's (Service) Cheyenne Ecological Services Field Office has coordinated with Pat Hnilika of the Service's Lander Fish and Wildlife Management Assistance Office regarding this project.

The WRPA consists of five separate development areas; Pavillion, Muddy Ridge, Sand Mesa, Sand Mesa South, and Coastal Extension. These areas consist of nearly 91,500 acres of combined private, federal and state lands. The proposed action includes 325 traditional natural gas wells on 325 well pads as well as associated facilities such as roads and pipelines. The development stage is expected to take 20 years while the life of the project may extend to 40 years.

GENERAL COMMENTS

As management of the WRPA includes private, state and federal lands, the U.S. Fish and Wildlife Service (Service) recommends that analysis at the project level and the application for permit to drill (APD) level consider potential effects from this project on private and state lands that may be interrelated and interdependent to the action occurring on adjacent federal lands.

Threatened and Endangered Species

Section 7(a)(1) of the Endangered Species Act of 1973 (Act), as amended, (50 CFR 402) directs the Bureau of Indian Affairs (BIA) to utilize their authority to further the conservation and recovery of threatened and endangered species. Although the DEIS addresses measures to minimize impacts of project development on listed species, the Service encourages the BIA to take the opportunity to incorporate measures for species conservation and recovery into the planning document for this project.

Appendix L of the DEIS is identified as the Biological Assessment for this project. However, we have not received a request from the BIA to initiate consultation under section 7 of the Act. The DEIS states that several of your determinations for listed species are "may affect." Therefore, we recommend that you incorporate the following comments into your project plan and Appendix L and subsequently initiate section 7 consultation to request our concurrence with your determination of effects.

SPECIFIC COMMENTS

Page ii, Executive Summary, Proposed Action, paragraph 3: The DEIS indicates that directional drilling will be considered under several circumstances. *The Service encourages the BIA to insist that project proponents implement directional drilling practices wherever possible to minimize threats to wildlife. Threats include habitat fragmentation, disruption of seasonal migration routes, disruption of breeding activity, and increased predation, and are caused by well pads, access roads, pipelines, power lines, transmission stations, compressors and increased traffic that accompany natural gas development. Directional drilling may reduce the many factors that contribute to the degradation of wildlife habitat and should be an integral part of this project.* 1

Page iii, Executive Summary, Proposed Action, paragraph 3: The DEIS states that reclamation of the disturbed land will begin as soon as drilling and construction have been completed. *Please clarify whether reclamation will be completed at each well site once drilled, or at the completion of the entire project. The Service recommends that reclamation activities occur immediately upon completion of a well pad, or at such time when a well has been abandoned.* 2

Page x, Executive Summary, Threatened and Endangered Species paragraph 1: The DEIS states that black-footed ferrets and Canada lynx that may be present in the project area are identified as part of an endangered/experimental population and threatened/experimental population respectively. *Please be advised that the only population of black-footed ferrets in Wyoming to be considered as non-essential/experimental are located in the Medicine Bow-Shirley Basin reintroduction site. All other populations, currently unknown, are considered endangered and have full protection under the Act. Additionally, Canada lynx populations in the lower United States are not considered experimental populations, but have full protection under the Act as a threatened species.* 3

Page 1.1-9, section 1.1.3, Project Background: The DEIS states that well spacing will vary between 16 and 32 wells per section. It also states that the operators will submit requests for spacing orders prior to development. However, Table 1-2 states that the majority of the wells within the Pavillion Field and the Muddy Ridge Field can be placed anywhere within the 640-acre section and 160-acre quarter-section respectively. *The Service is concerned that this high density of wells could preclude the ability to provide the necessary protection for migratory birds, sage grouse and other wildlife due to habitat fragmentation. The Service highly recommends that the well spacing authority consider habitat and species disturbance-free buffers that are necessary in order to provide adequate protection (e.g., 1-mile buffer around active nests of bald eagles and ferruginous hawks and 2-mile buffer around sage grouse breeding habitat). The spacing of wells in such a manner as to preclude the ability to implement a 1 to 2-mile protective buffer may exacerbate the decline of some species.* 4

Page 2.1-1, Proposed Action and Alternatives: The DEIS states that some of the 325 proposed wells would be exploratory or delineation wells and future development, especially in the Coastal 5

LETTER 9 continued

Extension and Sand Mesa South Fields is planned. *The Service understands that some exploration is necessary in order to determine the capability of gas production within any field. However, based on information from adjacent natural gas developments and the ever improving gas extraction technologies, the Service highly recommends that your analysis consider the impacts from full field development rather than only the development stage. The Service's analysis of impacts to our trust species should be conducted using the best available information. We believe information can be extrapolated from adjacent developments to determine the extent of development in the WRPA and the possible impacts to the environment. The DEIS states development is very likely to exceed 325 wells and therefore the final EIS should reflect the number of wells expected for full-field development and the potential impacts that may result from such a development.*

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Page 2.1-5, Proposed Action-325 New Gas Wells: The DEIS states that directional drilling in the Pavillion Field is not mechanically feasible while achieving the maximum recovery of the resource. Also, it states that the feasibility of directional drilling in the Coastal Extension and the Sand Mesa South fields has not been determined. No mention of directional drilling was made for the Muddy Ridge Field. *As mentioned above, the Service highly recommends the use of directional drilling where possible to reduce roads, well pads, pipelines, and other facilities that attribute to habitat fragmentation, long term loss of habitat, and direct and indirect negative impacts to many species. The Service recommends the BIA clarify in the final EIS whether directional drilling within all or at least a portion of the WRPA is feasible.*

6

Page 2.1-7, Paragraph three, Voluntary mitigation: The DEIS lists several voluntary mitigation measures that operators will take in order to reduce short and long term impacts. One of the measures states that new wells would be drilled on existing well pads, where possible. *Please clarify where and how many of the wells will be drilled in this manner. The Service strongly encourages drilling several wells on one well pad to significantly reduce disturbance and habitat fragmentation through fewer access roads, pipelines, and other associated natural gas facilities.*

7

Page 2-57, Section 2.8.1, Project-Wide Mitigation Measures: The DEIS states that mitigation measures for threatened and endangered species were prepared by the USFWS. *Please correct the Final DEIS to state that minimization measures (not mitigation measures) for listed and proposed species were developed through coordination with the Service's Cheyenne and Lander Field Offices. Effects to listed and proposed species should be minimized or avoided, but can not be mitigated for.*

8

Page 2-57, section 2.8.1.1, Pre-construction Planning and Design Measures: The DEIS states that the operators would submit an APD for each proposed well site on federal and tribal leases to the BIA for approval prior to construction. *In the event that proposed well sites include private lands as well as federal and/or tribal lands, the APD should include such lands in the description so as to completely describe the action area. If the action on the private land would not occur or would occur to a lesser degree but for the action on the federal land (Interrelated/Interdependent action), then the action on the private lands must be considered.*

9

Page 2-61, section 2.8.2.5, Water Resources: The DEIS discusses several protection measures for surface and ground water resources due to potential negative effects from reserve pits. However, netting or fencing reserve pits is not mentioned here. T*he Service recommends that netting be used to prevent birds from landing in potentially toxic or contaminated water sources.*

10

Page 2-63, section 2.8.2.8, Wildlife, Item 1: The DEIS states that no disturbance would be allowed within 0.5 to 1-mile of active raptor nests from February 1 through July 31 and that these dates may vary by species. *The Service commends your protective measures for raptors. However, implementing a 0.5 to 1-mile disturbance-free buffer (1-mile for bald eagles and ferruginous hawks) may be difficult in areas where 20-acre well spacing is implemented. Directional drilling may result in the same amount of wells being drilled but will reduce the number of well pads and habitat fragmentation and enable you to implement appropriate protective buffers for wildlife.*

11

Page 2-63, section 2.8.2.8, Wildlife, Item 2: The DEIS states that no above-ground structures will be placed within 0.5 to 1-mile of a raptor nest, but where disturbance is unavoidable, artificial nest structures may be used. *Please note, nest manipulation is not allowed without a permit. In the event that a raptor nest requires removal (e.g., human health and safety), the BIA will need to contact the Service's Migratory Bird Office in Denver at 303-236-8171 to see if a permit can be issued for removal of such nest. If a permit cannot be issued, the project may need to be modified to ensure take of a migratory bird or eagle, their young, eggs or nest will not occur.*

12

Page 2-63, section 2.8.2.8, Wildlife, Item 3: The DEIS states that electric power lines and other transmission facilities are designed to minimize electrocution hazards to raptors. *The Service commends your actions to minimize electrocution to raptors. Please ensure that these electric facilities meet the standards presented in Suggested Practices for Raptor Protection on Power Lines, The State of the Art in 1996 (Edison Electric Institute/Raptor Research Foundation), to minimize electrocution potential.*

13

Page 2-63, section 2.8.2.8, Wildlife, Item 4: The DEIS indicates that road killed animals will be removed from access roads, shoulders and right of ways to minimize collisions between vehicles and scavengers. *To minimize the lure that road killed animals may have on bald eagles, golden eagles and other scavenging wildlife, we suggest that road killed animals be promptly moved off of all road surfaces associated with this project. This may include access roads, right of ways and existing highways.*

14

Page 2-63, section 2.8.2.8, Wildlife, Item 6: The DEIS suggests that only those reserve pits where potentially hazardous materials occur will be fenced and netted or flagged. *According to Esmoil (1991), wildlife deterrents such as flagging and reflectors do not minimizing wildlife mortalities from oil reserve pits. Tulley and Boulter (1970) recommend complete covering of reserve pits with chicken wire (netting) or hardware cloth in order to effectively deter wildlife from these areas.*

15

Page 2-64, section 2.8.2.9, Threatened and Endangered Species: The DEIS indicates that threatened and endangered species would be protected through mitigation measures. *Please refer to our previous comments regarding minimization measures versus mitigation measures.*

16

Page 2-64, section 2.8.2.9, Threatened and Endangered Species, Item 2: The DEIS states that all powerlines and transmission lines must minimize electrocution hazards. *In order to address these issues the Service recommends that all such facilities are built to the standards presented in Suggested Practices for Raptor Protection on Power Lines. The State of the Art in 1996 (Edison Electric Institute/Raptor Research Foundation), to minimize electrocution potential.*

17

LETTER 9 continued

Page 2-64, section 2.8.2.9 Threatened and Endangered Species, Item 3: The DEIS states that no disturbance will be allowed within 1-mile of active bald eagle nests from February 1 to July 31. *Although we believe these protection dates will provide adequate protection for most active nests, please be aware that some bald eagle nests may still be active in early August due to late nesting birds or fledglings that are still reliant on the natal nest. We suggest that these dates be flexible to accommodate unusual nesting activity. A monitor, qualified in bald eagle ecology, should determine when the chicks are completely fledged and the disturbance-free period adjusted accordingly.* 18

Page 2-64, section 2.8.2.9 Threatened and Endangered Species, Item 8: The DEIS states that workers would be educated as to the effects of canine distemper on black-footed ferrets, emphasizing why workers should not have pets at the work site. *The Service recommends that the prohibition of pets at the work site be strictly enforced.* 19

Page 2-64, section 2.8.2.9 Threatened and Endangered Species, Item 11: The DEIS states that disturbance in areas that may provide potential sage grouse leking habitat would be avoided as much as possible. *Although protection of leking habitat is important, we recommend that protection of nesting and brood rearing habitat also be considered during project planning. As you may know the Service has been petitioned to list the sage grouse as threatened or endangered. Proactive conservation actions, which are incorporated into project planning can preclude the need to list the sage grouse under the Act. The BIA should ensure this project does not exacerbate greater sage-grouse declines on either a local, or range-wide level. For site specific measures to protect this species on Bureau of Reclamation Lands, private lands or state lands we recommend you contact the Wyoming Game and Fish Department. For tribal lands we recommend you contact the Service's Fish and Wildlife Management Assistance Office in Lander.* 20

Page 2-64, section 2.8.2.9 Threatened and Endangered Species, Item 12: The DEIS discusses measures to protect mountain plovers. *As you may know the Service has withdrawn the proposal to list the mountain plover as a threatened or endangered species and we will no longer be reviewing project impacts to this species under the Act. The mountain plover is protected as a migratory bird under the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703. In order to protect mountain plovers from further decline we suggest the following measures, (1) avoidance of suitable habitat during the plover nesting season (April 10 through July 10), (2) prohibition of ground disturbing activities in prairie dog towns, and (3) prohibition of any permanent above ground structures that may provide perches for avian predators or deter plovers from using preferred habitat.* 21

Page 3.9-2 through 3.9-6, Black-footed Ferret: The DEIS describes four white-tailed prairie dog colonies (approximately 1200 acres) that occur within the WRPA and states that black-footed ferret surveys will be conducted prior to construction. *Please be aware that black-footed ferret surveys are no longer recommended in black-tailed prairie dog towns statewide or in white-tailed prairie dog towns except those noted in our enclosed February 2, 2004, letter. However, we encourage you to protect prairie dog towns for their value to the prairie ecosystem and the myriad of species that rely on them. We further encourage you to analyze potentially disturbed prairie dog towns for their value to future black-footed ferret reintroduction.* 22

If white-tailed prairie dog towns or complexes greater than 200 acres will be disturbed, surveys for ferrets may be recommended in order to determine if the action will result in an adverse

effect to the species. Surveys are recommended even if only a portion of the white-tailed prairie dog town or complex, as identified in our enclosed letter, will be disturbed. According to the Black-Footed Ferret Survey Guidelines (USFWS 1989), a prairie dog complex consists of two or more neighboring prairie dog towns less than 7 km (4.3 miles) from each other. If a field check indicates that prairie dog towns may be affected, you should contact this office for guidance on ferret surveys. 22 con't

Page 4.9-2, (Bald Eagle) Habitats: The DEIS states that wells and facilities will create optimal viewing perches for bald eagles throughout the WRPA. *We understand that natural gas facilities may provide perching areas for bald eagles especially if these facilities are located near potential nesting, roosting or foraging areas. However, we do not recommend that bald eagles or any raptor species be encouraged to perch on natural gas facilities. The availability of perch or nest sites on these facilities may bring raptors into areas where they do not normally occur and subject them to increased mortality (e.g., attraction to carrion, increased vehicular collisions, illegal shooting, poisoning). We strongly recommend that you install anti-perching structures on all above ground structures that may attract raptors.* 23

Page B-2, section 2.0, Wildlife Mitigation Guidelines: The DEIS states that exceptions to mitigation guidelines may be approved after analysis. *In the event that an exception to a wildlife stipulation is considered, the Service encourages the BIA to consider the loss, even temporary, of important habitat when disturbance is allowed. Certain species that are deterred from suitable habitat where an exception has been granted may instead use marginal habitat where reproductive or winter survival success may be reduced. Based on these concerns, the Service recommends that the BIA use its authority to consider only those exceptions where unforeseen circumstances have delayed or halted a previously, well planned project.* 24

Page B-8, USFWS Mitigation Requirements for Listed Species: The DEIS states that the Service has required mitigation measures for listed species for this project. *For clarification, the Service does not have required mitigation guidelines for listed species. Also, sage grouse, mountain plover, migratory birds and wetlands and riparian areas are not considered under the Act but under other federal regulations. Below are measures that we recommend to minimize effects to listed and proposed species that may occur within the WRPA. For species such as the black-footed ferret, sage grouse and mountain plover please refer to our previous comments regarding protective measures. For site specific protective measures on Bureau of Reclamation Lands, private lands or state lands we recommend you contact the Wyoming Game and Fish Department. For tribal lands we recommend you contact the Service's Fish and Wildlife Management Assistance Office in Lander.* 25

Bald eagle: We recommend annual raptor surveys within 1-mile of proposed disturbance. All known active bald eagle nests should be protected by a 1-mile disturbance-free buffer until the chicks are fully fledged. Known winter roost sites should also be afforded a 1-mile protective buffer. Surveys for winter roosts in suitable habitat is recommended.

Grizzly bear: The DEIS states that grizzly bears have been observed within the WRPA. For areas where there is potential for grizzly bear-human interaction, we strongly encourage the enforcement of food storage and garbage disposal stipulations. In addition, all on-site personnel should be aware of the protected status of the grizzly bear and of appropriate personal safety

LETTER 9 continued

measures and behavior in grizzly bear habitat. We recommend that your actions comply with the Interagency Grizzly Bear Guidelines (1986) and the Final Conservation Strategy for the Grizzly Bear in the Yellowstone Ecosystem (2003).

Gray wolves: Wolves are dependant on movements of big game populations and may occur in large ungulate migration, wintering, or parturition areas. During project activities wolves may change their use of the project areas based upon changes to big game population numbers and changes in movement of herds. Project planning should consider impacts to big game populations, including migration, wintering, or parturition areas.

Migratory birds: Federal agencies are obligated to protect the many species of migratory birds, including eagles and other raptors protected under the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703 and Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668. We recommend habitat surveys within the WRPA to identify important migratory bird areas. Avoidance of these areas during the breeding season may significantly increase nest success. In order to promote the conservation of migratory bird populations and their habitats, the Service recommends that federal agencies implement those strategies outlined within the Memorandum of Understanding directed by the President of the U.S. under the Executive Order 13186, where possible.

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Wetlands and riparian areas: Wetlands perform significant ecological functions as well as possess aesthetic and recreational values. The Service recommends measures be taken to avoid and minimize wetland losses in accordance with Section 404 of the Clean Water Act, Executive Order 11990 (wetland protection). If wetlands may be destroyed or degraded by the proposed action, those wetlands in the project area should be inventoried and fully described in terms of their functions and values. Acreage of wetlands, by type, should be disclosed and specific actions should be outlined to avoid, minimize, and mitigate for all unavoidable wetland impacts.

Plans for mitigating unavoidable impacts to wetland and riparian areas should include mitigation goals and objectives, methodologies, time frames for implementation, success criteria, and monitoring to determine if the mitigation is successful. The mitigation plan should also include a contingency plan to be implemented should the mitigation not be successful. In addition, wetland restoration, creation, enhancement, and/or preservation does not compensate for loss of stream habitat; streams and wetlands have different functions and provide different habitat values for fish and wildlife resources.

Page J.1-8, section 4.0, Conclusions: The DEIS indicates that no further surveys for sage grouse leks and raptors will be completed based on the results from the aerial surveys conducted in April 2003. *The Service recommends that habitats important to sage grouse nesting, broodrearing, and wintering also be identified and protective measures implemented. We also recommend annual raptor surveys within 1-mile of proposed disturbance to identify active nests prior to construction and subsequently the implementation of protective buffers.*

26

Appendix L, Biological Assessment: The draft biological assessment portion of the DEIS discusses several species, including listed and sensitive species. *Although much of the information necessary for a complete biological assessment was included throughout the DEIS, we recommend that the following information, regarding listed and proposed species, be included within your final biological assessment in order to expedite our review process.*

27

1. *A description of the project.*
2. *A description of the specific area potentially affected by the action.*
3. *The current status and habitat use of threatened and endangered species in the project area.*
4. *Discussion of the methods used to determine the information in item 3.*
5. *Direct and indirect impacts of the project to threatened and endangered species.*
6. *An analysis of the effects of the action on listed and proposed species and their habitats including cumulative impacts (pursuant to the Act) from state, or private projects in the area.*
7. *Measures that can potentially reduce or eliminate adverse impacts to threatened and endangered species.*
8. *The expected status of threatened and endangered species in the future (short and long term) during and after project completion.*
9. *Determination of "is likely to adversely affect" or "is not likely to adversely affect" for listed species (determinations in Appendix L do not coincide with determinations in Chapter 4).*
10. *Determination of "is likely to jeopardize" or "is not likely to jeopardize" for proposed species.*
11. *Alternatives to the proposed action considered, a summary of how impacts of those alternatives on listed and proposed species would differ from the proposed actions, and the reasons for not selecting those alternatives.*
12. *Citation of literature and personal contacts used in the assessment*

27 con't

Appendix L, section 7.1 Measures to Avoid or Minimize Adverse Impacts: The DEIS lists several measures to minimize or avoid adverse impacts to bald eagles. *Additionally, the Service recommends annual raptor surveys within 1-mile of proposed disturbance and during the appropriate time of year to observe nesting birds. All known active bald eagle nests should be protected by a 1-mile disturbance-free buffer until the chicks are fully fledged. Known winter roost sites should also be afforded a 1-mile protective buffer. Additional surveys are recommended in habitat suitable for winter roosting.*

28

Appendix P, Wildlife Monitoring/Protection Plan: Tables P-1 and P-2 and section 2.1.2.1 states that raptor surveys, including nest inventories and productivity monitoring, will be conducted every five years within the WRPA and annually in areas of high development. *Based on the proposed high density well spacing in this development we recommend that a raptor mitigation and monitoring plan be developed for the WRPA to include (1) baseline aerial and/or ground surveys of nesting and roosting areas within the WRPA to determine raptor concentration areas, (2) annual surveys of nesting and roosting areas for five consecutive years within the WRPA to determine raptor use trends within the WRPA, (3) site-specific raptor surveys within 1-mile of proposed disturbance associated with each application for permit to drill and right of way application, (4) construction of alternate nest structures in the event a nest may be negatively impacted at a rate of two alternate nest structures to one impacted nest. (A permit for active nest removal must be obtained from the Service's Migratory Bird Office prior to removal.), (5) implementation of 0.5-mile disturbance-free protection buffers (1-mile for bald eagles and ferruginous hawks) to protect existing nest sites, (6) review and approval of raptor mitigation and monitoring plan by the Service's Wyoming Field Office and the Regional Migratory Bird Office, and (7) review and possible amendment to the plan after five years of data. If negative trends are documented sooner the plan should be amended prior to five years.*

29

LETTER 9 continued

Appendix P, Wildlife Monitoring/Protection Plan: Table P-3 discusses several stipulations to protect raptor nests during the nesting season while the application for permit to drill stage of development is implemented. These include 0.5 to 1-mile nest avoidance areas from February 1 to July 31 and nest avoidance year long within 825 feet (1,200 feet for ferruginous hawks) of active nests. *The Service is unsure whether nesting raptors within the WRPA may be habituated to disturbances occurring at 825 to 1,200 feet. Unless extensive site-specific data indicates particular nests are habituated to this level of disturbance, we strongly discourage the use of the latter protective buffer, as disturbances within this distance may cause nest abandonment. The Service does recommend that a 0.5-mile and a 1-mile for ferruginous hawks and bald eagles, disturbance-free buffer be implemented for all active raptor nests within the WRPA. Additionally, we recommend that nesting burrowing owls be afforded the same protection as other raptor species with a 0.5-mile disturbance-free buffer instead of the "as necessary" protection as indicated in Table P-3.* **30**

Appendix P, Wildlife Monitoring/Protection Plan, Table P-1: Table P-1 states that black-footed ferret monitoring will be conducted annually from April to July. *Please refer to our enclosed letter regarding surveys in white-tailed prairie dog towns. Also, in the event that surveys are warranted, they should be conducted pursuant to the 1989 Black-footed Ferret Survey Guidelines. Surveys conducted in April are not adequate to determine presence or absence of ferrets and can not be accepted by the Service to clear an area of use by black-footed ferrets.* **31**

Appendix P, Wildlife Monitoring/Protection Plan, Table P-1: Table P-1 discusses several survey methods for sage grouse. *The Service recommends that you contact a local biologist to determine if your survey methods are adequate to determine that status of sage grouse population within the WRPA.* **32**

Appendix P, section 2.1.2.3, Threatened and Endangered Species, Bald Eagle: The DEIS states that inventories and monitoring protocols for bald eagles will be as described for other raptors. *Please refer to our previous comments regarding raptor monitoring and protection.* **33**

Appendix P, section 2.1.2.3, Threatened and Endangered Species, Mountain Plover: The DEIS includes the mountain plover within the listed species section. *As we stated previously, the Service has withdrawn the proposal to list the mountain plover and will no longer be reviewing project impacts to this species under the Act.* **34**

Appendix P, section 2.2.1, Raptors: The DEIS states that the primary protective measure for raptors will be nest avoidance from February 1 through July 31. Additionally, the DEIS states that surface structures, requiring repeated human presence, will not be placed within 825 feet (1200 feet for ferruginous hawks). Finally, the DEIS states that exceptions to the timing stipulations may be granted based on field investigations. *Please refer to our previous comments regarding raptor monitoring and protection.* **35**

Appendix P, section 2.2.3, Threatened and Endangered Species: The DEIS states that consultation and coordination with the Service will be conducted as needed and the terms and conditions of the biological opinion, prepared by the Service, will be followed. *This statement indicates that a biological opinion will be issued for this action. However, information provided within the DEIS regarding determinations of effect to listed and proposed species indicate that the effects will not rise to the level of adverse effects, where formal consultation is required. Please clarify your determination of effect for listed and proposed species and identify in the* **36**

DEIS whether you wish to initiate consultation at either the informal or formal level. For clarification, a federal agency is only required to consult under section 7 of the Act when effects of an action are likely to adversely affect listed species or critical habitat. **36 con't**

Additional Issues Not Addressed in DEIS

The Service recommends that the BIA consider potential impacts of the project to the pygmy rabbit (*Brachylagus idahoensis*). The Service received a petition (April 21, 2003), to list the pygmy rabbit under the Act. This smallest of the Leporidae family occurs in portions of many western states including southwestern Wyoming where they occur in a few isolated populations in Lincoln, Uinta, Sweetwater, Sublette and Fremont counties. Pygmy rabbits are sage-brush obligate species, primarily found in dense western big sagebrush (*Artemisia tridentata*) communities preferably where at least two other species of sagebrush and forbs occur as well. Conversion of sagebrush grasslands, habitat fragmentation and overgrazing are considered potential threats to pygmy rabbits. Project planning measures that retain large tracts of suitable habitat and corridors to adjacent habitat will aid in the conservation of this species. We would appreciate information on the status of the pygmy rabbit within the WRPA. **37**

The Service appreciates the opportunity to comment on this DEIS. If you have any questions regarding this letter or your responsibilities under the Act, please contact Kathleen Erwin of my staff at the letterhead address or phone (307) 772-2374, extension 28.

REFERENCES

Edison Electric Institute and the Raptor Research Foundation. 1996. Suggested Practices for Raptor Protection on Power Lines - The State of the Art in 1996. Washington, D.C.

Esmoil, B. J. 1991. Wildlife mortality associated with oil pits in Wyoming. Department of Zoology and Physiology. Wyoming Cooperative Fish and Wildlife Research Unit. 68pp.

Interagency Grizzly Bear Committee. 1986. Interagency grizzly bear guidelines. Missoula, MT.100 pp.

Interagency Conservation Strategy Team. 2003. Final Conservation Strategy for the Grizzly Bear in the Yellowstone Ecosystem. Missoula, MT. 86 pp.

Tulley, R.J., and M. Boulter. 1970. Survey of water pollution, soil contamination, and wildlife mortality caused by sludge pits and related oil pumping practices in Colorado. Colorado Division of Wildlife Report. 8pp.

USFWS. 1989. Black-footed ferret survey guidelines for compliance with the Endangered Species Act. U.S. Fish and Wildlife Service, Denver, Colorado and Albuquerque, New Mexico. 13pp.

Enclosure (1)

cc: wo/enclosure
Shoshone Business Council, Wind River Reservation, Ft. Washakie (J. Washakie)
Northern Arapaho Business Council, Wind River Reservation, Ft. Washakie (R. Brannan)
BLM, Lander Field Office, Lander (Field Supervisor)
FWS, Region 6, Federal Activities Coordinator, Denver (B. Dach)
FWS, Region 6, FWMAO, Lander (P. Hnilika)
WGFD, Statewide Habitat Protection Coordinator, Cheyenne (V. Stelter)
WGFD, Non-Game Coordinator, Lander (B. Oakleaf)

LETTER 9 continued

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

In Reply Refer To:
ES-61411/BFF/WY7746

February 2, 2004

Dear Interested Party:

This letter is to inform you that black-footed ferret (*Mustela nigripes*) surveys are no longer necessary in black-tailed prairie dog colonies statewide or in white-tailed prairie dog towns except those noted in the attachment. In response to requests from numerous entities and our own review of the situation regarding ferret surveys, the U.S. Fish and Wildlife Service (Service) and others have been evaluating the potential for a previously unidentified black-footed ferret population to occur in Wyoming and the need for conducting black-footed ferret surveys across the entire state. This issue has been especially pertinent when evaluating various activities for compliance with the Endangered Species Act of 1973 (Act), as amended (16 USC 1531 *et seq*).

The black-footed ferret was listed as an endangered species in 1967, prior to the Act (under the Endangered Species Preservation Act of 1966). The Act prohibits the take of listed species without proper permits and places an additional requirement on activities funded, authorized or carried out by Federal agencies to ensure that such actions will not jeopardize the continued existence of any listed species. The latter process is known as interagency consultation and is outlined in section 7(a)(2) of the Act (50 C.F.R. § 402.13) .

The Service developed the 1989 *Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act* (Survey Guidelines) to assist with section 7 consultations for ferrets. The Survey Guidelines provide a mechanism to evaluate the possibility of locating existing ferrets in prairie dog colonies by examination of the size, density, and juxtaposition of existing prairie dog colonies. The key points of the strategy are to determine the existence of ferrets or an area's potential for ferret recovery and either may be used in section 7 consultations when determining whether an action may affect the black-footed ferret. The Survey Guidelines can be followed by interested parties (federal agencies and their partners) during the section 7 consultation process to make determinations on whether an activity may adversely affect ferrets. However, an unintended drawback to the Survey Guidelines is that repetitive surveys may be undertaken to evaluate possible impacts to ferrets on prairie dog colonies that have already been searched or that didn't present any realistic opportunities for ferret reintroduction.

The Service has been coordinating with the Wyoming Game and Fish Department in reviewing information about the current and historic status of prairie dog towns throughout Wyoming. In addition to the status review, we have also been reviewing the history of black-footed ferret surveys to determine whether the survey guidelines should continue to be applied across the entire state. Through this process, the Service has developed an initial list of blocks of habitat that are not likely to be inhabited by black-footed ferrets. In these areas, take of individual ferrets and effects to a wild population are not an issue and surveys for ferrets are no longer recommended. The term "block clearance" has often been used to describe this type of approach. This initial list is based largely on the quality of the habitat today, as well as information regarding past population bottlenecks that may have resulted from plague and poisoning events in particular areas and may have led to the loss of ferrets in the area.

Additional information regarding the survey effort on the specific areas not yet block-cleared is currently being reviewed by the Service. Based on this review, the Service will likely add several blocks of habitat to the list in the future. The Service will continue to collect and review information on any remaining areas to determine if they should be added to the list of areas cleared from the survey recommendation. Therefore, prior to conducting surveys, you should coordinate with the Service to determine which specific areas are recommended for surveys. We have attached our initial list of areas cleared from the ferret survey recommendation. We believe this approach is not only biologically defensible, but also allows all parties involved to focus survey effort and resources on those areas where the likelihood of discovering wild ferrets is greatest.

Please note that "block clearance" must not be interpreted to mean that the area is free of all value to black-footed ferrets. These areas, or blocks, are merely being cleared from the need for ferret surveys. Therefore, this clearance from the survey recommendations reflects only the negligible likelihood of a wild population of ferrets occurring in an area. It does not provide insight into an area's value for survival and recovery of the species through future reintroduction efforts. Nor does this clearance relieve a Federal agency of its responsibility to evaluate the effects of its actions on the survival and recovery of the species. For example, while an action proposed in a cleared area needs no survey and is not likely to result in take of individuals, the action could have an adverse effect upon the value of a prairie dog town as a future reintroduction site and should be evaluated to determine the significance of that effect. Consultation with the Service is appropriate for any agency action resulting in an effect significant enough to diminish a site's value as a future reintroduction site. Additionally, block clearance of an area does not imply that other values of maintaining the integrity of the prairie dog ecosystem are unimportant.

We appreciate your efforts to conserve listed species. Without the valuable information collected to date in association with black-footed ferret surveys, we would not be able to undertake this effort to focus ferret surveys on the most promising habitat. If you have any questions regarding

Attachment

Black-footed Ferret Survey Block Clearance List **February 1, 2004**

The following blocks of black-footed ferret habitat are cleared from the recommendation for ferret surveys:

1. All black-tailed prairie dog towns in Wyoming

2. All white-tailed prairie dog towns in Wyoming **EXCEPT** those identified in the following table.

Complex Name	Townships	Ranges
Baxter Basin	T18,T19, T20	R103, R104
Big Piney	T 28 T29, T30, T31	R111, R112 R109-R111
Bolton Ranch	T17 T18, T19	R86, R88 R86-R88
Carter	T16, T17 T18	R114-R116 R115
Continental Divide	T16 T17 T18 T19 T20	R93-95 R92-95, 98-100, 97-98 R92-96, 98-99 R92-96 R92-95
Cumberland	T16 T17-T19 T19, T20	R118 R117 R116
Dad	T15, T16 T17	R90-R93 R92, R93
Desolation Flats	T13 T14 T15 T16	R93-95 R93-94 R93-94, 96 R93-96
Fifteen Mile	T47-T49 T48	R97, R98 R96 (west half)
Flaming Gorge	T12, T13 T12-T14 T13	R109 R108 R107
Manderson	T47, T48 T49	R90, R91 R91
Moxa	T15, T16 T17, T18 T19, T20 T21 T22, T23 T24	R112, R113 R111-R113 R111-R114 R110-R113 R111-R113 R112
Pathfinder	T27 T28 T29	R85, R86 R85-R89 R85, R89
Saratoga	T14 T15 T16	R82, R83 R82-R84 R83-R85
Seminoe	T23, T24	R84, R85
Shamrock Hills	T22, T23 T24, T25 T26	R89, R90 R89 R89, R90

LETTER 9 continued

this letter or your responsibilities under the Act, please contact Mary Jennings of my staff at the letterhead address or phone (307) 772-2374, extension 32.

Sincerely,

Brian T. Kelly
Field Supervisor
Wyoming Field Office

Enclosure (1)

cc: WGFD, Non-Game Coordinator, Lander, WY (B. Oakleaf)
FWS, BFF Recovery Coordinator, Laramie, WY (M. Lockhart)

LETTER 10

Faxed: Aug 30, 2004
2:08 p.m

Mr. Ramon A. Nation
Bureau of Indian Affairs
Wind River Agency
P. O. Box 158
Fort Washakie, WY 82514

August 30, 2004

RECEIVED
SEP - 1 2004
BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

Dear Mr. Nation:

On behalf of Bill and Lyda Garland, Steve and Nina Garland, other private property owners who own lands within the project area identified in this Draft Environmental Impact Statement (DEIS), and myself, I am submitting these brief comments to you pursuant to the abbreviated comment period that you have provided for the Wind River Gas Field Development Project DEIS. On July 19, after initially seeing the 1000+ pages of documentation in the DEIS and its technical support documents, I requested a 45-day extension of the comment period in order to honor the requests of the BIA and submit comments of substance rather than opinion. Although your letter of August 16 which denied the extension did follow the letter of the Council on Environmental Quality (CEQ) regulations as per Section 1501.8(b)(2), it certainly violated the spirit of the National Environmental Policy Act (NEPA) in that it completely discourages and, in fact prohibits, the general public from being a meaningful participant in the development and understanding of the EIS.

This document must also be revised in light of the August 26, 2004 Executive Order signed by President Bush in which it states, "Sec. 3. Federal Activities. To carry out the purpose of this order, the Secretaries of the Interior, Agriculture, Commerce and Defense and the Administrator of the Environmental Protection Agency shall, to the extent permitted by law and subject to the availability of appropriations and in coordination with each other as appropriate (ii) takes appropriate account of and respects the interests of persons with ownership or other legally recognized interests in land and other natural resources;...(see attached.)

The BIA sent CD-Rom discs of the DEIS to those members of the public who had participated in the scoping process 2 years ago as the document on which people were to comment. Many of these persons do not have the computer technology or capacity to read these CD-ROMs, and once they see the volumes of new information that the industry and the consultant have prepared, they are more intimidated than encouraged to write to you to seek a hard copy of the data. In addition, your advertising of the public meetings was rude at best and sneaky at worst. To publish the announcement of the public hearings in the small print legal section of the paper, and to not post announcements in the local post offices, public buildings or paid advertisements in the regular sections of the newspaper, is a blatant effort to, again, meet the basic legal requirements of the law and purposefully avoid the spirit of public input.

The DEIS is a product of 20 months of effort by several industry-paid scientists, air quality specialists, legal experts and industry personnel familiar with the oil and gas industry, technologies and procedures. Complicated scientific models are utilized in the

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document, particularly regarding air quality, which are used to forecast future impacts. Given this data is more complicated than the average citizen can be expected to understand, your process places the onus on these citizens to hire experts of their own review and analyze these model inputs and derive their own conclusions. 45 days is simply an inadequate period of time to expect the general public to find experts, enter into contracts to hire them for review, and assume these busy individuals can turn their immediate attention to perform the critical analysis.

Given there have been no working groups involving the public during the development of this DEIS, nor has there been any communication with members of the public other than a small group of understaffed and overworked cooperating agencies, it appears a purposeful move on the part of the Bureau of Indian Affairs to limit significant and constructive public comment to improve the final EIS. Nothing in the DEIS indicates a sense of urgency for the proposed federal action, and given it will admittedly impact private property owners and that farming community for decades to come, the BIA has not made the case for why an additional 45-days of comment period cannot be granted.

We request that you eliminate in the FEIS the reference to landowners in your list in 6-3 of "NEPA Team members". As I stated during my public comments, to be a member of a team, landowners should be consulted as much as you have consulted the oil and gas industry during the development of this document. Since that has clearly not happened, in the name of honest disclosure, it should not be insinuated as such to the public.

Given the limitations that you have therefore placed on me and other interested members of the community in providing substantive comments, we are left simply to outline our areas of concern and ask that the BIA do all of the necessary analysis to ensure the FEIS is in fact complete, comprehensive, and complies not only with the spirit of NEPA, but also meets all of NEPA's legal requirements for a hard look at the impacts, full public disclosure, meaningful public involvement, and a full assessment of mitigation requirements.

On behalf of the Garland family, affected landowners in the proposed oil and gas field, and on behalf of myself, a member of the public at large who is concerned about the long-term environmental quality of this area, I respectfully request that the BIA perform the following tasks and analysis and include the results in the FEIS:

Bureau of Reclamation and Midvale Irrigation District:
It is important to include a legal review from the Bureau of Reclamation regarding the ability of the BIA to promote mineral development at the acknowledged expense of the agricultural values that the BuRec has a legal and political obligation to promote and protect. Given the DEIS concludes that there will be "moderate and long term impacts to agricultural lands and residential properties, visual impacts (alteration of landscape

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LETTER 10 continued

charter, reduction in scenic quality), split estate conflicts, change in rural character and increased traffic and maintenance demand on county roads", it is imperative that the public be provided with the comments of the BuRec regarding these impacts on their ability to continue to fulfill their federal mission and thoughtfully expend the tens of millions of federal dollars that are allocated through that agency to promote rural life.

This DEIS is also lacking in adequately describing in its baseline data the affected environment of irrigators, agricultural producers, etc. including soils, water supplies, water impacts, soil erosion, vegetation impacts, etc. and is also lacking in describing the environmental and socioeconomic impacts to irrigators, farmers and ranchers.

It is also important to include the legal opinion from both the Bureau of Reclamation and the Midvale Irrigation District regarding the acknowledged impacts on water quality and ability to continue to effectively irrigate these agricultural fields. Since the landowners have a decades-long relationship with both the Bureau and the Irrigation District as allies in promoting successful irrigated farm lands in these areas, it is important to know how these agencies will be able to continue work with the impacted landowners to fulfill their federal mandates. It is one thing for the BIA to recognize – and accept -- the adverse impact of oil and gas drilling operations on private landowners; it is another entirely to jeopardize the mission and responsibilities of other federal and local entities in pursuit of 300 wells. We would like to see the comments of these agencies, including their plans for continuing to fulfill their obligations to the public in the face of this proposed action.

2 con't

Socio-economic cost/benefit analysis:
This DEIS continues the trend of the federal government to pay as little attention to the socio-economic analysis as is legally required. In this case, this approach is unacceptable. The proposed action of the federal government to enable a private oil and gas entity to maximize its revenues at the expense of private landowners is deemed, in the DEIS, as acceptable. In fact, after acknowledging the moderate and long-term adverse impacts to agricultural lands and residential properties (which are primarily private property), the DEIS goes on to conclude that when weighed against the long-term beneficial impacts of regional economic output, employment, etc., "overall cumulative effects are expected to be minor, with the exception of the beneficial economic effects."

We respectfully request that the BIA and its cooperating agencies prepare a comprehensive economic cost-benefit analysis to support this conclusion. We would like this analysis to show which jobs are being created, how long they will last, what they pay per hour, if these workers pay local property taxes, and where the workers are registered to vote. We would then like the analysis to show the jobs in agriculture that are predicted to be replaced, how long they will be replaced, how much these workers pay in property taxes and where these workers are registered to vote. We would also like a qualitative analysis showing the difference in type of worker: transient and renter vs. property owner and long-term investor in the community. In addition, we request that this analysis also include the decreased property values and a qualitative discussion of the change in cultural and community character caused by this development. As we both know, it is perfectly legal for you under NEPA to reveal the adverse consequences and still select them in pursuit of a federal agenda. However, in the case of this DEIS, you have not adequately revealed and explained the adverse consequences of this socio-economic shift to the public and you are obligated to do that.

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Air Quality:
I am aware of the pending litigation between the Environmental Defense and the Bureau of Land Management regarding BLM's insufficient air quality modeling on the Powder River Basin EIS and its lack of adequacy regarding cumulative impacts. Since I was not able to thoroughly review your air quality modeling, I respectfully request that you include some verbiage in the FEIS explaining if the AQ modeling in fact was done on a cumulative basis on impacts for the state of Wyoming and if it analyzes the incremental consumption related to air quality, or if you limited the analysis to your development area alone. If you did the later, of course, there will be insufficiencies to that analysis and I would predict the same legal approach as has occurred in the Powder River Basin.

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Landowner Alternative:
During my spoken comments during one of the public meetings, I offered to prepare a landowners alternative for your consideration. The lack of sufficient time during the comment period prohibits me from being able to do that – so I will formally request that of you. The three alternatives that are analyzed are alternatives developed and put forth by the oil and gas industry, based on their resource data and need to fully develop that mineral resource. The landowner alternative should be prepared with communication with the landowners which is nothing more or less than the access and communication you provided to the industry when developing the existing alternatives. Pursuant to the August 26 Executive Order, this landowner alternative should include an acknowledgement of their private property rights and how they intend to maximize the returns on their surface resources over the next 20-40 years. This alternative should include options for full-field development beyond what the industry volunteered on behalf of landowners in pages 2.1-7,8, and instead include suggestions from the landowners for voluntary requirements of the industry such as no drilling in hay meadows (and instead limit access to these reserves to directional drilling from upland locations which is completely available and technologically feasible), centralized facilities to minimize traffic, computerized well monitoring to also minimize traffic, and piping of condensate and waste water rather than trucking. This alternative should include a cost analysis of these best management practices, so that the public understands what the investments would be by the industry to more accommodate and lessen its operations' impacts on the community.

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We respectfully request that this FEIS include a full disclosure of the BLM's new guidance memo on Best Management Practices at the APD stage, and a discussion of if BMPs are being utilized by the operators in this field, and if not, why not. We would also request that the BIA include a discussion of the new guidance regarding additional bonds that the BLM has the authority to require, for surface damages, and if in fact it is the intention of the BLM and the BIA to impose such bonds during the development of this field.

LETTER 10 continued

Although these suggestions may not be legally enforceable, as you well know, NEPA does not require such. NEPA requires the federal agency to reveal to the public what would be the outcomes of certain actions, and then they leave the decision-makers to make the final decision. The DEIS does not provide sufficient information to the public or the decision-makers to make a fair and comprehensive choice, and is therefore insufficient.

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Well density:
Section 2.8.5 is grossly insufficient in the presentation of data to the public. Although the Wyoming Oil and Gas Commission may well have established bottom-hole spacing at 20 acres (and has the legal ability to go down as low as 5-10 acres in the future), there is no requirement that this bottom-hole spacing must dictate the spacing of wells on the surface. In addition, there is no requirement that the BLM/BIA must accept every decision of the WOGCC. This DEIS must show to the public the authorities of the BLM/BIA to minimize impacts to the surface, and must show the differences between down hole and surface spacing, as well as a thorough presentation of the technical and economic feasibility of directional drilling, as a credible option to minimize surface impacts. This DEIS attempts to mislead the public to believe that there is a legal barrier to meeting the public's request for surface spacing to be limited to 1 well/40 acres, and there is no legal or technological barrier. It is simply a matter of cost for the oil industry and you are required by NEPA to disclose that to the public. I would also request that you do an analysis in the FEIS that shows an alternative of developing this field on 1/40 acre surface spacing units, and how the surface impacts and impacts to landowners are accordingly reduced and the commensurate cost to the industry.

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Surface Impacts:
This DEIS is also grossly misleading in its conclusions that the surface disturbance is calculated by adding up all of the acreage disturbed by well pads, operations and roads. The DEIS concludes and presents to the public this foot-print disturbance is a small percentage of the area. This issue has been battled and won in many other areas and courts of jurisdiction and the truth that needs to be revealed in a NEPA document is the total amount of altered landscape and current use of an area. Just because a well pad does not lie directly on top of a sage grouse lek, does not mean that that well does not have an impact on that lek. Again, we recognize the right of the BIA to make a final decision in its best judgment, but you must accurately reveal the impacts to the public prior to making that decision, and you have not done that in your analysis of affected lands.

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Scope of analysis:
As I stated in my public comments, it is not clear from the document if this analysis simply presents the impacts of the proposed 325 well locations, or if it includes the more accurate accounting of the impacts of these wells in addition to the pre-existing 178 wells that have been drilled with insufficient NEPA analysis. If this FEIS does not include all of the impacts from all of the wells that have been drilled, it not only misleads the public,

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but it also establishes a twisted incentive to the oil and gas industry to drill as many wells as they can absent sufficient NEPA analysis, because they will not be held accountable for those impacts. I would like this clarified in the FEIS, and if the impacts from the 178 wells are not included, I respectfully request that you do that.

In addition, 40 CFR 1508.7 requires that Environmental Impact Statements reveal to the public "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 (federal or non-federal.) So it is required of the BIA to identify in this document what other activities are proposed in the area, by other federal agencies, state or private individuals, including subdivisions, and how these actions, when combined with the proposed oil and gas development, might impact the environment. Again, it is incumbent upon the BIA to show to the public the full range of what is happening – and what is proposed to happen – in this project area, so that they can accurately assess the impacts of the proposed action. This DEIS presents information as if this oil and gas drilling project is the only development in the area, and that is not the case.

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Reclamation:
Given the testimony of Dr. Douglas Dollhopf, it appears that this DEIS is grossly insufficient in failing to present in Chapter 3, the Affected Environment, the full range of existing hazardous materials buried on private lands and their potential impacts to the water and productivity of the soils. Regardless of who drilled the original wells or which agency will eventually be responsible for its clean-up, it is legally required by NEPA that this EIS reveal the extent of the waste along with proposed mitigation measures for how it will be handled. Landowners with reclaimed and producing wells on their property have the right to know what has actually been buried on those lands and what the current risks are from that contaminant. We request the following:

1. A complete inventory of reclaimed wells in the project area and actual test results from each of these sites indicating the level of hazardous materials in the soils.
2. A more accurate accounting of the salt content that exists on these reclaimed sites which will better indicate to the public which sites can ultimately be reclaimed under current circumstances, and which sites will need additional reclamation work.
3. Map locations of the trenches that were legally or illegally dug from every wellhead in the project area to the reserve pits or the "informal" discharge pits that were apparently used by some operators. The EIS must also include soil samples from each of these pits in order to provide the information to the public, including the Indian Tribes, as to what is on their lands.
4. Mitigation procedures, as proposed by the operators and approved by the Department of Environmental Quality and the Environmental Protection Agency, so that the public has a clear understanding of what they are entitled to on their lands and what they should expect from the operators.

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LETTER 10 continued

Thank you for this opportunity to present my comments and requests to you to ensure that the FEIS meets not only the legal requirements, but also the spirit of the NEPA law. Our landowners and public deserve nothing less.

Sincerely,

Laurie D. Goodman

Laurie D. Goodman, individually and for Bill and Lyda Garland, Steve and Nina Garland and other private property owners in the affected project area
3355 Ten Sleep Drive #5
Jackson, WY 83001

For Immediate Release
Office of the Press Secretary
August 26, 2004

Executive Order Facilitation of Cooperative Conservation

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1. Purpose. The purpose of this order is to ensure that the Departments of the Interior, Agriculture, Commerce, and Defense and the Environmental Protection Agency implement laws relating to the environment and natural resources in a manner that promotes cooperative conservation, with an emphasis on appropriate inclusion of local participation in Federal decisionmaking, in accordance with their respective agency missions, policies, and regulations.

Sec. 2. Definition. As used in this order, the term "cooperative conservation" means actions that relate to use, enhancement, and enjoyment of natural resources, protection of the environment, or both, and that involve collaborative activity among Federal, State, local, and tribal governments, private for-profit and nonprofit institutions, other nongovernmental entities and individuals.

Sec. 3. Federal Activities. To carry out the purpose of this order, the Secretaries of the Interior, Agriculture, Commerce, and Defense and the Administrator of the Environmental Protection Agency shall, to the extent permitted by law and subject to the availability of appropriations and in coordination with each other as appropriate:

(a) carry out the programs, projects, and activities of the agency that they respectively head that implement laws relating to the environment and natural resources in a manner that:

(i) facilitates cooperative conservation;

(ii) takes appropriate account of and respects the interests of persons with ownership or other legally recognized interests in land and other natural resources;

LETTER 10 continued

(iii) properly accommodates local participation in Federal decisionmaking; and

(iv) provides that the programs, projects, and activities are consistent with protecting public health and safety;

(b) report annually to the Chairman of the Council on Environmental Quality on actions taken to implement this order; and

(c) provide funding to the Office of Environmental Quality Management Fund (42 U.S.C. 4375) for the Conference for which section 4 of this order provides.

Sec. 4. White House Conference on Cooperative Conservation. The Chairman of the Council on Environmental Quality shall, to the extent permitted by law and subject to the availability of appropriations:

(a) convene not later than 1 year after the date of this order, and thereafter at such times as the Chairman deems appropriate, a White House Conference on Cooperative Conservation (Conference) to facilitate the exchange of information and advice relating to (i) cooperative conservation and (ii) means for achievement of the purpose of this order; and

(b) ensure that the Conference obtains information in a manner that seeks from Conference participants their individual advice and does not involve collective judgment or consensus advice or deliberation.

Sec. 5. General Provision. This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, instrumentalities or entities, its officers, employees or agents, or any other person.

GEORGE W. BUSH

THE WHITE HOUSE,

August 26, 2004.

LETTER 11

IPAMS
Independent Petroleum Association of Mountain States

620 Denver Club Building ◆ 518 17th Street ◆ Denver, Colorado 80202-4167 ◆ 303/623-0987 ◆ FAX: 303/893-0709 ◆ www.ipams.org

August 30, 2004

RECEIVED
SEP - 1 2004
BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

Bureau of Indian Affairs
Wind River Agency
1st and Washakie
Fort Washakie, WY 82514

Re: Draft Environmental Impact Statement for the Wind River Natural Gas Field Development Project.

To Whom It May Concern:

Please accept the following comments on the Draft Environmental Impact Statement for the Wind River Natural Gas Field Development Project.

The Independent Petroleum Association of Mountain States ("IPAMS") is pleased to submit the following comments in support of the Wind River Natural Gas EIS. IPAMS is a regional trade association representing hundreds of independent oil and natural gas producers in the Intermountain West.

General Statements

IPAMS is pleased to comment on the Wind River Natural Gas EIS. IPAMS supports the Proposed Action with the following comments. While we feel the document is well done a couple of issues need further clarifications. Tom Brown, Inc. was clear in the proposed action that pace of development will be controlled by factors such as commodity price and rig availability. While I believe the proposed action does not dictate pace it is not clearly outlined that it does not. The socioeconomics clearly show that any attempt to limit pace will cost the tribe revenue and will leave reserves in the ground that would otherwise be recovered.

Was a mandated pace of development the intent or is this an "assumed pace" to be used in the various levels of analysis? If this is a mandated pace of development, what justification was used in arriving at the particular level of activity? The pace of development should be left to the operator, taking into account such external factors as pipeline capacity, commodity prices, capital requirements, rig/service availability, etc.

Considering present value economic analysis, a slower pace of development not only impacts the return on investment for the operator, but also negatively

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LETTER 11 continued

impacts the financial benefits to the royalty and surface owners, the government, and all other parties identified to share in the socioeconomic benefits of this proposed development.

In addition, many surface owners might prefer to have all development activities and the associated disturbances confined to a shorter timeframe, rather than being drug out over 10 years.

Paragraph 2, Page 2-74
Tribal minerals within the WRPA are held in trust for the Tribes by the Department of the Interior (DOI). Under the 1916 Act, the IMLA, and the IMDA, the DOI has a fiduciary responsibility to assure that the Tribes receive the maximum economic benefit from the minerals on their lands. The reduction in both the absolute ands present value revenue associated with LOP alternatives would clearly be contrary to this obligation. Please clarify in the Proposed Action that pace is not limited.

The document in several places refers to no activity with 1000' of a water body, this requirement is confusing. Midvale irrigation and TBI have an agreement to not drill within 500' of Midvale's main irrigation canal, and within 500' of Five Mile Creek. We do not believe there is any other regulatory authority to restrict drilling near any other water body. Please correct this in the document.

Selection and Analysis of Alternatives

Generally, the agency has made a good effort to analyze a full range of alternatives to the Proposed Action. Alternative A does a good job of analyzing the impacts of a scenario which is clearly possible for the reasonable and foreseeable future, where the natural gas price trend could result in higher levels which would make currently marginal gas resources economic.

Alternative B is intuitively understandable, as an environmental protection alternative, but as one studies it there appears to be little relevance or significance to many of the concerns raised during scoping. Table ES-1, which summarizes Impact Determinations for the Alternatives, compares the magnitude and duration of each described impact from each alternative. There are 106 categories of described categories. For comparison purposes, Alternative B and the Proposed Action only differ in 8 of the categories. For the 98 additional wells in the Proposed Action and the development timeline there are very few significant differences in impacts between the two alternatives.

Actually, if you go back to the concerns raised in scoping, e.g., wildlife, T&E, all of the impact categories, except one, are identical for the Proposed Action, Alternative A and B. Ostensibly there is little difference in the impacts of Alternative A and the Proposed Action.

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Finally, it appears the Alternative B, as stated is a "phased development" scenario focusing upon well numbers, surface disturbance acreage and pace of development; Phased development and pace of development often come up on these EIS documents. While it may be intuitive that controlling pace and phases yields protection and benefits, it is usually clear, when rigorous analysis is applied to the details, that such a desire to control development is arbitrary. If one reads Chapter 4.13.6 Impacts Summary carefully it is obvious that the economic benefits of the Proposed Action, and Alternative A overwhelm those of B and C. Meanwhile, it appears that the environmental impacts of the Proposed Action are negligible compared to Alternative B. Additionally, Alternative B represents gas resources which will probably be left in the ground, which is waste. Perhaps Alternative B must remain in the document as a stated alternative, but it would be arbitrary to consider it as viable for Record of Decision.

5

"Changing the Character of the Lands" and "Split Estate Impacts"

Perhaps the single most interesting media issue in Wyoming surrounding resources today is that of the so-called split estate. The surface and mineral estate have been joined geographically long before Wyoming became a state and the resources have been managed as a partnership for over 100 years. Such a positive nature between the two estates continues on every day, in every energy/food-producing basin in the state. However, that is not news, and does not create excitement. This document should be careful to not emphasize inherent "conflicts" of "split estate" issues. The BIA has very limited control over fee lands in the project area, and no jurisdiction over surface settlements with private property owners and private companies. Furthermore, the court system in this nation has proven an adequate avenue for dealing with private disputes regarding damages to the surface.

For this project the issue of impact upon the surface needs consideration, as any other project, but it does not deserve attention that goes beyond federal control. Oil and gas is a temporary use of the surface, i.e., the Life of Project for this is at a maximum of 40 years. Sometime, before the middle of this century this project will have exhausted the gas and the surface will be completely reclaimed to the agricultural and dry land character of today. The character will temporarily change.

Consider the same agricultural land today. It really is a permanent use of the land, once having been non-commercial habitat for Native Americans and wildlife. It will never be reclaimed to its original state, as such. The surface used for gas extraction can be returned to its current agricultural character, with no deleterious long term damage to the surrounding resource values.

While no one would deny that impact to the surface will occur, it should be emphasized that "voluntary mitigation actions" as listed in Chapter 2.3 have been implemented and will continue as the operators develop the field. Such mitigation actions reduce the impacts and accelerate the reclamation of the land to its agricultural character. This has been the practice of the partnership, and will continue that way in most of the reasonable cases.

6

LETTER 11 continued

Based upon a careful reading of this document it is clear that the Proposed Action provides the most prudent method of extracting the natural gas resource while balancing and mitigating the other community resource values. This letter supports the adoption of the Proposed Action by the BIA in the Record of Decision.

Below are line by line specific recommendations to the Wind River Gas Field Development Project.

EXECUTIVE SUMMARY:

ii Proposed Action – 325 New Gas Wells: Greka operates in W/2 Sec 4, Saba Energy is shown as operator of record. 7

iii Alternative A – 485 New Gas Wells: Clarify that interim development is allowed prior to the ROD. 8

iv Alternative B – 233 New Gas Wells: Clarify that interim development is allowed prior to the ROD. 9

vi Alternative C – No Action: Correct 2nd line to read … **a** "Communitization Agreements"… 10

vii Geology/Mineral Resource/Paleontology: Correct second sentence to last paragraph to …would be minor **and in the** short or long term… 11

xv Strike "hydrogen sulfide leaks" None have ever been encountered within EIS area, nor will zones capable of H2S production ever be drilled. 12

xix Wildlife: Correct 2nd sentence to …the amount of development… 13

Socioeconomics:
xx Correct 1st sentence regarding the casino to …construction in the spring summer of 2004.

xxi Correct reference to 8x8 feet to reflect "Pavillion irrigated lands". Include references to larger pad in Muddy Ridge or for wells drilled below a certain depth? 14

Please note that the operator committed mitigation for the 8' X 8' locations is only for the Pavillion Area.
Abbreviations, Add:

FONSI
HP
NO2
NOx
PM2.5
PM10
SO2
SOx 15

15 con't

PM2.5
PM10
SO2
SOx

Executive Summary, Page ix, Paragraph 3: *"Impacts to groundwater from implementation of either the Proposed Action or alternatives could result in decrease in water levels, change in water quality and change in hydraulic properties. These impacts would be negligible under all alternatives."* 16

Groundwater is isolated by casing and cement therefore groundwater would be un-impacted.

Executive Summary, Page xv, Paragraph 2: *"Formation of a transportation planning committee would allow annual identification of intended transportation routes, proactive maintenance of affected roads and bridges and identification of alternative routes to avoid roads and bridges in poor condition."* 17

What agency would maintain jurisdiction for this transportation planning committee. Funding source?

Chapter 2 – Proposed Action and Alternatives

2.3 Proposed Action:
1st Sentence: Greka operates in W/2 Sec 4, Saba Energy is shown as operator of record.
3rd Paragraph: Clarify that interim development is allowed prior to the ROD. 18

Reserve pits on agriculture ground are referenced twice in this section. TBI under operator committed mitigation have agreed to closed mud systems during drilling. These references should be removed 19

Table 2-4:
Provides phased drilling limited to the annual well count per field.
Intended to vary by field up to annual well count for all fields.
This does not account for "the remainder" of the WRPA not identified as a field.
An annual well count for the WRPA does not appear to be well established. 20

LETTER 11 continued

1st Bullet Point: Correct to On irrigated agricultural land...
4th Bullet Point:
"Fill material, purchased from the landowner..." appears too limiting. Subsequent reference is made to securing fill material from the landowner or elsewhere. 21

No mention of "removing and replacing topsoil" 22

2.4 Alternative A: Clarify that interim development is allowed prior to the ROD. 23

Table 2-5:
Provides phased drilling limited to the annual well count per field.
Intended to vary by field up to annual well count for all fields.
This does not account for "the remainder" of the WRPA not identified as a field.
An annual well count for the WRPA does not appear to be well established. 24

2.5 Alternative B: Clarify that interim development is allowed prior to the ROD. 25

Table 2-6:
Is this phased drilling limited to the annual well count per field?
Intended to vary by field up to annual well count for all fields?
This does not account for "the remainder" of the WRPA not identified as a field.
An annual well count does not appear to be well established. 26

2.6 Alternative C: Correct the 1st sentence of the 2nd paragraph to "The No Action Alternative would allow wells to be developed on fee minerals (through individual APDs on a case-by-case basis, and on tribal minerals to offset potential drainage of adjacent fee tribal minerals. 27

Table 2-7:
Provides phased drilling limited to the annual well count per field. 28

2.7.1 Preconstruction Planning: Regarding the last bullet point, is a project-specific EA required if we have an EIS? 29

2.7.2.1 Access Road Construction:
Strike the 4th sentence of the 2nd paragraph or correct to "Roads located on private lands/tribal minerals would be constructed in accordance with the standards imposed by for the private lands landowner. 30

Does the road width reference in the 3rd paragraph refer only to "post construction" disturbance? 31

The 5th paragraph refers to the "Plan of Development (POD)". Is a POD applicable or should this reference be stricken? 32

2.7.2.2 Well Pad Design and Construction: To avoid limitation by reference should the last sentence of the 1st paragraph be corrected to "Drilling activity under the Proposed Action is planned in to include, but not be limited to, the Wind River, Fort Union, Lance Meeteetse, Mesaverde, and Cody formations."? 33

2.7.2.3 Drilling Operations:
To avoid limitation by reference should the 1st sentence of the 3rd paragraph be corrected to "...in the WRPA are will include, but not be limited to, the Wind River, Fort Union, Lance, Meeteetse, Mesaverde, and Cody Formations."? 34

The 4th paragraph addresses produced water used in drilling operations. Do we need to address how we acquire surface/subsurface water for drilling operations? 35

Service Trailers also use the BLM/NIA approved envirotech system when not self contained. This should be included in the document. 36

2.7.2.11 Site Restoration and Abandonment:
Correct the 3rd sentence of the 3rd paragraph beginning with Figure 2-12 to read "...reclaimed to 8x8 feet, unless a larger pad is requested by the landowner specified otherwise." 37

Do we need to adopt a different size for Muddy Ridge locations in irrigated fields or for wells drilled/completed below a certain depth? 38

2.8.1 Project-Wide Mitigation Measures: Strike the 1st sentence of the 2nd paragraph or correct to "……..applied on privately owned surface/tribal minerals, unless otherwise…….? 39

2.8.1.1 Pre-construction Planning and Design Measures: Correct the 2nd bullet to strike "or private" or correct to "...unless the surface owner, whether BIA, BOR, or private surface/tribal minerals, landowners whichever is applicable, specifies y otherwise." 40

2.8.2.1 Geological and Mineral Resources: Strike the 2nd and 3rd sentences of the 2nd bullet point or correct the 2nd sentence to "...On fee surface lands overlying tribal minerals these activities...." 41

2.8.2.3 Soils: Correct the 6th bullet point to "...for construction of well pads and wellsites facilities. 42

2.9.3 Phased Development of Wells: Correct to reflect a limitation to the number of wells drilled annually in the WRPA. Correct Table 2-16 accordingly. 43

2.9.4 Natural Resource Protection:
Strike the last sentence of the 1st paragraph or correct to "....on private surface/tribal minerals are established with the individual landowner surface owner." 44

2nd bullet: Should reference be to "irrigated" ag land and 8x8 to Pavillion with a larger 45

LETTER 11 continued

pad for MR or wells completed below a specified depth?

3rd bullet: strike ", purchased from the landowner,". Add language regarding a barrier between field and fill material? 46

2.8.5 Forty-Acre Spacing
Insert 2.9.5 in lieu of 2.8.5. 47

Last paragraph refers to CFR applicable to federal lands. Add similar reference to State of Wyoming Regulations for patented lands? 48

Chapter 3 – Affected Environment

Table 3.5-17 Hydrogeologic Description: Correct the 3rd column heading to Stratigraphic. 49

Figure 3.6-1 Primary Land Cover Types: The depiction of irrigated crops appears overstated in the WRPA. 50

Figure 3.10-2 Hunting Areas: The legend for WY Game & Fish hunting areas should be qualified to include "Hunting on tribal lands is restricted to tribal members." 51

Figure 3.10-3 Waterfowl Hunting Areas: The legend for WY Game & Fish hunting areas should be qualified to include "Hunting on tribal lands is restricted to tribal members." 52

3.13.5.1 Population, Demographics: Include "Ethete is the headquarters of the Northern Arapaho tribal government" in the paragraph preceding Table 3.13.7. 53

There is no table summarizing the amount of taxes, including Tribal Tax or Wyoming Severance Tax, paid on oil and gas until Tables 4.13-8 and 4.13-9. 54

Chapter 4 – Analysis of Environmental Consequences

4.13 Socioeconomics: Change the page headers to reflect ANALYSIS OF ENVIRONMENTAL CONSEQUENCES in lieu of Affected Environment 55

4.13.1.1 Assumptions
The second paragraph under the Pavillion Field section and Figure 4.13-5 should be altered to delete reference to phased drilling. 56

The section on the Muddy Ridge Field and Figure 4.13-6 should be altered to delete reference to phased drilling. 57

The section on the Sand Mesa Field and Figure 4.13-7 should be altered to delete reference to phased drilling. 58

The section on the Sand Mesa South Field and Figure 4.13-8 should be altered to delete reference to phased drilling. 59

The section on the Coastal Extension Field and Figure 4.13-9 should be altered to delete reference to phased drilling. 60

4.13.2.2 Direct Economic Stimulus: Clarify that the phased drilling analogy is used as an assumption throughout this section. 61

Tables 4.13-8, -9, -10 and Figure 4.13-14: Should the reference to the Wyoming Oil & Gas Conservation Commission be changed to the State of Wyoming? 62

4.13.2.9 Split Estate Issues:
The next to last sentence to the paragraph following Figure 4.13-17 refers to well pad reclamation of 64 square feet. Alter if sizes are different between Pavillion and wells completed below a specified depth (Muddy Ridge). 63

The second paragraph following Figure 4.13-17 refers to 116 private parcels in the Pavillion Field. This number seems high if you account for multiple surface owned by a single party. 64

4.13.2.10 Gas Development Agricultural Productivity…: This section addresses reclamation based upon the Pavillion model only. 65

4.13.2.11 Resource Extraction…: The first paragraph refers to phased drilling. 66

4.13.3 Alternative A: Ditto 4.13 remarks. 67

4.13.4 Alternative B: Ditto 4.13 remarks. 68

4.13.5 Alternative C: Ditto 4.13 remarks. 69

Table 4.13-41 Cumulative Tax….: Should the reference to the Wyoming Oil and Gas Commission by changed to the State of Wyoming? 70

4.13.7 Additional Mitigation Measures: The 3rd bullet refers to 8x8 well pad only. 71

4.13.8 Residual Impacts: Correct the punctuation at the end of the 1st sentence. 72

4.14.2.1 Development Phase Impacts:
Correct 1st sentence to …it is assumed likely that one rig would drill continuously in each….. 73

The 1st sentence under the section on Sand Mesa and Sand Mesa South fields should be corrected to …Proposed Action, drilling could would occur at the rate of……. 74

LETTER 11 continued

The 1st sentence under the section Pavillion Field should be corrected to ...development phase traffic to the Pavillion field (assuming from 10 to 18 wells/year…….. 75

The 1st sentence under the section Muddy Ridge Field should be corrected to ...the Muddy Ridge field (assuming 12 wells/year for 4 years……. 76

The 1st sentence under the section Coastal Extension Field should be corrected to ...the Coastal Extension field (assuming one well/year for 8 years……. 77

Chapter 5 – Cumulative Impact Analysis

5.2.8 Past Environmental Assessments……..: Necessary to include any EA conducted for any of the incremental 3D activity or by Snyder Oil Corporation on the Alkali Butte Oil/Gas Lease Option? 78

5.3.12.2 Reasonably Foreseeable Future Activities…….: Correct the second sentence regarding the casino to …..fall spring of 2004. 79

5.3.12.4 Past, Present and…….: The 4th paragraph refers to a reclaimed well pad of 8x8 only. 80

Chapter 6 – Consultation and Coordination

No Comments

Appendix B

Correct the cover page to read GUIDELINES 81

Appendix B

Table C-1: Update with regard to size of Wellpad/ Production Facility? 82

Again IPAMS is happy to provide this comment to the document al look forward to a timely review for inclusions into the FEIS and ROD. If you have any question or if IPAMS can provide further assistance please contact us.

Respectfully Submitted,

Andrew A. Bremner, Esq.
IPAMS

LETTER 12

United States Department of the Interior

FISH AND WILDLIFE SERVICE
170 N. First Street
Lander, Wyoming 82520
(307) 332-2159

RECEIVED
AUG 3 0 2004
BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

August 25, 2004

Ray Nation
BIA-Wind River Agency
P.O. Box 158
Ft. Washakie, WY 82514

Dear Ray,

The following are our comments pertaining to the Wind River Gas Field Development Draft EIS. Our comments are specific to the Tribal surface-owned lands. We defer to the Wyoming Game and Fish on private and BOR lands and to the Cheyenne ES office on T&E species. First of all, the DEIS is very thorough, comprehensive and well put-together. As a result, our comments are brief.

The Wildlife Monitoring Plan is a good idea. It's not totally clear who will be responsible for the monitoring; however, it appears that the USFWS and Wyoming Game and Fish Department are tagged with the task. As you know, staff and budget shortfalls make monitoring a difficult thing to do. We recommend that funding be provided by Tom Brown, Inc. to offset costs incurred from monitoring activities as laid out in the plan. I am willing to participate in the annual Review Team. Please keep this office informed as to meeting times and place. 1

We recommend that the Tribal-owned surface within the Coastal Extension area be exempted from drilling. A number of reasons for this recommendation include: this area contains the most intact native habitat of the 5 Potential Development Areas that contain tribal lands and is relatively fragmented-free; this area does not contain any active oil or gas development; and, the low likelihood of successful wells. The DEIS indicates that 8 wells would be targeted for drilling under the Proposed Action and that only 20% would be successful in hitting gas. With those odds and the fragmentation of habitat that would result, we highly recommend that no drilling occur in this area. 2

Finally, to minimize wildlife habitat loss and fragmentation, we highly recommend that multiple wells be placed on a well pad where feasible. Thank you for the opportunity to provide input. 3

Pat Hnilicka
Wildlife Biologist
Fish and Wildlife Management Assistance

cc: Dave Skates

LETTER 13

Friday, August 27, 2004

RECEIVED
AUG 3 0 2004
BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

United Stated Department of the Interior
Bureau of Indian Affairs
Wind River Agency
P.O. Box 158
Fort Washakie, WY 82514

Dear Sir or Madam:

As surface owner of T3N R2E of Section 14, I am responding to the Draft Environmental Impact Statement on the proposed Wind River Natural Gas Field Development Project. Please note my comments and concerns, which I authorize to be published with my name and address.

If drilling for coal bed methane is intended on this property, when will I see a proposed surface owner's agreement? When will drilling commence? How will the wastewater be managed? How will I be compensated for access and for surface damage? How will reclamation of the site be handled? 1

I purchased this property intending to make it my home. I do not want to see it eventually seized under the eminent domain process. Additionally, very little additional mineral development will compromise its livability and destroy my desire to live on it. Therefore, I ask what are the likely and the highest possible well density index numbers for this property? 2

On this property, there is already a gas well and its accompanying rusty corrugated tin shack. This building is an eyesore that diminishes both the monetary and aesthetic value of my property. Should there be a need to erect additional structures on this property, I insist upon reviewing and approving the building plans in advance. 3

I request that you place my name on the mailing list, as I wish to be notified as soon as the Environmental Impact Statement for this project is complete. Please be aware, I intend to be involved with every facet of this operation should drilling on my property be intended.

Sincerely,

Henry M. Stoll

TRANSCRIPT 1

BUREAU OF INDIAN AFFAIRS
WIND RIVER AGENCY
FORT WASHAKIE, WYOMING

WIND RIVER GAS FIELD DEVELOPMENT DRAFT EIS
Public Meeting
August 10, 2004
7:15 p.m.
Pavillion, Wyoming

TRANSCRIPT OF PROCEEDINGS

A P P E A R A N C E S

BUREAU OF INDIAN AFFAIRS: Ray Nation

COOPERATING AGENCIES:

BUREAU OF LAND MANAGEMENT: Stuart Cerovski
FREMONT COUNTY COMMISSIONERS: Pat Hickerson
SHOSHONE AND ARAPAHO TRIBES
JOINT BUSINESS COUNCIL: Don Aragon
BUYS AND ASSOCIATES: Marion Fischel

(Whereupon the following proceedings were had:)

0001

NORTH ACRE REPORTING SERVICES
(307) 389-5776

P R O C E E D I N G S

MR. NATION: Let's go ahead and get started. It's about 7:15.

My name is Ray Nation. I'm the Environmental Coordinator for the Bureau of Indian Affairs. About two years ago, we had a public meeting to start this EIS process regarding the Wind River Natural Gas Development Project. Tonight, the purpose of the meeting is to receive oral comments from the public regarding the Draft Environmental Impact Statement for this project. That was sent out about two to three weeks ago. It was sent out in cd format and also in hard copy. We do have other copies available tonight for those of you that haven't received one yet.

Part of this -- this whole process, we had three cooperating agencies, one was the Shoshone-Arapahoe Tribes, the other was the Fremont County Commissioners, and the other was the Bureau of Land Management. We have representatives from their agencies here tonight, and I would like to just maybe make some introductions.

From the BLM, we have Stuart Cerovski. He's the petroleum engineer, and we also have Ed Womack. He's the

TRANSCRIPT 1 continued

Chief of Minerals.
From the Fremont County Commissioners, we have Pat Hickerson. If Pat will stand up here.
And also from the Shoshone-Arapahoe Tribes, we

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have Don Aragon. Don is the Executive Director for the Environmental Quality Program for the Tribes.
Stuart, if you would maybe, I guess, talk a little bit about your role as far as the Bureau -- for the BLM.
MR. CEROVSKI: Sure. Again, I'm Stuart Cerovski, petroleum engineer for the Lander field office, and bottom line is we manage the oil and gas operation -- operational aspects of the development on tribal or Indian lands. Our role within the -- for this EIS is -- is as cooperating agency with the BIA. BIA is the lead agency, direct document, and they involve agencies like the BLM to -- to assist them, provide them with the information that we may have, and some of the -- some of the information that we will provide to the -- for the benefit of the EIS is we need -- known gas reserves that are defined in this development area and verify any reasonable foreseeable development in the area based on spacing, density wells, recovery of the resources, et cetera. We have a group of reservoir engineers and geologists in Casper, reservoir management group that helped us out in that aspect.
We also -- since we deal with permitting of application of permits to drill on a regular basis, we deal with the various mitigation measures that can be on the ground during the time of on-site for construction. We are to provide information and expertise and comments on that.

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We also involved some people in our state office concerning air quality, socioeconomic development and environmental refuse. We didn't get too involved in the cultural aspect or the transportation aspect of this project as defined in our agreement with the BIA.
So in essence, in a nutshell, we're going to come down and deal with BIA and provide them with any support they need in finishing this project. Once the project is complete, we will be dealing with the operators that are trying to permit or develop different Indian minerals in this project area.
I think that covers pretty much it all at this point. Do you have anything else, Ray?
MR. NATION: No. That's good. Thank you.
MR. CEROVSKI: Does anybody have any questions? Bill.
MR. GARLAND: Stuart, what kind of data did you collect on air samples and ground water samples --
(Whereupon the court reporter interjected with instructions on speaker identification and speaking up.)
MR. GARLAND: My name is Bill Garland.
Stuart, can you tell me what sampling was done or

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what data you based air quality and what ground water quality for this EIS.
MR. CEROVSKI: Okay.

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MR. GARLAND: I understood you to say BLM --
MR. CEROVSKI: Well, Buys and Associates actually developed a lot of the base-line data, and we have a -- an air quality specialist in our state office that reviewed that data for accuracy and validation of it, and that was our involvement on air quality. Because normally, we're not dealing with air quality, BLM does not, but --
MR. GARLAND: What about ground water?
MR. CEROVSKI: Ground water, that was -- ground water studies were done up there, or at least reported. As far as mitigation of those, the -- the casing and cementing programs, et cetera, were -- were supposed to be set deep enough, deeper than any of the existing water wells and adequately cemented for isolation, and that was part of the mitigation process in that.
MR. GARLAND: Are you aware of buried production pits.
MR. CEROVSKI: Buried production pits. Mr. Garland, that sounds like a -- a compliance or -- issue as opposed to something that would be involved in the EIS. At this point in time, I'm not -- I'm not sure how to answer that one. No, I'm not aware of any unfound buried pits.
MR. GARLAND: Thank you.
MR. NATION: Bill, some of the information you've been asking about is in the -- in Volume -- I think it's

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Volume 3 of the supporting documents of EIS as far as the water quality and the air quality data that was collected to make certain determinations in the EIS itself.
I would like to kind of make it clear, this meeting is more to receive oral comments regarding the Draft EIS, not for us to answer questions as far as some of your concerns. If you have some concerns, we do have a court reporter here that will go ahead and -- and document your concerns and your comments. After we receive all the comments and everything, we'll go ahead and analyze them and incorporate them into the final EIS, so if you could tonight, when you want to give a comment, will you state your name and who you work for, and then we can provide the recorder with a little bit better information as far as what she needs to do in order to record these comments for this Draft EIS.
Thanks.
MR. CEROVSKI: Thank you, Ray.
MR. NATION: Pat Hickerson, do you want to come up here for a sec.
MR. HICKERSON: I'm Pat Hickerson, Vice-Chairman of the County Commissioners. I'm kind of here filling in for Doug, so I'm not fully informed on everything that has

TRANSCRIPT 1 continued

went on at these meetings, but I will address a little bit of some of the County's concerns, I guess.

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The reason we decided to become a cooperator was because of the -- the effects this has on our infrastructure, our county economics, tax base, and those kinds of things. I think this project is important to Fremont County. It does -- you know, a huge part of our tax base is developed from oil and gas and minerals, so it's important in that way. It's also important for good-paying jobs for the citizens.

There's also, you know, I know issues with the private landowners and the -- and the minerals being owned by the federal government, and we're -- you know, as commissioners, at least this commissioner is concerned that we make sure that these folks get a fair shake, that their property rights are respected and those kinds of things.

So I guess that's our interest. We'll continue to -- to work through the process. I think we have some expertise in terms of the transportation system. We have the responsibility for maintaining the roads and -- and doing those kinds of things in this kind of a project that will definitely have an impact on -- on our roads department and transportation. There may be bridge issues and those kinds of things that I would expect would come up as -- as this project goes forward, so those kind of things are things that we will be involved with, I'm sure.

I guess that's about all, unless someone has some

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questions for me. I would be happy to try to answer them. However you want to do that.

Thanks, Ray.

MR. NATION: Thanks. Don Aragon.

MR. ARAGON: Like Ray said, I'm the Executive Director for the Wind River Environmental Quality Commission for the Shoshone and Arapahoe Tribes, and first of all, you know, I'm extremely pleased to see an environmental impact statement done on a project like this on the reservation. This is the first time that an environmental impact statement has been done, and I think that the value of an environmental impact statement is, number one, to protect the environment, but also, like the commissioner said, to protect human rights, human property, and I think that some of our concerns is human health and safety.

And what we want to do is make sure that these things are done in a manner that we can look back on in the future and say that, you know, we understood what the environmental questions were, what the environmental concerns were, and that the people's property rights and human rights were just as valuable as protecting the environment, and I think that from the Tribes' perspectives in developing their mineral rights, this is one of the things that we want to make sure that, you know, it's done

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in a manner following the NEPA process, which is the National Environmental Policy Act, so that it doesn't infringe upon individuals and destroy your life if we went in there to develop the mineral -- mineral rights of the tribes with disrespect to you, your property, and the overall concerns. You know, we would not be very good neighbors, and I think that that's what the tribes in this situation are pushing for is to be good neighbors.

We are a cooperating agency with the BIA in assisting with providing all of the data on water quality, and some of the stuff that I heard on air, we have an air program. We do have sampling sites on the reservation, but not out in this area. We're working with the EPA on bringing air quality regulations into this area, but it has been a slow process.

We are also working with the State of Wyoming's Department of Environmental Quality because there's some serious jurisdictional concerns both between the State and the Tribes, and what we want to do is mitigate those things instead of litigate them because litigation doesn't get us really anywhere. It may solve the -- the problem for the moment there, but one of the things that we find with litigating a problem is that, you know, once again, we're dealing with individuals, individuals who are enrolled and non-enrolled members of the tribes, and I think that when we say we're concerned about your human health and safety, that

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includes all people, and the ambient air stuff that we have gotten, which is in the EIS here, all came from the State and from different federal agencies throughout the area.

The Tribes are in the process now of doing what we call an emissions inventory, and that's going to take us several more years. These things are just not thrown together overnight. It takes a lot of scientific work, and that's exactly where we are going with it.

The same thing with our water quality. One of the things that's really difficult about water quality in our area here is the terrain, the geography and the elevation. All of these things have great impacts on water quality, and one of the things that we're finding is that in our area here, you go from 13,000 feet down to 4,000 feet within a 100, 150 miles. What that does is it creates a real problem with the water quality because it creates zones. We have what we call Alpine Zone, Mountain Zone, Low Land and Desert, and these are the type of things that we have to study.

In this area out here, this is probably in between the River Bottom and the Desert type zones, and so the difficulty that we have with doing the water quality stuff in there is that, number one, this is extremely arid country out in this area. A lot of the water that's out here is what we call produced water coming from oil fields, and so

TRANSCRIPT 1 continued

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the impacts that we look at, and we look at what we call ecosystems, this water shed out here is being fed by produced water, as well as canal water; waters that were never naturally coming into this area, and so these are the things that have added to the complexity of taking a look at doing an environmental impact statement out here, and I think the Buys people have done a great job in pulling together all the information that they have.

Thank you.

MR. NATION: Thanks, Don.

MR. ARAGON: Any questions?

MR. GARLAND: May I ask a question?

MR. NATION: Yeah, yeah.

MR. GARLAND: My name is Bill Garland.

Are you aware if the operator is burying hydrocarbon sludge and heavy metals on the well pads in this area?

MR. ARAGON: No, I am not.

MR. GARLAND: We were sampling on our farm to determine why we couldn't grow crops, and we dug into hydrocarbons and heavy metals. That's one of my questions about the environmental quality.

MR. ARAGON: I understand. Once again, I'm going to point you back to the jurisdictional things. The Tribes have jurisdiction on tribal lands. If your property is feed

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lands, then we work with the State Department of Environmental Quality on that, and you know, I would probably suggest that you give them a call, and we will be a cooperator with them.

MR. GARLAND: I have talked with Region 8, EPA, the DEQ, and the Oil and Gas Commission, and now that's why I wanted to question you if you knew about it, because I wasn't aware the Tribes were regulating the environment here.

MR. ARAGON: Well, I think that the statement of regulating the environment --

MR. GARLAND: Well, I mean, you addressed the environmental question. That's why I'm asking you the question, sir.

MR. ARAGON: Oh, okay. Well, it's a jurisdictional problem that you're dealing with. Once again, I'm going to take you back to the complexities that we are working with with the jurisdiction. Right now, we're dealing with this EIS and the development of the Indian mineral rights. As far as the surface goes, that's why we have Mr. Nation here and the BLM people to try to assist us, and the County, in sorting out how we can all work together in partnership more so than who has the jurisdiction, let's not draw lines in the sand here on who has the authority or the jurisdiction or the responsibility.

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The Tribes are just now -- you know, I've been working for the Tribes in the environmental program for 12 years, and we're just now getting to the point to where we are looking at being a regulator. It has taken that long to build -- build up the -- the legal aspects of it to deal with it. I mean, like I told you before, these things just don't happen overnight. In your situation, I'm not aware of it, but I will talk with you and look into it.

MR. GARLAND: I'm not trying to be antagonistic. I'm asking you what is the basis of this EIS?

MR. ARAGON: Oh, well --

MR. GARLAND: I've talked to the BLM, I've talked to the Oil and Gas Commission, I've talked to you and now you, and it's nobody's jurisdiction.

MR. ARAGON: Well, I think the value of the EIS is to prevent this kind of activity because --

MR. GARLAND: Yeah, if it addresses it. I thought it was, too.

MR. ARAGON: I think that it will in the future.

MR. GARLAND: Good.

MR. ARAGON: But, you know, what happened in the past is something else. We are dealing with what's happened in the past, and it's not easy. I mean, it's very --

MR. GARLAND: Thank you, sir. I'm not trying to be antagonistic. I just --

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MR. ARAGON: No, I appreciate you --

MR. GARLAND: -- I'm asking a simple question. Is the Tribal -- or the Environmental -- is this your jurisdiction for water --

MR. ARAGON: I don't -- Stuart, do you have any --

MR. CEROVSKI: Uh --

MR. GARLAND: That's why I was asking Stuart. Is it the BLM? Is anyone here from the Oil and Gas Commission?

MR. CEROVSKI: On private -- private surface, private minerals or --

MR. GARLAND: It's both. It's both federal -- or tribal minerals held by the feds and fee mineral, on my property. I have both on my property, quite a mix of fee mineral land and tribal land, and we found material on both wells, tribal wells and private wells.

MR. CEROVSKI: If you -- if you would like, like I say it earlier, it sounds like a compliance issue --

MR. ARAGON: Yes.

MR. CEROVSKI: -- and let's you, me --

MR. GARLAND: I'm sorry.

MR. CEROVSKI: No. Let's you, me and Don sit down after our meeting here, and I would love to talk to you, Bill.

MR. ARAGON: Yes, same here.

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MR. GARLAND: Thank you very much.
MR. CEROVSKI: You bet. We can talk to you about it.
MR. ARAGON: Thank you.
MR. NATION: Thanks, Don.
I guess just for some information, you know, we were kind of talking about jurisdiction, we tried to not deal with jurisdiction in the EIS because there's so many different agencies that have certain authority over certain things, over the surface, over the mineral, over the air, over the -- over the ground water, and a lot of that hasn't been sorted out, yet, between the EPA and the Tribes and the State Oil and Gas Commission and the Tribes.
MR. GARLAND: I understand that, Ray, but we live here.
MR. NATION: I know. I understand that. But we tried not to go there because we were going someplace where no one knows who's got authority, yet, because those things haven't been worked out, yet, but I do understand your concern as far as your -- your tests and who's supposed to regulate them and stuff like that.
Tonight's meeting is one of two meetings that we're going to have regarding receiving oral comments of this Draft EIS. Tonight, and then also there's one tomorrow night at Fort Washakie at Rocky Mountain Hall at 7 o'clock,

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also.
Next, we'll -- I'll go ahead and turn everything over to Marion Fischel. Marion is our project manager for the Draft EIS, or actually, for the whole EIS project. She works for Buys and Associates. She has a handout here, and we thought we had a Power Point, but we seemed to have misplaced the disk, so we'll just go ahead and I guess go over this -- this document here. I hope all of you have it. If you don't, we can get you some.
MS. FISCHEL: Well, at least you have a nice photograph to look at. I did have a nice presentation, and I will have the presentation tomorrow. Unfortunately, the cd got misplaced, and so we'll just have it sent by e-mail.
So instead, I'm just going to go through the handouts rather than a Power Point presentation. I'll be talking about the project, about the Draft EIS, a little about the process, the different chapters in the EIS, and the schedule, the rest of the schedule for this process.
The first map, and it's also on the -- in the back of the room, shows the overall project area and the five development areas that the Proponent wishes to drill in, and that includes Pavillion, Muddy Ridge, Coastal Extension, Sand Mesa and Sand Mesa South.
The next map, which is also in the back of the room, focuses on the wells, and as you can see, the majority

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of the development and production is in Pavillion and Muddy Ridge. There is very little in the other fields. The only other field that has any production is Sand Mesa, which has three producing wells.
And there were some questions about water, and the next map shows the major drainage divides and also the major creeks, Muddy Creek, Five Mile Creek, and the Cottonwood Creek. Cottonwood Creek is ephemeral or intermittent, meaning it does not have water in it all the time. The other two creeks do have water in them all the time.
Then the next photograph shows the -- a production facility and a well. Another photograph showing production facility in an agricultural area, and the next photograph shows Middle Depression, which is a reservoir managed by the State as a -- it stocks it with fish, as a recreational area, and you can also see the wetlands.
As Don said, the reason for doing -- or the process and the reason for doing an EIS is under the National Environmental Policy Act, and the regulations that implement that act, which is commonly referred to as NEPA, is the Council of Environmental Quality Regulations, the CEQ regulations.
The process in this particular EIS involves the Bureau of Indian Affairs, which is the lead agency, three cooperating agencies, the Tribes, the BLM, and the Fremont

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County Commissioners. And then the third group participating in the process is the Public, and that includes other agencies that are not members of the cooperating agency group, other organizations, and for this EIS, landowners, since in the Pavillion field, a lot of the land is privately owned.
The first part of the EIS process is developing the scope of what the EIS will be, and all of you participated in the scoping meetings early on in the process, and that gave the BIA the idea of what elements needed to be analyzed.
This Draft EIS was developed, it was submitted as a preliminary draft to the cooperating agencies, and that's one of the responsibilities that the cooperating agencies is to review the preliminary draft, and then the comments were received and changes were made as appropriate, and then we submitted the draft, which is what you have, to the public, and a 45-day comment period is now the standard comment period. Probably a couple of years ago, the standard was six -- 60 days. It has been changed to 45 days, which is considered to be standard.
Then during the comment period, the public is invited to participate in meetings, such as this, so that they can make comments.
Yes, sir.

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MR. GARLAND: May I ask a question?

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MS. FISCHEL: Sure.
MR. GARLAND: Did you consider the cumulative effect of the number of wells in this EIS?
MS. FISCHEL: Yes. I have -- I'll get to that shortly.
MR. WALKER: Can I also ask a question?
MS. FISCHEL: Sure.
MR. WALKER: Are we accepting questions as we go through here or do you want to wait until the end? Does it matter?
MS. FISCHEL: If they're brief questions, I'll answer them as I go through.
MR. WALKER: My name is Jon Walker, and I work with Per-Tech Resources.
Back on the applicable statutes and regulations, is there any federal codes -- regulations that apply to, for example, how close well heads can be to buildings, people occupied, other structures?
The reason I ask this question is I recall a meeting with the developer several years ago when I was told that there were no federal regulations that applied to where well heads could be put in relation to existing buildings, for example, the front door of someone's house, and I think if you drive around, you'll see that it doesn't look like

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there's a lot of consideration for that, but I know for a fact there are regulations governing that. As I see it, they're not referenced in this document.
MS. FISCHEL: They are referenced in the EIS.
MR. WALKER: Okay.
MS. FISCHEL: Yeah. The EPA has -- it's not required, but has a standard, a noise standard, and that noise standard is 55 decibels, so if EI -- the EPA would recommend if the noise level is above 55 decibels, that --
MR. WALKER: As I recall, it was kind of a distance thing. If there wasn't -- there shouldn't be any development within, you know, I don't remember the exact --
MS. FISCHEL: Yeah.
MR. WALKER: -- distance, but there was something. Anyway, we were told at that particular point in time that, in fact, as long as they were developing tribal rights, that there were no regulations governing that, and they could basically do as they pleased. That's what we were told by a developer of the rights out there, and I want to clarify, isn't that -- is that, in fact, the case? And if not, how would we go out about finding exactly what those --
MS. FISCHEL: There is no distance required. You're asking is it 500 feet, 1,000 feet? No. The -- the EPA recommends 55 decibels as being the upper limit of

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noise, and -- and that is mentioned -- there is a section in Chapter 3 and Chapter 4 of the document on noise and how much noise in terms of decibels each type of equipment makes, so I suggest that you look at those sections.
MR. WALKER: So you're saying there is not a federal regulation governing development of wells in proximity to manned structures? That's what you're saying?
MS. FISCHEL: Yes. I'm not aware of that.
MR. WALKER: All right.
MS. FISCHEL: And I know at cooperating meetings, we did raise that issue. The closest thing is that recommendation for 55 decibels.
MR. WALKER: And is this EIS concerned with that? I mean, theoretically, if somebody wanted to put a gas well outside of my front door, if it's quiet enough, that's okay? Is that the intent of this, this document?
MS. FISCHEL: Well, we're -- private property is something that is dealt with between the property owner and the -- the Proponent, the operator.
MR. WALKER: I think that -- I think that's part of --
MS. FISCHEL: But if you have concerns, I would suggest that you, you know, make detailed comments, either --
MR. WALKER: Well, I think that's part of the

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problem is, unfortunately, the landowners in this area haven't seen a lot of responsible development. You know, basically, I believe, in fact, that the developers will do whatever they please, even to the point of aggravating the landowners. I think you can drive around out there and see that. Of course, they don't do any directional drilling or anything like that. I see you're going to talk about that later, but that's the concern is if we don't get some of this defined today, what -- exactly what can and cannot be done and what is permissible, and I understand maybe the Environmental Impact Statement is not the best place to do that, but it may be the only opportunity we have. We seem to have a tribal entity and a federal government, and we have this jurisdictional problem where a lot of this seems to be undefined, and unfortunately, the landowner is caught in the middle.
MS. FISCHEL: I certainly appreciate your comment, and that's why we're having all of this recorded so that we can respond to your concerns and hopefully come up with an answer.
MR. WALKER: Okay.
MS. FISCHEL: And that's why we're having this meeting so that we can hear your concerns. We can't address them now because we're in the middle of the comment period, but the comment period ends on August 30th, and subsequent

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to that, we'll review all the comments, and the comments will appear in the Final EIS, so your -- your concerns will be responded to. How they'll be addressed, I can't say at

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TRANSCRIPT 1 continued

this point. We just have to look at all the comments.
MR. WALKER: Thank you.
MS. FISCHEL: Okay. Okay. The next page shows the contents of the EIS, and what I'll be going through is a little bit about each chapter so you know what is contained and where you might be able to find the information when you read the document.
And to respond to Mr. Garland's question, Chapter 5 deals with cumulative effects, and I will be talking a little about cumulative effects later on.
The first chapter talks about the purpose and need of this EIS, and the purpose is, obviously, to drill the undeveloped -- the gas resources on tribal minerals and private minerals, and it's the BIA's responsibility to encourage environmentally sound development, and that's what this whole EIS process is all about.
Chapter 2 analyzes the alternatives, and there are four alternatives, but if you look at the first bullet, it talks about the existing development, so the existing development is considered in addition to the four alternatives, and the existing development is 178 producing wells. You have the Proposed Action, which is 325 new

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wells; Alternative A which is 485; Alternative B, 233; and Alternative C, No Action, and I'll be talking in the next few pages about each of these alternatives. And for those of you that have the document, this is in Chapter 2.
So for the Proposed Action, and the term "proposed action" means that this is the development that the operators wish to undertake, and this page shows what the anticipated success rate is, and the success rate is based on each of the development areas. Some of the development areas, such as Coastal Extension, have no history of development, and so their success rate is anticipated to be very low, whereas other areas such as Pavillion and Muddy Ridge are -- have known reserves, and their success rate is to be very high, and the success rate I gave here is just an average.
And on the Proposed Action, I've indicated the number -- the disturbance, short-term and long-term disturbance. The long-term disturbance means disturbance for the life of the project, and the life of the project is 20 to 40 years. Short-term disturbance is -- and later on, I'll define what short-term and long-term is. So you can see that much of the short-term disturbance is remediated, and you have a fraction of disturbance residually.
The next one, which is Alternative A, the purpose of that alternative -- and by the way, all of these

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alternatives were based on scoping comments. Alternative A is a greater number of wells, and the reason being that as all of you know, these days, there's a very high demand for oil and gas, and so it may be necessary or economically

feasible to develop a lot more wells than the proposed action.
Unfortunately, one of the detriments is that there's also going to be increased environmental impact. In this alternative, there are 485 new wells, and the short-term and the residual disturbance is greater than the proposed action.
Alternative B was chosen to address environmental concerns. Because there are fewer wells, only 233, there is going to be a decrease in environmental impact and decrease in short-term and long-term disturbance.
Alternative C, which is the No-Action alternative is required by NEPA. Every EIS must have a No-Action alternative. In this case, the No Action means no pub -- no drilling on tribal minerals. There are no federal minerals in this particular project area, however, there are numerous private mineral lands, and those can be drilled on regardless of whether there's -- the action has been denied.
However, in addition, because some of these private minerals may be adjacent to tribal minerals, there

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also has to be drilling on tribal minerals to make sure that the tribal minerals are not drained by the project wells, and so if you have a private well next -- tribal well next to a private well, you need to drill both, and that is a requirement.
The total number of wells on private minerals and offsets would be a hundred in this No-Action alternative, so in this EIS, "no action" doesn't mean nothing happening. It just means greatly reduced development.
The next two tables show you the total disturbance by the whole project area, which is 92,000 acres, and it also shows you by the fields, which is about 38,000 acres. And the result being that the disturbance is a lot higher if you just consider the five development areas.
And this was requested in the scoping process that both the entire field, plus the development areas be considered.
MR. WALKER: Excuse me. Jon Walker, again.
How do you define this residual disturbance? Can you --
MS. FISCHEL: Yeah. Residual is -- well, let's look at an access road. You -- at first when you construct an access road, you'll need about 50 feet width. After it's constructed, you'll only need sometimes as little as 20 feet in width, and so the residual disturbance is the length of

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the access road by the residual width.
MR. WALKER: So there's no consideration for surrounding surfaces that are no longer useful for their intended purpose? For example, I'm thinking of part of an irrigated field that will no longer drain and -- and in

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TRANSCRIPT 1 continued

essence, goes to weeds because of well pad placing and stuff like that?

It looks like the actual surfaces disturbed is much larger than might, in fact, just be occupied by the pad.

MS. FISCHEL: Well --

MR. WALKER: Is that --

MS. FISCHEL: -- in doing -- in doing these calculations, especially for the initial disturbance, it includes the pad, plus the area where the spoil is, so it's more than just the pad or more than just the road. It includes the whole right-of-way, but the residual disturbance just includes whatever's left. If it's a well on agricultural land, it would be 8 by 8 feet or 64 square feet, but it does not consider land that hasn't been drained or something like that.

MR. WALKER: I'm sorry. You said that the well is 8 feet square?

MS. FISCHEL: Yes, in -- in -- and I'll get to that shortly.

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MR. WALKER: Oh, okay.

MS. FISCHEL: Yeah. Okay. In addition to analyzing those four alternatives, which is Proposed Action, Alternatives A, B and C, there was some alternatives that were not analyzed in detail, and those are listed on this next page, and I will explain each of them. There's a separate page for each of these alternatives.

Extending the life of the project was rejected as I'll explain shortly. Directional drilling was not analyzed further because it is incorporated into the Proposed Action and Alternatives. Same is true for Phased Development, Natural Resource Protection -- 40-acre spacing was rejected, and I'll be explaining this -- it's on the next few pages of your handout.

The goal and -- as -- as with the alternatives that were incorporated, the alternatives that were not analyzed are also based on the scoping comments. Everything is based on the public scoping notice and their responses. Just as the Final EIS that we will have will be based on -- consider your comments to the Draft.

The goal of extending the life of the project was to increase the revenues to the Tribes, however, when calculations were done, it turned out that instead of increasing the revenues, it decreased it, and this was counter to the goal of the BIA, which was to increase

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revenues and also counter to the -- one of the scoping comments.

Directional drilling is -- the purpose of that is to decrease environmental effects so you can have several wells from a single pad. One of the wells would be vertical, and the subsequent wells would be directional; that is, at an angle. The BIA determined that directional drilling would be used under the following conditions that are listed below: If there are topographic features where vertical drilling is not feasible; if there are cultural sites, you would have directional drilling, unless you can move the -- the site -- not the site, move the well, because for all of these, if you can move the well, then there's no problem.

High potential for impacts to threatened and endangered species. For example, there's a potential of black-footed ferrets being in -- living in the prairie dog towns in the project area. If the Proponent wanted to drill wells in that area, a survey would have to be done for the ferrets. If the ferrets were found, then under the Endangered Species Act, they would not be allowed to drill there and would have to drill directionally.

The fourth condition is health safety concerns associated with the occupied residence, the private properties -- yes.

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MR. GARLAND: May I ask another question? Bill Garland.

Did you consider directional drilling to preserve agricultural producing fields? In other words, put the well at the edge of agricultural fields and directionally drill? Did you consider that as one of the options? **12**

MS. FISCHEL: No, that is not included in here, but --

MR. GARLAND: Thank you.

MS. FISCHEL: -- that's certainly something that can be considered.

MR. WALKER: Along those same lines, when you say there's 325 proposed wells, is there a well density associated with that?

(Whereupon the court reporter asked the speaker to restate.) **13**

MR. WALKER: A well density. Excuse me. How many per depth of well heads per acre?

MS. FISCHEL: That is going to be my -- I'll talk about that in two slides, so --

MR. WALKER: Oh, okay. Sorry about that.

MS. FISCHEL: So those are the conditions for directional drilling, and of course, between the Draft and the Final, those -- if you have comments and, you know, we determine that your comments are -- have to -- should be

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addressed, we may make changes. After all, this is a draft. The final may look somewhat different than the draft.

MR. LOCKER: Excuse me.

MS. FISCHEL: Yes.

MR. LOCKER: In a comment made earlier by this gentleman on the -- on the location --

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MS. FISCHEL: Can you give your name, please.
MR. LOCKER: Jeff Locker -- made by locating the wells next to residences, I see on your last one here, you have health, safety and environmental concerns associated with occupied residences. If there are no federal guidelines, who's going to be responsible for these guidelines in place on the bottom of this?
MS. FISCHEL: A lot of this will be based on discussions with the landowners.
MR. LOCKER: So it will be dealt with on an individual basis?
MS. FISCHEL: On a case-by-case basis.
MR. LOCKER: Thank you.
MR. WALKER: That would occur between the developer and the landowners, or between these agencies and the landowners?
MS. FISCHEL: The agencies are involved. The BLM is going to be involved, the BIA is involved, the Project

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Proponent is involved, and of course, the landowner.
MR. WALKER: And will this EIS, for example, define that process if there is, in fact, a conflict there about how that is resolved?
MS. FISCHEL: The EI -- the EIS at this point does not discuss how this will be resolved, but if it's determined to be appropriate, it may very well do that, but at this point, the BLM is responsible for filling out the applications or providing permits for drilling, and they work with the BIA and the landowner and the -- the operator as well, so generally, for private property, it's based on communications amongst all these parties.
And by the way, I really appreciate all of your questions. This is very useful for us.
The next page talks about phased development. There were requests in the scoping comments that development be conducted in a orderly fashion rather than, you know, all 325 wells at the same time, and the Proponent -- and this is to reduce environmental impact. The Proponent plans to phase the development. The numbers here are just approximates. There may be more, there may be less, but they do not plan to drill all wells at the same time. It's going to be a certain number of wells every year, and this is based on our understanding of the process, and because this is adequately considered, it was not felt necessary to

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analyze it further.
The next alternative, which was not analyzed in detail, is natural resource protection, again, to reduce environmental impacts, and I just gave you a few of the operator-committed mitigation measures, which includes drilling in the winter rather than in the summer during the agricultural season, so generally, they drill between November and early to mid-April.

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And also, the well pad is reduced from about -- I don't remember the exact numbers. They're in the EIS. Probably 250 by 170 to 8 by 8, so the only thing that remains in the agricultural area is the well head plus 8 -- 64 square feet. There's also no drilling -- they do not drill within 500 feet of water bodies, where possible existing roads and right-of-ways are utilized.
Yes.
MR. HORTON: I'm Stan Horton. I have a few of these wells on my place, and there isn't a location out there that's less than probably 200 by 200. I don't see how you're going to -- they have the corner stakes from where they put up the -- the drilling rigs when they come in for, you know, to do anything. There isn't a location out there on the Muddy Ridge that is 8 by 8.
MS. FISCHEL: That's true.
MR. HORTON: There's buildings out there that are

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bigger than that.
MS. FISCHEL: Yeah. Muddy Ridge -- this 8 by 8 is so far -- one, it's only been initiated in the last several years, and --
MR. HORTON: And they're all shallow wells, I take it.
MS. FISCHEL: Pardon?
MR. HORTON: These are the shallow wells that are drilled around here? Is that the --
MS. FISCHEL: It's only in Pavillion and irrigated fields. In Muddy Ridge, since there are no irrigated fields there, you will you have a 200 by 200 --
MR. HORTON: I would like to take you out to my place. My place is irrigated, and there isn't a well out there that is 8 by 8. I don't know where you came up with 8 by 8, but that -- like I say, there's buildings on it that are bigger than 8 by 8.
MS. FISCHEL: Well, there -- when I've been out there, not in Muddy Ridge, I agree. Muddy Ridge is -- they are not reduced to 8 by 8, but the newer wells in the Pavillion agricultural fields are reduced, and all future wells in Pavillion will be reduced to 8 by 8 in agricultural fields. If they're not in agricultural fields, they'll stay about 200 by 200 or whatever.
MR. HORTON: Irrigated?

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MR. BLENKINSHIP: Yeah. Only in the irrigated fields are they -- George Blenkinship.
MS. FISCHEL: Yes.
MR. GARLAND: Bill Garland again. I have two wells that have been drilled in irrigated fields on my property where they were reduced back to 8 by 8 that you're talking about.
In the EIS, did you address the fact that they should remove the top soil before they bring subsoil in and

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build the pad, because when they remove the subsoil, of course, they don't get it all, so it mixes with the surface, and the land is not as productive once that pad is removed. I -- I don't know that you considered that in the EIS. Did you?

MS. FISCHEL: It was mentioned because that is my understanding that that is --

MR. GARLAND: I question -- I would like to go on the Record with this, I question whether or not the -- the value of that, the 8 by 8 is more PR than it is really worth to the landowner. It's PR for the operator.

One other question while I have the floor, what do you consider water bodies? How about the irrigation canals.

MS. FISCHEL: Yeah. It would include the irrigation canals, the --

MR. GARLAND: Would a irrigation canal be a water

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body?

MS. FISCHEL: It contains water, yes.

MR. GARLAND: Then we have wells close to all of the canals. I mean, I doubt if you can drill any well that's not within 500 feet of a canal out here.

MS. FISCHEL: Well, then we'll -- we're duly noting that and --

MR. GARLAND: I'm bringing it up because I think it's a fallacy in what you seem to be concluding here. Come out and look at the land.

MS. FISCHEL: Well, I have looked at -- I've been there a few times. I haven't looked --

MR. GARLAND: You're familiar with what I'm saying. The laterals and whatnot with the irrigation system, of course it's intermittent, it's just the summertime, but if you consider those water bodies, I don't think you can say that they won't drill within 500 feet of a water body. It would be hard to place many wells without being that close to a lateral of some type, at least on my property. I don't know about the other landowners here if that's true or not.

MS. FISCHEL: Well, the BIA requirement, and it's possible that an artificial stream such as a canal is not considered a water body.

MR. GARLAND: This is what I was referring to

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earlier when I was talking about hydrocarbons and heavy metal leeching into the water, which goes back into the Wind River.

MS. FISCHEL: Right. Yeah. Stuart, does the BLM consider an artificial stream such as an irrigation canal as a water body?

MR. CEROVSKI: I don't -- I don't know. I can't answer that without --

MR. GARLAND: I've been told by the operator the only water body they consider is Five Mile Creek and Muddy

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Creek, and the reason is because Bureau of Rec owns that, and they won't drill within 500 feet of it. That's what I've been told by the operators, and I assume that's what this meant until we started talking about it, and I'm asking a question, I don't know what you mean by it, but if laterals are water bodies, I don't think you can really say this in your --

MS. FISCHEL: Then -- then we may have to change that. We'll certainly address your comments.

Our disadvantage as contractors is that we do not live on the property and you do, and there are a lot of things that you know that we don't know.

MR. GARLAND: That was constructive when I said come and look at the property.

MS. FISCHEL: No. I appreciate that.

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MR. GARLAND: I think that's the way to do that.

MS. FISCHEL: Okay. The next one is 40-acre spacing, and that should respond to one of the questions that I had. One of the comments was to have a consistent one well per 40 acres, and that is not possible because it is counter to the BLM spacing orders, and the -- for private minerals, the Wyoming Oil and Gas Conservation Commission's spacing orders.

The spacing orders have to be followed. The spacing orders that exist, and you can find those on the Internet, if they're, for example, one well per 20 acres, the existing spacing orders allow the well to be placed anywhere -- within certain restrictions, anywhere within the 20 acres. It does not have to be at the center point. Unlike the one well per 40 acres, those -- well, that's not correct, either. Let me clarify that.

The BLM spacing orders may or may not say that the well has to be at the center of this 40 acres or the center of the 20 acres. Most of the spacing orders for this particular project area allow the wells to be drilled pretty much anywhere within that -- that acreage. However, if there is no existing spacing order, then there is another document that the BLM has -- I think it's a regulation that the BLM has published, which requires one -- where there's no specific spacing orders, it requires one well per 40

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acres in the center of that 40-acre area.

Did I get that right, Stuart?

The BLM explained this all to me. So all of this so far has been in Chapter 2, and I'm going to go --

MR. WALKER: Can I ask some questions regarding that, please? Jon Walker again.

MS. FISCHEL: Sure.

MR. WALKER: What -- it says here, I don't understand the goal is one well per 40 acres in Muddy Ridge and Pavillion, and then it says it's rejected. I'm not sure I understand what it said.

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MS. FISCHEL: Yeah.
MR. WALKER: What is the spacing? Is it 40 acres?
MS. FISCHEL: No.
MR. WALKER: What is it?
MS. FISCHEL: When I said goal, that was what somebody requested, that there be consistently one well per 40 acres, and I'm saying that that is not the case because the BLM and the Wyoming Oil and Gas Conservation Commission have specific spacing orders that the operator must follow, and their spacing orders are not one well per 40 acres, in most cases.
MR. WALKER: I guess I don't understand. As far as this EIS is concerned, it doesn't matter? Is that what

you're saying?
MS. FISCHEL: No, no.
MR. WALKER: Going to go by somebody else's guideline independent of -- I guess I don't understand.
MS. FISCHEL: Okay. What I'm trying to say is that the -- let's use the Bureau of Land Management, the -- let's go back one step further. The operator sends a request to the BLM for drilling, and they say they would like to drill one well in a 20-acre area, and they would like to be able to put it in places other than the center. The BLM then reviews this, does a site visit, I presume, and looks at the -- the reservoir features and determines whether or not that is feasible, and if it is feasible, they will approve the request.
MR. WALKER: But it just seems like from an environmental perspective, there would be a maximum density. You know, for example, this EIS doesn't even cover all the development that's going to happen out there, correct? The private mineral rights will be developed independent of this EIS; is that correct?
MS. FISCHEL: Well, that's for the No-Action alternative. No, the -- the private minerals are going to be developed --
MR. WALKER: Are they going to be guided by this EIS also?

MS. FISCHEL: Yes. The only reason they'll be independent is when they are -- when all other -- when the Proposed Action is denied. If the Proposed Action, which is 325 wells, is denied, the operator still has the right to drill on private minerals.
MR. WALKER: And just nominally, what well density does that work out to? The 325 wells in this area, what does that work out to as a well head per acre, well head density?
MS. FISCHEL: Well, the spacing orders are such -- I don't -- that they're really -- they let the operator pretty much decide.

MR. CEROVSKI: This is Stuart Cerovski. I -- if you're talking about the No-Action alternative, and all tribal drilling would be denied, Proponent would still be able to --
MR. WALKER: I'm not referring to that at all. I'm --
MR. CEROVSKI: Well, they would still be able to develop private minerals because they don't need federal approval to develop private minerals. They need Oil and Gas Commission approval, and they would have to follow the Oil and Gas Commission spacing requirements.
MS. FISCHEL: And it's section by section.
MR. CEROVSKI: And the spacing -- current spacing

approval within the project area varies from default spacing, which is 40 acres with a 400-by-400-foot drilling room in the middle of that quarter. Okay? That's the default spacing. To spacing in Pavillion which is 640-acre spacing units that were down sized or -- allowed to be in-field drilled to extract resources, to some pilot project spacing of 20 acres in the southern end of Muddy Ridge field to explore the -- the aspect of density there.
MR. WALKER: So it sounds like -- you know, I don't hear the answer to my question. It just sounds like this EIS isn't going to address any kind of well head density.
MS. FISCHEL: Yes, it does.
MR. WALKER: In other words, what the independent commission comes up with is acceptable?
MS. FISCHEL: No.
MR. CEROVSKI: The spacing is currently set in such a manner -- that's what I was explaining. It's either default spacing, or it's spaced differently than default spacing.
MS. FISCHEL: Yeah.
MR. WALKER: I understand that. It seems like there is an environmental implication there, I would assume.
MR. CEROVSKI: The reasonable foreseeable development of the number of wells necessary to extract the

gas resources is -- is addressed in the well densities of the EIS.
MS. FISCHEL: I would suggest that you look at Chapter 2, and we do need to -- to move on, but do you have a --
MR. GARLAND: Yeah, I -- you know, I don't want to belabor the point but you have me confused. I thought I understood well spacing, with the resource development, improve with the BI -- the BLM and the Oil and Gas Commission, but I'm not hearing -- are you saying the private minerals would be regulated and spacing by this EIS? I don't believe that's correct.
MS. FISCHEL: No, they're not regulated. The

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question was --
MR. GARLAND: Or set.
MS. FISCHEL: No, they're assessed -- the private minerals are assessed by the Wyoming Oil and Gas Conservation.
MR. GARLAND: I understand that -- I understand that very well, that both the BLM group and the Oil and Gas Commission, they get together before they really issue the order.
MS. FISCHEL: Right.
MR. GARLAND: And they'll issue any order that efficiently extracts the mineral and extracts the oil of the

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owner, and it has nothing to do with the surface.
MR. CEROVSKI: That's correct.
MR. GARLAND: So therefore, the spacing on my property, for example, is down to 20-acre spacings, and they can put those wells anywhere they want in that section. They can put them all in one spot if they wanted to. That's the current 2000 order from the Oil and Gas Commission.
MS. FISCHEL: Yeah. And --
MR. GARLAND: Okay. Well, I'm just saying this EIS doesn't address that at all.
MS. FISCHEL: No. It just has a section that explains it. That's all. No, the EIS does not -- well, it would address spacing on tribal minerals.
MR. CEROVSKI: I believe it addresses spacing in the whole project area.
MR. GARLAND: I think it does, too, because both groups get together and decide the spacing, and when the operator asks for different spacing, they get together -- I heard the chief geologist say with the intermittent -- with the particular sands out here, they may have to go to 10-acre spacings. I heard that testimony before the Oil and Gas Commission and the Resource Management, and so I assume that ultimately, we may be down to 10-acre spacings, and again, that's not one per ten acres; that is that density per section, and they all can be in one spot if they wanted

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to that way.
And that's why I asked earlier my question about cumulative effect, and you know, I take issue with the number of acreages disturbed. Why you're even looking at 92,000 acres if you're going to drill with that kind of density here in Pavillion.
MS. FISCHEL: And that's why we also divided it by the specific development area, so you can see what the -- what it would be for Pavillion, for Muddy Ridge, and for each of those areas.
Yes.
MR. HORTON: Stan Horton. You know, everything I can see here, this is just your -- this whole thing is about the shallow wells that are being drilled right around here,

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and they don't drill shallow wells out on Muddy Ridge. They drill deep wells out there.
MS. FISCHEL: Right.
MR. HORTON: And so all of your figures that you put into this thing that -- that the pads will be returned back to 8 by 8, that's -- that is so far off that it isn't funny.
MS. FISCHEL: That's just -- if you look at the slide, it just says in agricultural areas, and I guess it should have specified in Pavillion, and, you know, that can be a comment that we need to clarify, and that's why we're

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having --
MR. HORTON: Well, I would challenge any of the oil and gas people that there isn't a well that, you know, on the Muddy Ridge, especially, because I live out there, that -- that there isn't most -- well, they keep the anchor stakes, they keep everything out there, plus they've already -- because most of the ground is steep enough, they build a pretty good size pit or pretty good size location, they level off hillsides to build the location, and they do not return those back to anything close to what they were before there was drilling.
MR. GARLAND: There are four wells existing here in Pavillion that have been drilled out in agricultural fields and reduced back to the 8 by 8. Two of them are on my property. I'm sorry. There's five. The other three are on my neighbor's. That's all that exists out there right now is five wells.
MS. FISCHEL: Right. But we're talking about the proposed -- what has been done in the past --
MR. GARLAND: But if we're going to do that in the future, will they please remove the top soil and then bring the top soil back like the Highway Department and every other agency does.
MS. FISCHEL: Right. And that is -- that is a general operating procedure is to remove the top soil first.

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MR. GARLAND: Are they also going to farm it when they get through?
MS. FISCHEL: That's something that you have to discuss with the operator.
Okay. The affected environmentals -- I'm going to just go through the rest of these slides pretty quickly. Affected Environment is Chapter 3 --
MR. GARLAND: I'm sorry, ma'am. I won't ask any more questions. I seem to be disturbing this, but this is a farce.
MS. FISCHEL: You're welcome to ask questions.
MR. GARLAND: No. I've disturbed enough. Please continue.
MS. FISCHEL: The Affected Environment is listed, and that's Chapter 3, and Chapter 3 describes what the

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environment is in the project area.
The definitions of Impacts, those are the definitions that were used for Chapter 4 to determine impacts. And impacts, another way of saying "impacts" is environmental consequences, and the next several pages, as well as this handout, which -- this table, determines what the impacts are, and they range from negligible to major. For geological resources, major is for gas depletion. That's the only thing that is major.
You move on to socioeconomics, you find something

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major there as well, and that's the beneficial impact. Impacts can be beneficial or adverse. The beneficial impact that's major is the revenues, revenues to the taxing authority such as the County, revenues to the Tribes. Health and safety impacts were determined to range from negligible to minor, and you can -- looking at the -- this table, you'll see more detail on specific impacts.
Then I would like to move on to the schedule. At this point, we're in the 45-day comment period, and the comment period officially ends on August 30th, and so the comments that we're receiving from you today, as well as comments that you'll be sending in writing, will all be considered and reviewed after the 30th of August, and then we will respond to your concerns, your issues in the final EIS.
After the comment period closes, we review all the comments, prepare a document, the cooperating agencies, the three groups that I mentioned earlier, BLM, Fremont County, the Tribes, review the Preliminary Final EIS, and we make changes and then submit the Final to the public for 30 days, and that 30 days is a standard review period, and if there are any additional comments, the public has the opportunity to make additional comments.
The Record of Decision is prepared, and that is the decision by the BIA as to whether there will be no

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wells, if that's what they choose, if there will be 325 wells, 485 or something in between.
Then there's a 30-day appeal period, during which the operator cannot do anything. That is an opportunity for the public to appeal the EIS, and then if there's appeal, then this process will continue, but if there's no appeal, then the EIS will be concluded, and at this point, the conclusion is anticipated to be in December of this year, and the operator would then initiate drilling after that period.
So this -- and what I would like to do, and I know Ray would as well, like to hear additional comments or concerns you have because your oral comments are of a -- of equal value to any comments in writing, and that's why we have the court reporter here, to -- to additionally take your comments.

Yes.
MR. HORTON: Stan Horton. I sent in my comments when this was started here a year or so ago. That -- but anyhow, you know, everything you put in here that "Socioeconomics, (beneficial), minor to major, long-term." Then you go to "Transportation, negligible to moderate, short to long-term." There isn't a road built around here that is built to have water trucks run up and down 24 hours a day. There isn't a road -- you don't -- it doesn't make

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any difference what road it is. Those water trucks are incredibly heavy, and in the spring when the frost is going out, there isn't a road out here that isn't like this. You can go anywhere out here and you can see those roads.
This is exactly the thing -- kind of thing that I sent back in. I have a bridge out there that we cross a dozen times a day, and it is the only bridge across the Wyoming canal out there, and because the railings were in the way all the time, they cut the railings off so they wouldn't have to mess with them, and they have never been put back on.
There is -- you -- this thing is so far off, it isn't funny. There isn't anything in this thing that is true, and that's my opinion.
MR. NATION: Say, Stan, are these roads and bridges, do they belong to the County?
MR. HORTON: They do. But there isn't a road built around here that is set up to do any kind of this stuff, and we drive these roads day in and day out.
MR. NATION: You know --
MR. HORTON: You have right in here, you say it's negligible, and it's -- the County can't -- for what they get out of this thing --
MR. NATION: We've talked to the County.
MS. FISCHEL: It's not across the board. If you

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look at transportation. The reason -- this slide is very generalized. It's negligible for the No-Action alternative. It is not negligible for the Proposed Action or Alternative A, so I -- I think -- I recommend that you look at this. Sometimes when you try to simplify things as I did here, it's an oversimplification.
MR. HORTON: I'll agree about that. This whole thing is oversimplified. That -- there's -- you know, I've lived with this for 24 years, and when I moved out to my place, there was one well there that I've talked with a number of people over the years about. It's amazing how things have changed. But now, because also, that's another thing that isn't in here is the fresh water during the winter. I have -- my neighbor has the only fresh water that is basically open 24 hours a day that doesn't freeze up, so there's water trucks going back and forth there on that road right across -- right through the middle of my place,

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basically, to get to that water well, and this is another one of those comments that I said in there, that -- and they go across this same bridge, and they bring water to clear over here because there isn't any fresh water over here, either, and those water trucks are running down the county roads, and there isn't a water -- and -- you know, and you can't blame the operator, that, you know, it's -- it's a good deal. It keeps people employed. I don't have a

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problem with people being employed. I'm the only one that has to worry about myself, and I'm -- I'm a little bit worried about whether I'm going to be in condition to, you know, be there the next year.

But it's basically, you know, that this was set up, and to put it bluntly, this is set up to drill. There isn't any other way of putting it. This thing was -- it's a -- a -- I would -- I better shut up.

MR. NATION: Stan, did you read the part or the section in the EIS about the County's concerns, and they've identified some roads and some bridges that need to be repaired.

MR. HORTON: They're talking about putting a new bridge in out there next to me.

MR. NATION: Yeah.

MR. HORTON: If there's going to be -- if you're going to drill 12 additional wells out there every year, and there's only one water well, if you're going to drill them during the winter, that one well is going -- that one water well out there is going to develop or produce all the fresh water for each one of these wells, so that means there's going to be -- what would that be? Twenty-six wells drilled right around the Pavillion area. I'm only 15 miles from Pavillion. You do the math. There's -- I don't know how many water trucks a day it takes to keep a well drilling,

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but it takes a bunch.

MR. NATION: I know the County is -- has looked at the road infrastructure out in that area, and they are -- they have moved some roads and bridges up on the priority list to try to deal with all the increased activity out there, and the County would like to maybe form some kind of a committee or group with all the affected agencies and the operator to try to get assistance in -- in making it safer out there regarding the -- the transportation system out in that area, so those are things -- some things we've talked about, and hopefully, once we get through this thing, some agreements will be made, some commitments will be made through agreements, and hopefully, some of those bridges and roads will be safer to travel.

MS. FISCHEL: And that is in the EIS, the -- their schedule for repairs.

MR. HORTON: Every one of those things, as near as I can tell, says negligible. Every one of those things when you come down to all the impacts, the different things, as near as I can see, that the 40-acre spacing was rejected since it's not a reasonable alternative. Major impact at -- anyhow, I -- like I say, I've lived with this long enough that I understand how to drill a well and who's making a living out of there, and it doesn't have anything to do with the people that are out here living out here. That's my

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blunt way of looking at it.

Thank you.

MS. FISCHEL: Yes.

MS. LOCKER: Rhonda Locker. I just wanted to ask, it talks about the Draft EIS distributed to the public. How is the public notified of this distribution to look at, such as this meeting, I heard word of mouth. What was the publication for this and the FES? Does it have specific dates? So how are we, as the public, knowing this specifically? What ways are you --

MS. FISCHEL: It was in the three different newspapers, in the Lander paper, the Fort Washakie --

MR. NATION: Riverton paper.

MS. FISCHEL: Riverton.

MS. LOCKER: Is it a copy -- or legal ad?

MR. NATION: It's a legal ad in public notice -- or public notice in the legal ad section.

MS. LOCKER: So each one of these things had come out in the legal ad for the FES -- when you say it's been distributed to the public --

MS. FISCHEL: Right.

MS. LOCKER: -- in what ways? What does distribution mean?

MS. FISCHEL: And if you're on the mailing list, like, if you've signed in, you will get a copy.

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MS. LOCKER: Okay.

MS. FISCHEL: And if you signed -- the people that got copies, cds or hard copies of the Draft, were those that attended the -- the scoping meeting, and so since you're attending, you will be getting a copy. Normally, we provide cds, but if someone doesn't have a computer or it's a hardship, then we provide hard copies.

MR. GARLAND: I promised I wouldn't say anything. Bill Garland again. But you didn't address my question about cumulative impact.

MS. FISCHEL: Oh, I'm sorry. I forgot about that. Thank you for reminding me.

I had forgotten to make a slide, but cumulative impacts are addressed in Chapter 5, and it is required that they be addressed. It's the -- it's basically any past, present, reasonably foreseeable future activity that can occur within the project area or in the general vicinity, and vicinity varies depending on the resource.

For example, in air, the whole northeastern part

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of Wyoming is considered. For, let's say, a -- the prairie dog, only a small area is considered, so the area -- the cumulative impact area varies by resource. The different activities that we considered were the oil development, other oil development within the project area which will occur, other oil development on the reservation. There is

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quite a bit of oil development planned on the reservation. There -- there are several leases, I believe, existing leases.

MR. GARLAND: Is this coal bed methane?

MS. FISCHEL: It doesn't include that because I wasn't informed that coal bed methane was a reasonably foreseeable activity. If it turns out to be, then we would include that. It includes recreation, which is a pretty minor activity, although there's a fair amount of hunting, it includes residential development, it includes other mining, such as gravel and sand and --

MR. GARLAND: What about transportation?

MS. FISCHEL: Huh?

MR. GARLAND: How about transportation? How about the increased traffic flow, the road conditions, the bridges --

MS. FISCHEL: Yeah. That's -- that's all considered in cumulative --

MR. GARLAND: -- cumulative input into the environment from both air and water standpoints?

MS. FISCHEL: Right, those are all --

MR. GARLAND: The impact on the residents in the area?

MS. FISCHEL: Yes, residents --

MR. GARLAND: Is there any impact on the residents

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in the area? I mean, do you consider that type of --

MS. FISCHEL: No.

MR. GARLAND: Is it moderate? Is it heavy?

MS. FISCHEL: I would have to look. Just look at the handout, see what it says. It's -- it's variable.

MR. GARLAND: Okay. Thank you.

MS. FISCHEL: Overall, residents are -- they're relatively -- compared to the city of Riverton, there's relatively few residents, and the studies that have been done do not indicate that there's going to be a lot of increase in residential development over the next 20 years.

MR. GARLAND: So the -- the conclusion is there's no cumulative impact from this EIS?

MS. FISCHEL: No, that's not the conclusion.

MR. NATION: There hasn't been a conclusion yet. That's kind of why we're here, Bill, because we're trying to get comments from you. You've been, I guess, asking us questions, but I guess we're taking them as comments, you know. You just made a comment about do we consider cumulative impacts as far as residents and anything to do

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with residents. I guess if you have a comment or a concern regarding that, I guess we need to hear that.

MR. GARLAND: Well, I think you've heard it from several of us here today. We have oil wells in our front yard. We figure that's an impact on us.

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MS. FISCHEL: Yes, that is.

MR. NATION: And that's what we need to hear. Rather than asking questions, you might tell us, if you would you like to comment --

MR. GARLAND: Probably don't have time for me to tell you what my problems are.

MR. NATION: That's the purpose of the meeting, and then, of course, you can provide written comments up to the 30th regarding some of your concerns and comments on some of the things that you feel are being impacted out there.

MR. GARLAND: I guess my question really is, why are we doing the EIS if you don't consider these things?

MS. FISCHEL: We are considering these things.

MR. GARLAND: You are considering them and you haven't decided, am I understanding you correctly?

MS. FISCHEL: They're addressed in Chapter 5, and --

MR. GARLAND: You've made no decision; is that correct or not?

MS. FISCHEL: I would suggest that you read Chapter 5 to see what the --

MR. GARLAND: Okay. I'll read Chapter 5.

MR. BLENKINSHIP: The impacts are identified in the document, the impacts --

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MR. GARLAND: Have any conclusions been made --

MR. BLENKINSHIP: The impacts are identified in the -- categorized in the --

MR. GARLAND: Any conclusions been made about whether there --

MR. BLENKINSHIP: Draft conclusions.

MR. GARLAND: I guess I'll read Chapter 5.

MR. BLENKINSHIP: Marion, one other point, when there is a range of impacts from negligible to moderate or major, what that means is within the wide area, some places --

MR. GARLAND: 92,000 acres.

MR. BLENKINSHIP: -- some places will be negligibly impacted, some places will be moderately impacted. It depends on what the resource is in each one of those areas, whether it's a transportation resource, a water resource, an air quality resource. Some places the impacts will be substantial; some places they'll be negligible for each resource.

MR. GARLAND: And that covers the 92,000 acres?

MR. BLENKINSHIP: It -- it -- it talks --

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MR. GARLAND: Well --
MR. BLENKINSHIP: It talks about every area. I would really suggest that if you have an area of specific interest, you look at it, because those issues are addressed

in the EIS.
MR. GARLAND: I apologize.
MR. BLENKINSHIP: No, no.
MS. FISCHEL: You don't have to apologize.
MR. BLENKINSHIP: This is what it's here for.
MS. FISCHEL: The difference, for example, the Proposed Action versus Alternative A versus Alternative B, if you look at increased sedimentation in lakes, for the Proposed Action, it's considered to be minor and short term; for the Alternative A, which is a lot more wells, it's moderate and short term, minor and long-term; for Alternative B, which is fewer wells, it's considered to be negligible.

These determinations were made by experts in the field. We had specialists for each of these areas. They evaluated the information they had available, and these are their determinations. I didn't tell them to make those determinations. Those are determinations they made based on the best information they had available.

And then if you look at socioeconomics, it does address residences. Let's see. Noise, for example, addresses -- compressor stations, the impacts for all of the alternatives, except for the No Action, are moderate and long-term, so those are substantial impacts. They're moderate.

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So I think this table will help you a lot in understanding what the experts in each of these areas have determined.
MR. GARLAND: Thank you. I'm sorry.
MS. FISCHEL: Yes.
MR. WALKER: I have a hard time understanding how you can draw those conclusions if you don't know exactly how the rights are going to be developed. I mean, you have it -- I mean, basically, the position that the surface right landowners are in, they have absolutely no recourse with the developer. They can do whatever they dang well please. That's a fact. I think they've shown that to the point of, you know, aggravating the landowner whenever possible as far as I'm concerned, but -- but this EIS doesn't -- I mean, I like the idea of having an 8-foot -- 8-foot square foot well, that's a great concept. I don't know whether it's realistic or not, but the fact of the matter is what happens after this is totally unknown, and this EIS hasn't really addressed that. What's going to happen? How are they going to develop these mineral rights?
MS. FISCHEL: It hasn't --
MR. WALKER: What is the real impact going to be?

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MS. FISCHEL: Yeah. It hasn't addressed them in detail because the operator hasn't determined exactly where the wells are going to be, so the document is the best that

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we can do with the information that is presently available.
MR. WALKER: What it should do is, you know, what are the assumptions behind those conclusions. This is the guidelines for developing, and I think you've done a reasonable job of that, and here's the recourse for the landowners who -- who don't believe that the developer is following these guidelines. How do they -- how -- I mean, there's this jurisdictional thing that just never goes away. How do they -- how do they -- what is their recourse if they don't believe a developer is following the guide- -- the intent of this EIS? How is that addressed? Is it addressed in here?
MS. FISCHEL: The mitigation that the operators have agreed upon is in there, and I suppose you could take that with you and say, "This is what you proposed to do. Why aren't you doing it on my property?"
MR. WALKER: I just -- you know, I think this is just too vague. That would be my conclusion is you can't draw any conclusions unless you know how the mineral rights are going to be developed. You can't tell what the impacts are. That -- that's -- you know, that's what I would conclude from this, because if -- if the past is any indication of the future, then it's not going to be pretty, and like I said, you can drive around out there now, and you can see that there hasn't been a lot of care taken with

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regards to anything, whether it be the landowner or the environment or you name it. That's my personal opinion, and if that doesn't change, then you're going to get these attitudes every time we have one of these meetings.

And unfortunately, you people don't have the control over that, the developer does, and that's just the way they do business. That's -- and unless this EIS can do something about that, the conclusions that you draw there in terms of the social -- socioeconomic impacts are just, you know -- you're right. It's what's -- you know, black on a white piece of paper. It just doesn't say anything.

So if you can put in it's an 8 foot -- square foot pad and you can put in a proposed well density and they're not all on one individual landowner, for example, which is, in fact, what's happening out there, there are -- there are people who are massively affected by this development. You know, we all support the minerals industry in this state. We all appreciate it. We all want to see the minerals developed, but we want to see it done responsibly. The fact of the matter is it has not happened, and this EIS is not going to help. That's a fact.
MS. FISCHEL: The EIS is not a decision document in the sense that it's going to say at Mr. Smith's property,

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you can only drill one well.
MR. WALKER: I'm just saying unless you have or

propose -- at least propose how these minerals should be developed so that -- so that, in fact, the conclusions you draw are relevant, then this document is meaningless. If what continues -- if what goes on in the future is what's happened in the past out there, it's just going to be a mess. It's already a mess, but it's going to be -- I mean, there's -- there's absolutely no substance here.

MS. FISCHEL: Well, I appreciate your comments.

MR. BLENKINSHIP: I guess we would just suggest that you read the sections that are of particular interest and read the mitigation sections, and we welcome your comments on whether those mitigation measures are adequate or inadequate in your opinion.

MS. FISCHEL: In Chapter 2, there's a whole section that deals with the mitigation options, probably about several -- several pages.

MR. BLENKINSHIP: And in Chapter 4 under each --

MR. GARLAND: How are you going to mitigate the well density?

MS. FISCHEL: Well, that -- that is cast in stone. That's determined by the -- by the BLM and the Wyoming Oil and Gas Commission, and it's --

MR. GARLAND: I know it is. And I know the surface owner doesn't have anything to say about it. It's whatever the developer wants to do.

MS. FISCHEL: I think the BLM determines based on the characteristics of the formation.

MR. GARLAND: Sure, they do. It's -- it's an extraction of a mineral, which is logical, there's nothing wrong with that, they protect their royalties (phonetic), and there's nothing wrong with that, but that's as far as it goes, but when you have development like we have here where well density is a major impact, at least you ought to address it in the EIS, I think.

MS. FISCHEL: That's -- that's not a --

MR. GARLAND: I would make the comment that it should be addressed in the EIS because the cumulative impact is that it's devastating to some of the farms, like my place, for example, and some of my neighbors. Now, that's fine. You know, we can be sacrificial lambs for the mineral industry, I understand that. We're just very few people. But don't come in here and tell us that this is, you know, something that it isn't.

MS. FISCHEL: Are there any additional comments?

MR. NATION: Any more comments?

Like I said earlier, tomorrow night, we're going to have another meeting in Rock Hall at 7 o'clock in Fort Washakie. 7 o'clock.

I guess thanks for coming, and thanks for the

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comments. I appreciate it.

MS. FISCHEL: Thank you.

STATE OF WYOMING)
)ss.
COUNTY OF SWEETWATER)

CERTIFICATE OF REPORTER

I, LAURA J. HAMM-HILLS, Professional Reporter and Notary Public, do hereby certify that I was authorized to and did record in stenotype the foregoing; that the foregoing pages numbered 1 through 66, inclusive, are a true, correct and complete transcript of aforementioned stenographic notes as reduced to typewritten form by me.

I FURTHER CERTIFY that I have no interest in the outcome of these proceedings, being in no way related to any of the parties.

DATED this 30th day of August, 2004.

_____
Laura J. Hamm-Hills
Court Reporter/Notary Public

TRANSCRIPT 2

BUREAU OF INDIAN AFFAIRS
WIND RIVER AGENCY
FORT WASHAKIE, WYOMING

WIND RIVER GAS FIELD DEVELOPMENT DRAFT EIS
Public Meeting
August 11, 2004
7:05 p.m.
Fort Washakie, Wyoming

TRANSCRIPT OF PROCEEDINGS

A P P E A R A N C E S

BUREAU OF INDIAN AFFAIRS: Ray Nation

COOPERATING AGENCIES:

BUREAU OF LAND MANAGEMENT: Stuart Cerovski
FREMONT COUNTY COMMISSIONER: Pat Hickerson
SHOSHONE AND ARAPAHO TRIBES
JOINT BUSINESS COUNCIL: Don Aragon
BUYS AND ASSOCIATES: Marion Fischel

(Whereupon the following proceedings were had:)

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P R O C E E D I N G S

MR. NATION: Welcome to tonight's meeting. My name is Ray Nation. I'm the Environmental Coordinator for the Bureau of Indian Affairs. This meeting tonight is being conducted to seek oral comments on the Draft Environmental Impact Statement for the Wind River Natural Gas Development Project. This is the second meeting being held for this project. There was one held in Pavillion last night.

The Draft Environmental Impact Statement was made available for public review beginning July 16th,2004.The Notice of Availability was published in the federal register and also in the local newspapers. I think it was first published on the 16th, and that's how we notified people. I can't remember when it was published in the federal register.

MS. FISCHEL: 16th.

MR. NATION: 16th.

Topics of tonight's meeting include the NEPA process, the tentative future of the EIS schedule, the contents of the EIS, and the receipt of oral comments. Oral comments will be allowed to be given following my presentation and Marion's presentation.

The National Environmental Policy Act is all federal agencies' national charter for protection of the environment. Also, when federal agencies approve federal

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actions, oil and gas leases, projects like this, they have to comply with the Council on Environmental Quality Regulations. A NEPA document or Environmental Impact Statement is just a disclosure and planning document. Any NEPA document is to ensure that environmental information is made available to the public before decisions are made and the actions are taken. This Environmental Impact Statement is not intended to address or fix any regulatory or jurisdictional issues that are pending.

In November of 2002, the BIA and the Tribes received a proposal from -- from three oil companies. Their proposal and intent was to drill an additional 325 wells out in the Pavillion, Muddy Ridge and Sand Mesa areas. The scoping area comprises of approximately 90,000 acres. Public scoping meetings were held in Pavillion and Fort Washakie in the month of November to discuss the comments concerning the companies' Notice of Intent. All oral comments and written comments that were received at that time would have been incorporated and addressed in this Draft Environmental Impact Statement.

This EI process includes determining the scope and significant issues to be analyzed in the Environmental Impact Statement. Also submitting the Preliminary Draft Environmental Impact Statement to cooperating agencies, which these things have already been done, submitting the

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Draft Environmental Impact Statement to the public for a 45-day comment period. That's the period we're into right now. And then also holding public meetings during public comment to receive oral comments from -- from all interested parties, in addition to the written comments.

The NEPA team, interdisciplinary team, consists of the Bureau of Indian Affairs, which is the elite agency. It also comprises of three cooperating agencies, the Shoshone-Arapaho Tribes, Fremont County Commissioners and the Bureau of Land Management. All agencies have provided the -- the lead agency, which is the BIA, their levels of expertise in preparation of this Draft Environmental Impact Statement.

These cooperating agencies brought to the team their levels of expertise; the County regarding transportation and socioeconomic, the Tribes, the socioeconomic, transportation, environmental, and of course, the BLM provided a lot of technical assistance regarding a lot of the down hole, reservoir and spacing information.

Other team members include the public, other agencies, other organizations, and of course, the landowners.

TRANSCRIPT 2 continued

We have representatives tonight here from each cooperating agency. I would like to maybe have them just briefly talk to the audience as far as their role in this

EIS process. First, I would like to call Stuart Cerovski up here. Stuart is a petroleum engineer for the Bureau of Land Management.

MR. CEROVSKI: Thank you, Ray. Again, I'm Stuart Cerovski, and I just want to go over a few things. Like Ray said, we're a cooperating agency, which means we signed a Memorandum of Understanding that says we would participate in this development of this EIS with the BIA as lead agency, and the main purpose of -- of the BLM participating as a cooperating agency in this agreement is because the BLM has the federal laws and regulations that govern the development. In other words, the operational aspects on the grounds once they get going, and so we'll provide that information and have provided that information to the BIA.

We also have a reservoir management group in Casper, Wyoming, that is staffed with reservoir engineers, reservoir geologists that provided some data for us concerning the oil and gas resources in the area and any verification of reasonable foreseeable development scenarios.

One aspect of the MOU that we pulled in kind of at the last minute, I guess, was we do have an air quality specialist in our state office that reviewed the Draft document and provided comments to Buys and Associates and the BIA on the air quality aspect of this document, so in

essence, we're here to provide comments to the BIA, as well as review the document for what we feel is technically correct information within it, so that's pretty much our role as BLM.

We will be also approving the applications for permits to drill once things get rolling to drill in the project area, so --

MR. NATION: Thanks, Stuart. I would like to call on Pat Hickerson. Pat Hickerson is on the -- one of the Fremont County Commissioners.

MR. HICKERSON: Hi, everybody. Basically, the County Commission was interested in this process for several reasons. The -- we're interested in the impacts on our infrastructure, our roads and bridges. Primarily, we're responsible for the maintenance of those, and the kind of activity and the levels of activity that are proposed are going to have some significant impacts on those, so we're concerned about making sure those are mitigated and -- and making sure we can do some long-term planning to better prepare our roads for that kind of impact. We've -- we've got some bridges we have concerns on and things like that.

We're concerned about the economic stability in Fremont County. This kind of project is significant to our tax base. It creates a lot of jobs for our citizens and those kinds of things. We're also concerned about that.

We're -- we're concerned about making sure the citizens that live out there get a fair shake, that they're -- the environment is taken care of properly, and -- and those people can continue to farm and ranch and make a living and -- and you know, that's -- that's a long-term thing for Fremont County as well, and they're important to us as well.

We are and have provided some information to the BIA in terms of the economic -- socioeconomic things in the county, et cetera, so that's kind of our role, and I'm actually not participating all that much. I'm kind of filling in for Doug Thompson tonight because he's been campaigning pretty heavily, and he's had a hard time scheduling these meetings with everything else.

You know, we have worked through the preliminary documents and -- and made comments, and we intend to continue to participate, try to make sure that things are properly planned for and -- and have good mitigation for any of the expected problems that we have.

Thank you.

MR. NATION: Thanks. I would next like to call Don Aragon up here. Don's the Executive Director for the Environmental Quality Commission. He's been involved pretty heavily on all of the reviewing of the air quality and water quality information that's in the document.

MR. ARAGON: Thank you, Ray. On behalf of the Shoshone and Arapaho Tribes, we're extremely pleased to see an Environmental Impact Statement done on this project out there because it's the first one that's ever been done on the Wind River Indian Reservation, and what we want to do is make sure that the information that goes in there is accurate and that it serves the purposes of what the Environmental Impact Statement is supposed to do, which is, number one, the protection of the environment, but also, the protection of human health and safety is a real high concern of ours, and that's our primary role in this.

We, as a cooperating agency, have given the BIA and Buys just about all of our data, and we have several experts in our office that have assisted in reviewing the documents here. We have hydrologists, geologists, biologists and chemists, and all those kind of specialties that work in our program, and they have provided some excellent information to the BIA and also to Buys in putting this EIS together, and so, you know, we're -- we're available, and we have our offices here if anyone wants to give us a call or ask us any other questions, you know, we'll be glad to work with you in any way that we can.

I did talk briefly today with some of our councilmen, and they really feel that, you know, we ought to

TRANSCRIPT 2 continued

stick to working on the concerns of the EIS itself and stick

with that document, sticking with the NEPA policies, so that we can develop a tool that can help us all in the development of this area out there.

Thank you.

MR. NATION: Thanks, Don. The Draft Environmental Impact Statement consists of three volumes. I'm not sure if any of you got hard copies. A lot of people were sent cds, but it consists of three volumes. The first volume is the actual Draft Environmental Impact Statement, has all of the -- includes all of the associated chapters which Marion will talk about a little bit later.

Volume 2 is the appendixes section which contains all of the mitigation and reclamation guidelines, the wetland and wildlife inventories, the water resource data, and all the cultural and visual resource information that's been compiled.

Volume 3 is the technical support document addressing air quality. Pretty lengthy discussion on air quality. There was quite a bit of data to try to sort through.

Copies of all three of these documents in volumes are sitting back there. If anybody would like a hard copy, just get with us later on after the meeting.

The purpose of tonight's meeting is to, of course, receive oral public comments. When you want to comment,

would you please stand up so we can hear you more clearly. This is a fairly good-sized room, and it's -- you have to speak up a little bit. Go ahead and state your name and then your affiliation on -- like who you work for or whatever.

All your comments should focus on the scope and the adequacy of the analysis, and of course, this is being recorded, and they'll be part of the official record, and everything will be transcribed later on.

Tonight we can't respond to any of the comments. I guess I would like to hear more comments and actually not questions. If you're asking a question, unless it's a technical question, we won't answer you, so when you provide something, at least try to provide comments, please.

Once all the comments are received, the BIA will go ahead and review those comments and respond to them in the -- in the final draft -- in the Final Draft Environmental Assessment.

The tentative schedule for the remainder of this EI process, like I said earlier, right now we're in the 45-day comment period for the public and anyone else to review the Draft Environmental Impact Statement. The comment period closes or ends August 30th of 2004. Revisions will be made based on comments received. The Preliminary Final Environmental Impact Statement will be

submitted to the cooperating agencies for review, and then the Final Environmental Impact Statement will be distributed to the public for a 30-day review period. Once that's done, a Record of Decision, or ROD, will be signed, and then there will be a 30-day -- a 30-day appeal period after that -- after that ROD is signed, and then that will end the EIS process. We're looking at sometime in December. Like I said earlier, this is kind of a tentative date for right now.

I would like to turn it over to Marion. Marion Fischel, she's our project manager for the EIS. She works for Buys and Associates. I ask that you -- as she goes through her presentation and discusses the contents of the EIS, I ask that you refrain from making any comments until she's completed with her presentation, and when she's through, then we can go ahead and open it up to comments.

Thank you.

MS. FISCHEL: I want to thank you all for being here, and I will give you a quick summary of what is contained in the Environmental Impact Statement so that you have some background if you haven't read it yet, and we'll also be receiving your comments. As Ray mentioned, they're being -- they're going to be recorded, and after the 30th of August, we will be going through all of the comments and addressing each comment one way or the other. So we look

forward to your comments, and we'll respond to them.

I just thought I'd -- chose some maps and photographs, and they're also on the side of the room. This map shows the general project area, including Riverton and the five development areas; Pavillion, Muddy Ridge, Coastal Extension, Sand Mesa and Sand Mesa South.

And as you can see from this slide and this map, most of -- almost all of the development to date has been in Pavillion and Muddy Ridge. There are only three wells in Sand Mesa, no wells in the other development areas, and so those are exploratory fields.

There are two main streams. Five Mile Creek is at the southern end of the slide, Muddy Creek is further up, and those creeks run throughout the year. They're perennial creeks. There are some other water bodies, Middle Depression, Cottonwood Drain, Cottonwood Creek, and some of these are intermittent, and Ocean Lake and Boysen Reservoir, all of which flows into the Wind River.

This is a photograph taken at one of the production facilities showing a well, a storage tank, a metering station and a separation unit. This also shows a production facility in an agricultural area, and this shows Middle Depression with the wetlands around it and some pronghorn antelope. So this gives you a little background.

The Draft Environmental Impact Statement consists

TRANSCRIPT 2 continued

of six chapters. Chapter 1, Purpose and Need; Chapter 2 discusses the alternatives; 3, the Affected Environment; 4, the Environmental Impacts or Environmental Consequences; 5, Cumulative Effects; and 6, Coordination and Cooperation, and I'll be talking briefly about the contents of each of these chapters, and all of that information is in Volume 1 of the EIS.

The Purpose and Need is Chapter 1, and it is to drill and develop the gas resources on both private and tribal minerals. The BIA program encourages that, and the goal is to maximize the economic interest of the Tribes. So that is basically what is discussed in Chapter 1. It also discusses regular -- the regulations and statutes that are evaluated -- not evaluated, involved in this process.

Chapter 2 is a more lengthy chapter and deals with the alternatives. In this particular Environmental Impact Statement, there are four alternatives with the existing field, which is 178 producing wells, considered with all of the alternatives. The Proposed Action is the -- is the alternative that the operators have requested of the BIA, and that's 325 new wells.

The Alternative A is a much larger number of wells, 485. Alternative B is a smaller number, and Alternative C is the No Action alternative, which is required on -- under NEPA, and I'll have a slide of each of

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these that I'll be going through next.

The Proposed Action, the life of the project, that's what LOP stands for, is expected to be about 20 to 40 years. What will result from the Proposed Action, aside from the development of gas, is some disturbance. Disturbance from well heads, access roads, pipelines and compressors and other facilities. The disturbance -- the short-term disturbance that was calculated, and that is the initial disturbance, is approximately 1982 acres. After the initial construction and reclamation, the residual disturbance will go down to about 423 acres, and if you look at the percent of the disturbance, it's .46 percent is the residual disturbance for the whole project area. Whereas, if you just consider the five fields, the disturbance is about twice as much, which is 1.1 percent, so we looked to disturbance in two ways. Both from the field as a whole and from each -- well, the project area as a whole and from each of the five fields.

Alternative A was developed -- all of these alternatives, by the way, were developed based on the comments that were received during the scoping process, which is the initial comments received from the public.

Alternative A was developed for increasing the revenues to the Tribes, the County and other entities, and also, because at this time, there is an increased demand for

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natural gas.

However, the disadvantage of Alternative A is it will result in increased environmental impact, and it gives you the success rate, the life of the project, which is longer because each -- during each phase of development, the same number of wells will be drilled as were the Proposed Action, so it will just go for more years.

The initial disturbance is higher, and the same is true for the residual disturbance, and the percent of impact is .67 for the whole project area, and 1.6 for the five fields. And the residual disturbance means the disturbance after the pipeline right-of-ways have been reclaimed, after the well pads have been reduced in size to the minimum necessary, and after the roads have also been reduced.

Alternative B was developed because there was a lot of concern about the potential environmental impacts from this action, and so by decreasing the number of wells, you will decrease the disturbance, and the disturbance is -- residual disturbance is much less than the others. It's 325 acres, and also, a smaller percent.

The fourth alternative is Alternative C, and that's the No Action alternative, and what that means is the denial of the request by the Proponents to drill. However, even when their request is denied, because there's private property and private minerals, the Proponent can drill on

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private minerals, and there are about a hundred new wells would be developed, and the only area of those five development fields that has private minerals is Pavillion, and so under the No Action, all the drilling and all the disturbance would be in the -- in the Pavillion field.

And all those hundred new wells, the majority of them would be on private minerals, however, there are going to be some wells drilled on tribal minerals, and this is required by the BLM to make sure that tribal minerals are not drained, and so if there's a -- a well going to be drilled on private minerals that is near tribal minerals, wells will be drilled on both sites.

Now, in addition to considering those four alternatives which were analyzed in detail, there were several alternatives that were considered but not analyzed in detail. And very briefly, extending the life of the project was -- instead of the life of the -- of the drilling going on for a dozen years, it would go on for about 30 years, and the objective was to increase the revenues. However, when the -- when it was analyzed, it was shown that it would actually decrease the revenues, and so that's why it was rejected.

Directional drilling was not analyzed in detail because it is incorporated in the Proposed Action and Alternatives, and a detailed discussion on directional

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TRANSCRIPT 2 continued

drilling is in Chapter 2 of the document.

Phased Development, which means X number of wells per year, let's say 10 wells one year, 12 wells the next year and so forth, was not analyzed in detail because it is incorporated in the Proposed Action and Alternatives. This is what the Proponent is proposing to do. The exact number of wells have not been determined.

A Natural Resource Protection alternative is also included in the Proposed Action and Alternatives, and those are the mitigation measures, and the Proponent has committed to numerous -- probably around 15 or 20 mitigation measures that will be included in the Proposed Action and Alternatives, and therefore, it was felt that this was redundant and not necessary.

Another issue that was raised in scoping was having all wells at kind of equal distance at 40-acre distributions, and that was rejected because it is counter to -- counter to the spacing orders that both the BLM and the Wyoming Oil and Gas Commission have, and there is more detail in Chapter 2 on these topics.

Chapter 3 is a pretty large factor -- chapter because there's a lot of affected environment, and that includes the soil, the air, transportation, cultural resources, recreation, threatened and endangered species, health and safety issues that Don Aragon raised, noise,

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wildlife and others, so there's a pretty lengthy discussion about each of these resources and issues.

The next chapter deals with the impacts to each of these resources, so it deals with the impacts to wildlife, the impacts to vegetation, impacts to air quality and so forth.

And for this EIS, we defined four impacts ranging from negligible, which is essentially below the level of detection, to major, which is an impact which would have a regional effect.

Now, the impact, whether it's negligible or whether it's moderate, varies on the alternative analyzed. In Alternative A where you have 485 wells, you're going to have a much larger impact than Alternative C, the No Action where you have a maximum of a hundred wells.

It varies with the location. The impact would be higher in the Pavillion area than in Coastal Extension. It varies with the resource, whether it's water impacted or air, so the impacts are quite variable, and it depends on these factors, as well as others, but this just gives you an idea of some of the factors that will affect the impacts that were determined by the experts.

Short versus long-term impacts are defined as well, and short-term impacts are what I also refer to as the initial impacts and are impacts that would occur during the

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construction period up to the reclamation period. Long-term impacts may persist through the life of the project.

Cumulative impacts are defined specifically in the regulations under NEPA, and their definition is shown in this slide here, which is the impact in the environment which results from the incremental impact when added to past, present, and reasonably foreseeable future actions, regardless of the agency that -- or person that undertakes the actions. And the impacts -- cumulative impacts can be individually very minor, but when they're all added together, can be quite significant.

The cumulative impacts that were evaluated in this particular EIS are the existing gas development, the 178 existing wells, other oil and gas development that is likely to occur on the Reservation, not necessarily in the project area, sand and gravel mining on the Reservation, and also, may possibly occur in the project area. Agriculture, livestock grazing, additional residential development and commercial development, such as the new casino that is anticipated I think in the next few years.

So these are all the factors that were considered in cumulative impacts, and the cumulative impacts are going to be greater than the individual impacts of each activity by itself.

The last chapter is Consultation, and this chapter

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is very simple. It lists all the participants in the process, including those of you that are attending the meetings. The landowners, businesses, organizations, and so forth, and also identifies the preparers of the document, Buys and Associates, which is -- has prepared the document, has several experts that were responsible for each of the different resources potentially impacted.

So this gives you an idea, sort of a thumbnail sketch of what the contents of the EIS is. It's rather short. The document, as you can see, is quite voluminous, but it at least gives you a feel for what is contained in each of the chapters, and now we're going to open this to those of you that are attending here that indicated that you would be interested in making comments.

And as a reminder, please state your name and affiliation so that our recorder can get that correctly. Stand when you make your comment. We cannot respond to your comments at this time because the comment period does not end until the 30th of August, but the whole idea of this meeting is to receive your comments so they can be considered in making whatever changes are necessary in publishing the Final EIS, so Ray, it's all yours.

MR. NATION: I guess at this time, we'll go ahead and open it up to comments. Like Marion said, if you want to provide a comment, if you would just stand up and state

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your name and affiliation and try to speak clearly so we can understand what's being transcribed in these tapes.

TRANSCRIPT 2 continued

I noticed when you signed in, there was only one or two people that actually signed in saying they wanted to comment. I guess, Laurie, you were one of them.

MS. GOODMAN: Okay. I'm happy to begin. Thank you for this opportunity to do this.

My name is Laurie Goodman, and I'm the environmental consultant here on behalf of the Garlands and representing other landowners who are concerned about the development in their area.

I have several comments that I would like to be considered when you go forward with your Final. Number one is the sum of the initial things. At the beginning when you list that there is a NEPA team that has been put together, and then you also mention it in Chapter 6, that landowners have been a part of this process, I appreciate the impression that you're trying to create with that, but I think it's important that we clarify the reality of this, that landowners have never been a part of this team; that we were invited to a scoping two years ago, some people showed up and did that, and we have not been included in any of the analysis. We have not been asked to present any information as far as the impacts on our private lands during this process. We are only given -- we've been given about 15

days to take a look at this before we came to this meeting tonight, and then we are asked to limit our comments to substance only when that's in response to an industry and organizations and agencies who have literally participated with you on a daily basis and presented the inputs to all of this data.

So there are some people that you list as your NEPA team that truly have been treated as team members. The landowners are not part of the team, and I would like that to be clarified so that you stop saying that in your documents to infer that, in fact, you have met your obligations to include the public.

The second thing I would like to address is the notion of the cost -- well, your conclusions that state that there are long-term benefits on the socioeconomic side, but you also reveal that there are long-term adverse consequences to the landowners, and I appreciate that you're meeting your legal responsibility to state that, but I think you're falling far short of actually being able to reveal that to the public and let us actually see that. You stated that the whole purpose of this public comment is to show the public what the impacts are, but you really haven't done that. You just simply state that there is long-term consequences and -- and benefits.

What I would like to see and what I would suggest

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to you is that you do a true cost benefit analysis showing what the impacts really are. Out of the jobs that are going to be created, which will be oil field jobs, what types of jobs are those? I would like the document to show how much those are paid per hour, if those are actually residents of the community, if they will own property in the community, if they will participate to our tax base, or if they, in fact, are renters to the community or will, in fact, behave a little bit like man camps and leave as soon as the boom is over.

That has a very significant impact on the long-term community versus the jobs that you're going to replace, which you acknowledge you're going to replace and have a consequence of split estate owners. These people will be participants of the property tax base, in fact, probably will be still paying property taxes even though they can't do anything with their lands, but nonetheless, I would just like a more significant cost benefit analysis done on your socioeconomics. These people that endure this, it is, after all, their lives.

The comment period, I want to get back to that. You know, you've given us 45 days to comment on over a thousand pages of very, very technical data. Again, I know for a fact that the industry is able to submit parts -- data into that analysis on the air quality data, on surface

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impacts, and they probably have been given the opportunity, I would like it to be clarified in your Final, as to which committees they were actually on, did they get to peer review the air quality data and the modeling that you used.

If, in fact, that is the case and they were able to do that, it's all the more of a reason why we as landowners deserve more time to participate. You've told us at the very beginning of the document that you don't want qualitative comments, you want substance. If you want us to give substance and this administration truly cares about the public's input, give us time to do that. We are, after all, in the middle of haying. We're in the middle of our busiest time of our agricultural year.

This notice was presented in the legal section of the newspaper. If you really want a public comment, you would have sent letters to all of the affected landowners, you would have posted it at the Post Office, you would have, in fact, submitted it to the agricultural organizations so they could put it in their newsletters. People don't even know. And then on top of it, they don't get to make qualitative statements. They're supposed to actually comment on an air quality model. It's just ridiculous to assume that people can do this within 45 days, and if you want our comments and you want us to be a constructive part of the team, give us time to do that. We're going to come

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back to that point again and again.

I also want, with regards to the air quality analysis, of course, I haven't had a chance to go through that 500 pages, although I do look forward to that

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TRANSCRIPT 2 continued

opportunity, the analysis -- I have to ask you a question. I would like it to be revealed in the Final document if, in fact, you have run that analysis in conjunction with the statewide cumulative analysis. As you probably know, the BLM has recently been sued by the Environmental Defense Fund with regard to their air quality analysis in the Powder River Basin. That case makes the point that minor sources are, in fact, having a cumulative impact statewide. I think to be fair on the federal government's point of view, this -- this analysis has to be included in that so that we can stop looking at things in just a square box and actually look at the impacts that we're going to have as -- as a state, so that the State DEQ can begin to get a handle on these minor sources, so I respectfully request that you include that cumulative analysis in your -- in the next go round.

Of course, I don't know how you're going to be able to do that in the short period you've got going here, but maybe you can.

I would request, thirdly, that you do another analysis on your mitigation. I appreciate that there's a

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list -- I did read about 17 things that the operators have offered to do for the landowners. I find it sort of interesting that there's not been a dialogue or anything within this process actually asking the landowners what would benefit them, and I think that would be an important part. There may be some things that have been overlooked by the oil and gas companies.

I would like to see an analysis done that actually shows how the surface impacts can be reduced with some significant voluntary measures. Not simply staying out of our fields only in the winter months, which is nice, but frankly, we would like them to stay out of our hay fields at all times, and we figure they can do that through directional drilling.

I note in the document that it stated that you will limit yourself to directional drilling only if they are prohibited by the Endangered Species Act or by some technical issue, that they can't get there, but in fact, the reality is if they were required to do directional drilling to minimize the surface impacts, there might be a greatly reduced amount of impact to landowners, and the public deserves to know that. It might cost the companies more, and I think that would be fair to include in the analysis as well to show them how much more, but there are great ways to further reduce the surface impacts that you guys haven't

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even shown in your analysis.

I would like one that shows the reduced surface impacts to split estate lands and private property from requiring directional drilling, centralized facilities, piping of condensate to reduce water and telemetry for well

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reporting. Those are all issues that are best management practices that are in force in several other fields in Wyoming, as well as throughout the west, and there's no reason why we can't see through your analysis how the inclusion of those technologies might reduce surface impacts because, again, it is our land.

And I'm happy to have the cost, also, show because I think it would be interesting for people to be able to see the amount of revenues that these wells are generating per well and the revenues that are going to the companies and the minimal amount of costs that would be required to do these things that will make a significant difference to those people who still own the land.

I would like your analysis to also include a cost and a presentation of the true reduced values of the land. Quite frankly, I find it a little bit offensive, it's wrong, it's disingenuous, and it's purposefully misleading, in my opinion, for the BIA to release a document that simply states that the long-term impacts of this are .46 percent of the project area, which is overinflated to start with, and

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limits the damages solely to the dirt turned. As everyone knows in this room, the damages to an area are far greater than the well pads, and when you don't acknowledge that and when you don't have an analysis that shows that, you're not meeting your obligation to tell the public what's going to happen to them, and what, in fact, they're going to look like.

I understand and appreciate the fact that you can still do what you want to do and you can still have the amount of -- you can claim there are even more damages and you can still permit this number of wells, but you have fallen sorely short of actually revealing to the public what the true damages are, and until you include an analysis that goes beyond the dirt turned, you're falling short of your obligation to reveal to the public what the impacts are.

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I do have a question about this analysis. I'm not quite sure -- I couldn't figure it out if it includes the impacts from just the future 353 wells, or if it's an analysis of the 300 plus the 178 you have been permitted to be drilled without appropriate environmental analysis. If, in fact, the impacts are run on the -- that would almost be 520 wells, then I think that should be clarified in the Final. If they are, great. Just let everybody know that you did run the analysis on it, total number of damages of the past 178 plus the new ones. If, in fact, you're only

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limiting the analysis to the newly-drilled wells, the 353, I would offer, again, that you fall short of your obligation to share with the public the true impacts, and you're going to have to run some more analysis.

There's a spacing discussion that you mentioned a few times not only in the presentation today but also in

TRANSCRIPT 2 continued

Section 2.8.5 which claims that you are limited to one -- that you can't be limited to one well per 40 sections, which was brought up during scoping, because of the requirements of the Oil and Gas Spacing Commission. I would like the Record to show that the Oil and Gas Spacing Commission sets spacing for bottom holes, not for surface locations, and it's disingenuous for you to say to the public that you have no discretion to try to limit the surface locations because of something that the state agency has done, when in reality, you can meet every bit of the state agency's spacing requirements and still limit the surface locations to one per 40 or one per 80, quite honestly, if that was determined to be important for the landowner, and as long as you can still get your bottom holes, which are one per 20 or one per 10, I don't think that the industry would be affected by that.

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Let's see. I'm just about to wrap it up.

I'm concerned about the reclamation and the water quality, and I -- I haven't actually been able to get into

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that analysis, and I'm sure that the EPA will do that, and I'll look forward to their comments, but I'm particularly concerned about the comments by the Bureau of Reclamation and the Midvale Irrigation District. I'm assuming that you did, in fact, talk to them since much of this is their lands or land that they withdrew in an effort to meet certain obligations that they had by Congress, and I'm curious to know how they responded to these impacts to private lands, to surface lands, to water qualities, given that as an agency, I'm sure that they're pretty impacted, so I would like to see that in the Final document as well.

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And for now, that will summarize my comments and what I would like to see come about in the Final when you do do that. Again, I do want to repeat I know it's going to throw off your time line a little bit, but I would be happy to work with people that I know within the administration if that would help you to get an extension beyond what you determined is a December, you know, final decision and actually give us some time. This is going to affect people's lives for 20 to 40 years, as you stated. Forty years. That's two generations of people that are going to have to live by the very, very limited amount of mitigation that you have suggested in this document, and I think people deserve 45 days more to come to terms with that.

Thank you.

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MR. VINCENT: I'm John Vincent. I'm a lawyer in Riverton, and I represent the Garlands, and if you don't mind, I would like to sit. Otherwise, I've got to use this walker. I'll try to talk loud enough that you can hear me, though.

MR. NATION: That's fine.

MR. VINCENT: Thank you. Some of my comments will echo what Laurie has already mentioned.

I guess the first thing I would like to know is whether or not the preparers of the document are being paid by the oil companies.

MR. NATION: I guess why do you need to know that?

MR. VINCENT: Well, because I think the public has a right to know who is paying for this Environmental Impact Study. I think that that's a vital piece of information, and unless I am told otherwise, I will assume that the oil companies are paying for this -- for this effort.

MR. NATION: Okay. The -- the --

MS. FISCHEL: Why don't we -- that can be addressed in the comments, unless you want to --

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MR. VINCENT: Is there some reason that you just can't say the oil company is paying my firm to prepare this EIS? I don't think that's any secret, is it?

MR. NATION: Not really.

MR. VINCENT: Okay. Then -- then is that the

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case? Is the -- are the oil companies paying for this EIS prospect or EIS statement?

MR. NATION: Actually, what has happened is that the -- because the Bureau of Indian Affairs is so understaffed that we don't have the number of people to form a -- a team in order to draft the Environmental Impact Statement, we've actually hired Buys and Associates to do that for us.

MR. VINCENT: Okay. So it isn't the oil companies that are paying for this in any way, shape or fashion?

MR. NATION: With an agreement between the Bureau of Indian Affairs and the Proponent, we do have an agreement with them to go ahead and pay for the writing of this EIS.

MR. VINCENT: Okay. Thank you.

Now, with that in mind, the reason that I mention that is that the reason this process was started is because Steve and Bill Garland insisted that it be started. The Bureau of Land Management had issued, routinely, permits to drill without any Environmental Impact Statement whatsoever, but rather, they relied on an environmental assessment that was something like 15 years old.

So I don't want to keep hashing what -- or mentioning what Laurie has already talked about. Rather, what I would like to do is just ask a few questions -- or I guess I can't ask questions. I will say that I read the

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executive summary, and I did not see, and I would hope that the Proponents of this document would take the opportunity to avail themselves of the experience and knowledge of David Miller, a member of our legislature, who has performed geological services with respect to the Garland ranch with respect to location of wells outside of irrigated fields.

I did notice in the document that there is no evidence that the oil companies take bottom hole surveys of

TRANSCRIPT 2 continued

any of the wells, so that nobody knows where the wells are bottomed. I didn't notice in the document that it is -- the reason that there is 20-acre spacing is because the Proponents, Tom Brown, have asked the Oil and Gas Commission and the Reservoir Management Group for that spacing, and they've been given that spacing. I don't know why they haven't been asked to change the spacing back to 40 acres. I don't see any economic justification for not even posing the question. Those are some opening comments.

I don't know why the Environmental Impact Statement doesn't address production of this field under a unit agreement rather than section by section communization agreements. I don't understand that. I don't understand how that helps preserve the environment, enhance recovery of the resource, or protect the surface owners. I don't understand why the Bureau of Reclamation was not invited to be a participating member of this project. After all,

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millions and millions of dollars have been spent in this area to develop the irrigation systems.

I don't know, and I would like to -- I can -- I think I've got an exhibit marker, and if I don't, I've got several copies of this that I can provide all of you, and I can pass them around here. We can keep all of the -- if you want to pass a few out, Jessica, there are seven sheets here, and this shows -- these sheets show the progress of the well developments on the Garland farm and ranch on just 800 acres of it. We've been advised that there will be as many as 60 or 80 wells drilled on this acreage. Garlands have not been approached by anybody involved with this EIS to find out what their appraiser feels this will do to the value of their land. Nor has, apparently, the oil company appraiser been asked to consider those matters, nor has the person who was listed to sell their property, nor have the issues pertaining to buried hazardous substances on the Garland farm or on any of the other farms been addressed.

Dr. Doug Dollhopf who's come down with us tonight will -- will provide some comments on those subjects.

We don't understand why, given the oil companies' and presumably the -- the consultants' access to the oil company, that -- that the experience and knowledge and wisdom of Dr. Jack Evers hasn't been referred to in terms of directional drilling.

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We don't know where in this document the practice or non-practice of removing top soil prior to the drilling of wells in irrigated fields is addressed. We don't know whether the practice of burying drill cuttings has been addressed. We don't know whether or not the practice of taking samples of drill companies -- or drill cuttings and not disclosing them, why that hasn't been discussed.

We don't understand why in this document the -- the very real problem of salty soils that come about after

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supposed reclamation has been completed still exists and are not addressed in this document. We don't understand why the document wasn't peer reviewed or at least supplied to the landowners with time for them to have their own consultants peer review the document.

There is nobody that knows better than me how important a -- this industry is. I have five younger brothers, and all of us got through college working in agriculture and oil fields. That's how we got through school. By the same token, the people that live there have a right to not be offered up as sacrificial lambs in this. As you'll see when the Garland farm is drilled out and we've got deposition -- or transcript testimony where -- where the geologists in charge say they may well go to the 10-acre spacing, and by the way, there's no spacing, either. Why isn't that addressed? There's no spacing. It just says you

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can have up to 20 wells a section, so long as they are no closer than what? 320 feet from a section line? Is that right? I believe. So you can drill them all in one corner of a section. Why isn't that addressed?

Why isn't it addressed of the 98,000 acres, you're really talking about 5 or 6,000 acres if you're talking about Pavillion and Muddy Ridge. You have three wells outside of that area. Is it just to dilute the impact? The real impact occurs in those two areas, and that's what we're talking about. We're not talking about a nice laid well over by Depression Lake.

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The other thing I don't understand is whether or not the 300 or 400 wells that are proposed are only wells drilled into federal minerals or tribal minerals or whether that includes wells drilled on private minerals, and if it only includes one, why aren't both considered because, for example, as you can see from the exhibits with the Garland place, you can have tribal minerals adjoining private minerals literally in the same field. What sense does it make to -- to -- to do an EIS on one and act like the other doesn't exist? Why not lump them together? I can't tell what it is.

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There are comments made about the economic feasibility or non-feasibility of various actions, and yet, I have -- and I haven't reviewed this document in detail,

but I truly don't see any reservoir estimates, cost estimates, payout estimates, return on investments, AFEs, completion charges or any economic information from which one can derive any economic decisions, such as there's one slide in here that talks about 98 million or 96 million. I mean, how -- how are those numbers determined? Are they just plucked out of the air, or where does this stuff come from?

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I don't want to take any more time, and I don't mean to -- to sound angry, but what I'm talking about and

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what I have in my hands is really the -- the future well being of a family. We all know in Wyoming farmers and ranchers often live very poor and have to sell their place to have anything left for retirement. Right now, the Garlands are unable to sell their place. They've tried for two years. Now finding that there are hydrocarbons buried that were supposed to have been removed make it even more difficult, and I think as an agency, you owe the people who live here a good fair shake and a good fair opportunity to be protected from that kind of ravage.

The dominance of the mineral estate does not give anybody the right to ruin another person, and we hope that as you're considering these things, you will actually go talk to the people that are affected, visit them, look at their wells, talk to their experts, and come to some middle

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ground that they can live with that won't ruin them.

Thank you.

And -- and with that, I would introduce Dr. Doug Dollhopf of Montana State University.

DR. DOLLHOPF: To repeat, I'm Douglas Dollhopf, and I'm a professor at the Montana State University in Soil Science and Mine Reclamation. I teach mine reclamation at that University. And I'm here at the request of John Vincent this evening.

And I've been doing some sampling at the Garland ranch, and I would like to share some of the findings with you this evening, and I would like to supplement what I have to say with -- by submitting this written statement. There's multiple copies here, and who should I submit this to?

MR. VINCENT: I guess --

DR. DOLLHOPF: I'm going to comment on some soil resource issues, two in particular. Hydrocarbon contamination in the soil and salt contamination in the soil.

What we found on the Garland ranch is we went to several drill pads, and I want to just share results from two of those drill pads in terms of what I saw as soil, hydrocarbon contamination, and I'm talking about hydrocarbon contamination levels to the point that this is hazardous

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waste material.

What we found at one site was, and -- and I presume the hydrocarbon contamination emanates from concentrate disposal of the -- from well production activities during construction and production, and these materials should have been, I think, removed from the site but certainly not left at concentrations that are -- yield hazardous waste.

And just to put in the Record, what we found was total petroleum hydrocarbon levels at the 3,000 to 4,000 parts per million level, and within the state of Wyoming, the Oil and Gas Commission, when it exceeds a thousand parts per million hydrocarbon, and we're at 300 and 400 percent greater than that, when it exceeds a thousand, that represents a hazardous waste that is not supposed to have been left in the environment, and I found this level of contamination at the 4-foot depth down to as deep as I could dig, which was 10 feet, and it went deeper, and it wasn't only the total hydrocarbon -- total petroleum hydrocarbon contamination that was an issue at 3,000 to 4,000 parts per million, but the volatiles that we smell were at extremely high levels, and those levels are -- are shown in the tables within the document that I've handed out.

The point is, in just a few wells that we visited, we found these levels of hazardous waste in terms of oil

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contamination. Now, we didn't determine extent, but I assure you it wasn't a point source 2 feet wide or whatever. It had notable extent.

At the second site I went to, we found the hydrocarbon contamination just 6 inches beneath the surface, and this was at a location where the drill pad had been removed with the intent of putting the site back into irrigated alfalfa production, and the hydrocarbon at these, again, hazardous waste levels were present at the 6-inch depth, and there I only dug down to 2 feet, and the hydrocarbon was through that zone, and this was the alfalfa root zone, and no, there was not any alfalfa growing at that site. This goes to cumulative effects.

At this point, I'm wondering, I have no reason to think otherwise, that at these developed well sites or these drill sites, that a hazardous waste material may exist on the Garland ranch at each location. Right now, I'm not sure. There's 17 to 20 wells on the ranch. Is this occurring at all -- all these drill sites, and we're down in irrigated areas now where the ground water is only a few feet beneath the surface, and so this hazardous waste, hydrocarbon material in the soil is in contact with the ground water. We don't want these kind of settings to be occurring in our gas well development areas.

So I would like to see the Environmental Impact

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Statement address these kinds of hydrocarbon hazardous waste sites that are present at these drill sites, and maybe even more importantly, how are we going to preclude it from happening in the future.

Apparently, the methodologies being used today, putting these condensates or concentrates into open pits during the course of development and initial production, that these petroleum products are not being contained, and it's getting into our soil and water resources, and that process needs to -- to be corralled in, and so we need to upgrade our methods.

MR. NATION: Say, Douglas, just for the Record,

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are these old sites? I mean, when you say they're -- there's contamination of the soil, is that something that happened a long time ago? 20, 30 years ago?

MR. VINCENT: What difference does it make?

MR. NATION: I guess what I'm getting to is an issue like this can be dealt with separately, but --

MR. VINCENT: Evidently it can't because these were -- these places were represented as being reclaimed and returned. One of them, as Dr. Dollhopf mentioned, had been returned, the drill pad brought back and said it could be returned to alfalfa production. What difference does it make to the -- to the air, the water, or human health or safety or whether there's a ripper (phonetic) violation or

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circle (phonetic) violation? It makes no difference. It's this operator that needs to take care of their business.

MR. NATION: Yeah.

MR. VINCENT: That is a valid concern that he's raised about -- about the activities in this gas field.

MR. NATION: I guess my question is more, you know, we can deal with it -- I mean, if there's contamination, we can talk to the Proponent or the present lessee and try to deal with it.

MR. VINCENT: Dr. Dollhopf, would you explain to Mr. Nation the steps you went through the last week to try to get a regulatory agent to even return a call to you to determine if they had jurisdiction.

MR. NATION: Excuse me. I think it would be better dealt with in the Preliminary Draft Environmental Impact Statement as far as your concerns. Presently, the new operator has changed methods as far as dealing with -- with waste of this type. The new operator has been doing this for some time. I think what you're talking about is an old method of -- of --

MR. GARLAND: Can I clear something up? The current operator pulled this pad back two years ago.

MR. NATION: So that --

MR. GARLAND: Does that clarify for you?

MR. NATION: So this contamination is current, is

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that --

MR. GARLAND: Yeah. Right now. Right now as we sit here.

DR. DOLLHOPF: My perception is it's hooked into the present operator into recent year activities.

MR. HENDERER: Well, thank you. We appreciate your comments, and we certainly will take those into consideration.

MR. VINCENT: I would like -- I would like Dr. Dollhopf to just mention the -- the -- the down --

MR. HENDERER: Gave me the impression you didn't want to hear those.

(Whereupon the reporter interjected as the

speakers were talking on top of each other and not identifying themselves.)

MR. HENDERER: I'm sorry. I'm Doug Henderer with Buys and Associates. I'm part of the EIS team.

MR. VINCENT: Go ahead, Dr. Dollhopf.

DR. DOLLHOPF: The question was asked, I tried to go through some of the Wyoming Department of Environmental Quality folks initially to ascertain what levels of hydrocarbon in soil were a hazardous waste, a problem, and their comment was really any hydrocarbon that comes in contact with water resources is a significant problem in their eyes, but they couldn't establish for me a criteria,

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but the Oil and Gas Commission does have pretty well-written documents in support of how they want management done, and they do have this criteria that I mentioned earlier of when you're in the vicinity of a ground-water system, 1,000 parts per million hydrocarbon is a level, but it -- it did take a lot of phone calls before someone stepped up to the plate and offered the criteria information.

MR. NATION: Say Douglas, I apologize for cutting you off. I think this is an issue we can --

DR. DOLLHOPF: Okay.

MR. NATION: -- discuss in the final assessment. I guess for -- for the contamination that's out there, I guess, like I said earlier, deal with in a different way. I guess try to figure out what's contaminated and look at some way to mitigate or repair that damage.

MR. VINCENT: So that I'm clear, this is John Vincent. Is it the Bureau of Indian Affairs' position that existing, whatever that means, buried hydrocarbons will not be the subject of discussion or analysis in this Environmental Impact Statement?

MR. NATION: Actually, we'll address it in the -- in the Final Draft as far as what the Proponent's future plans are in order to deal with these -- with these wastes, these pit wastes, stuff like that.

MR. VINCENT: So it will be addressed in the

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Environmental Impact Statement?

MR. NATION: Yes, yes.

MR. VINCENT: Then I would just -- then I would ask that he be allowed to continue with his comment so that the consultants have the -- the benefit of that. I think that's what the public hearing is for. If not, we can sure take a hint and be quiet.

MR. NATION: I guess clarify what will be addressed in the Final Draft. It's not this issue itself, but -- but the future plans of the operator to address that these issues will not happen in the future.

MR. VINCENT: What about the ones that have already occurred, that are existing?

MR. NATION: I guess what needs to happen is

TRANSCRIPT 2 continued

jurisdictionally wise, I guess we need to talk to the BLM, the Proponent --

MR. VINCENT: How does -- excuse me.

MR. NATION: -- you know, because there are some jurisdictional things here. I'm not sure where this contamination -- it apparently is on Bill's surface. I'm not sure who owns the mineral, but there's some jurisdictional things that have to be considered before we come up with some plan in order to --

MR. VINCENT: Well, we --

MR. NATION: -- deal with the contamination.

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MR. VINCENT: We sure would like for his comments to continue to be considered as part of the cumulative effects analysis, if nothing else.

MS. FISCHEL: Yeah, and he can certainly continue. The --

MR. VINCENT: Okay.

MS. FISCHEL: -- the requirements for this meeting is to take comments as long as the comments are provided by the public, so --

MR. VINCENT: Thank you.

MS. FISCHEL: -- he can certainly continue to make comments.

DR. DOLLHOPF: I'm almost done with the hydrocarbon component. But I guess I think it's -- I'm just going to summarize and say I think it's very important that the EIS Statement evaluate the cumulative effects of this hydrocarbon contamination that I think is probably at numerous locations across the site, and potentially, if it's in the ground water, there should be a human risk assessment in this Environmental Impact Statement, and so I'm going to end my comments on hydrocarbons there.

Second point I wanted to make was pertaining to salt. East of Pavillion, large irrigation project with irrigated alfalfa, and alfalfa is extremely sensitive to any increases in salt content in the soil. It's well documented

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that increases in salt content -- any increase in salt content goes with a loss in production and ability to establish alfalfa.

What -- again, what we've seen on the Garland ranch is that when these fill materials are borrowed from the adjacent upland areas and placed on top of irrigated alfalfa fields, maybe anywhere from 6 inches to 2 feet thick for a period of years to develop the well site, that when those pads are removed, that the remaining -- the original soil is anywhere from 100 percent to 400 percent more saline, and thus, the placement of these pad materials borrowed from the adjacent hills, and the pad materials typically have notably higher salt contents than these irrigated soils, when these pad materials are placed on top of the irrigated soils, we're having a salinization effect,

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and this is going to culminate in a loss in plant production, et cetera, in the long-term. It's not a short-term impact.

So again, I would recommend that the EIS address this issue that we must avoid -- avoid salinization, increase in salt content of these soil materials that are being used for irrigated alfalfa production, and I would recommend that if pad fill materials have to be placed on top of irrigated alfalfa production, that there be a separation barrier there, just like when they have to -- are

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placing concentrates, condensates in pits and the pits should be lined, it should line the base of those pads on top of this prime irrigated agricultural commodity. Put a clear separation there, and if that can't be done, we can't put a separation underneath these pads constructed of a fill, then prior to constructing that pad, we should lift that soil resource and stock pile it, at least a portion of that soil resource, 10, 15 inches, so that it can't -- it's not impaired by salt issues of the construction process associated with the pad.

And this isn't being done, and as I -- I've only seen the summary statements on the EIS, I didn't see discussions pertaining to stockpiling soil resources to facilitate land reclamation, and that really should be discussed, and that concludes the comments I wanted to make.

MR. VINCENT: Thank you.

MS. FISCHEL: Thank you.

MR. NATION: Thank you.

MS. GOODMAN: Ray, I have some follow-up comments given that. This is Laurie Goodman again.

I would actually like to see -- it was an interesting discussion between you and John about what -- what exactly the impact statement has to look at regarding past operations as well as future, but I think that truly, it is the legal responsibility of the federal government to

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prepare this whole thing. I mean, you had to go back in and count how many animals are there, what the presence of endangered species are as far as plants, animals. I consider this part of the inventory responsibility that you are going to have to take to be able to reveal to the public what exactly is existing out there, and so I would like to see the Final Environmental Impact Statement show a soil analysis on or near or wherever it's determined by EPA, DEQ, and anybody that's going to be get involved in it, in every reclaiming site that's in your 92,000 acres in this total area, so we can actually see as the public what's out there and what do we know and what are the damages to a landowner because of that.

Again, your analysis right now simply shows the damages as the dirt's turned, but in fact, if this is found to be a practice that's throughout the field, that's going

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TRANSCRIPT 2 continued

to affect a lot of those land values, and those owners and the public has a right to know that. So I would like that to be done not only on all your reclaimed wells in this project area but most assuredly on the 178 wells that have been drilled and are existing. I think that's a critical key that would have to be presented in your inventory like all of the other, you know, assets and things like that that you counted.

And my last comment would be, I thought about this

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while we're going on. You know, in the presentation of your document in the development, without a doubt, the -- it was the industry who was able to pick the three proposed actions, how many wells they want, how many wells they could have that got disregarded, and then how many wells would be too little to do. I would like to suggest that the reason for the extended comment period is that the landowners, since we are part of the team, would like to present a proposal for an activity, and we're not going to ask for two years, which is the amount of time that you've had to prepare your own, but we are going to ask for enough time that we can come up with our proposed alternative in being to, you know, able to lay out around the number of wells that the oil company has asked for, what we see the impacts are on our private lands and on all the tribal lands and being able to make some decisions the best we can out of the information that you've relayed for us, what the costs of that would and wouldn't be.

And I can make a commitment to you, I mean, 90 days at least gives us until October. We can probably get some specialist to make that a credible part of what the public should be able to evaluate. So I respectfully request the ability to present a landowner proposed alternative as well.

MR. GARLAND: I'll be very brief, Ray. I'm Bill

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Garland. I -- I would just like to make this comment: We will retain specialists to review this EIS. We would respectfully request the comment period be extended to give us at least some opportunity for input.

Thank you.

MR. WALKER: I'm Jon Walker. I work for Per-Tech Resources.

Some of the things we talked about last night, I think one of the points I felt was important was that apparently, there's nothing in the federal register about where the wells should be located around people's residences and stuff, and I thought I could share some of my experience with that.

I've smelled the hydrosulfite that emits from some of these locations. It smells ten times worse than any barnyard I've ever been in. I've seen these locations burn down to the ground. They represent a significant safety

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hazard to the people that live out there. I assume that the wells themselves represent some risk to the domestic wells in that area, so if there is, in fact, no federal regulation governing that, I think this EIS should -- should address that issue, because the operator surely does not care. The operator's going to do out there just as they dang well please. I've seen how they operate out there. They -- they've done things just to spite the landowners out there,

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and I believe that's their standard operating procedure, and I don't really understand how this EIS is going to address that.

Some things we talked about last night was that these well pads will be 8 feet square, and I don't see much in this presentation about that. I don't know -- I'm not sure what we're implying there, what we're regulating, and in fact, all of these well locations are going to be that size? I think there's a need for a detailed plan from the operator out there to say exactly what they intend to do, how those locations will be developed, and I think that this EIS should be based around that.

To say that the affected surface area is limited to the actual well head is just really ridiculous. Agriculture has a very low margin of business. When -- when a well is drilled like that, the landowner not only loses the productivity of the actual occupied area, there's a reduced productability -- productivity from adjacent grounds. Beyond some well density, which again, I don't understand how significant it is but quite frankly, the adjacent ground is just one of these. It is no longer useful for what it's being used for today, so in fact, the impact is quite massive.

I don't understand how that's being addressed in this Environmental Impact Statement. The -- the 325 wells,

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I -- I assume that this -- those would be the tribal wells, and it sounds like there's up to 100 additional fee wells that could be drilled out there. Does this EIS apply to those 100 additional wells, also? Are we going to do anything to try to control how the application -- how the development is done? I don't understand.

I guess we ended our conversation last night without understanding how the operator intends to conduct business out there. This EIS has absolutely no purpose, the conclusions are irrelevant, and -- and I don't know where we leave it after that.

Thank you for your time.

MR. NATION: Is there any more comments?

MR. VINCENT: Do I need to have those marked in some fashion to get them as part of the Record?

MR. NATION: I think so. We've got copies of them.

MR. HENDERER: We'll see that they're

TRANSCRIPT 2 continued

incorporated.
MR. VINCENT: Thank you. Thank you very much.
MR. PHILLIPS: Excuse me, Ray. My name is Floyd Phillips. I'm a tribal member, tribal mineral owner. I would like to comment that I would like to hear more from the community out there as far as comments regarding the oil and gas development. That's all.

MR. NATION: Thank you.
Any other comments?
I would like to thank all of you for coming tonight. As far as -- I heard two requests from two of you requesting that we extend the comment period from 45 to 90 days. We'll go ahead and consider that request and let you know.
MS. GOODMAN: Will you let us know directly?
MR. NATION: Yes, yes. In fact, I'll respond to your letter.
MS. GOODMAN: Thank you.
MR. NATION: Thank you for coming.
MR. VINCENT: Thank you, Ray. Thank you, all.

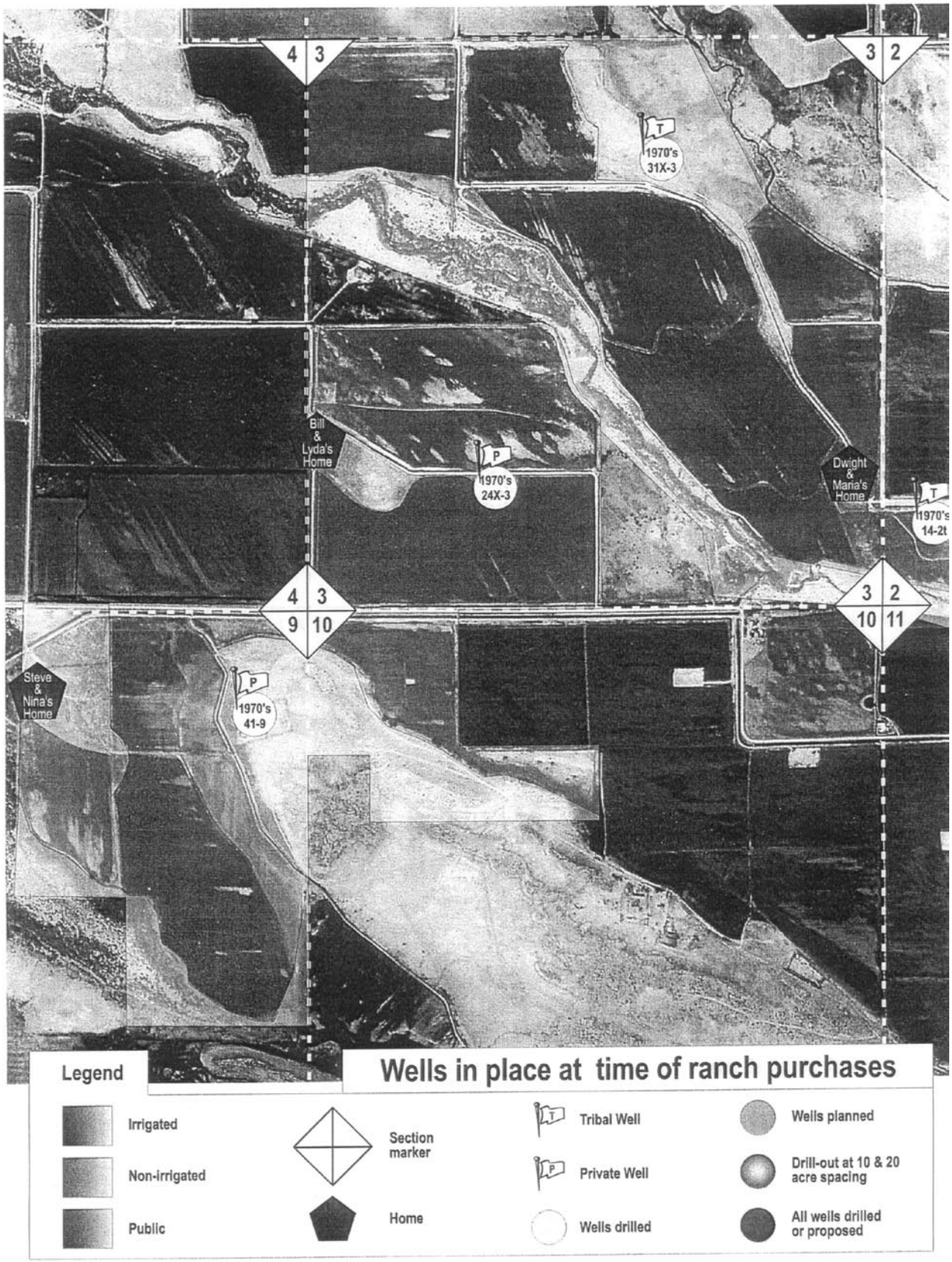
STATE OF WYOMING)
)ss.
COUNTY OF SWEETWATER)

CERTIFICATE OF REPORTER

I, LAURA J. HAMM-HILLS, Professional Reporter and Notary Public, do hereby certify that I was authorized to and did record in stenotype the foregoing; that the foregoing pages numbered 1 through 55, inclusive, are a true, correct and complete transcript of aforementioned stenographic notes as reduced to typewritten form by me.
I FURTHER CERTIFY that I have no interest in the outcome of these proceedings, being in no way related to any of the parties.
DATED this 30th day of August, 2004.

Laura J. Hamm-Hills
Court Reporter/Notary Public

EVIDENCE 1


4
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1970's
31X-3
Bill
&
Lyda's
Home
P
1970's
24X-3
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&
Maria's
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11
Steve
&
Nina's
Home
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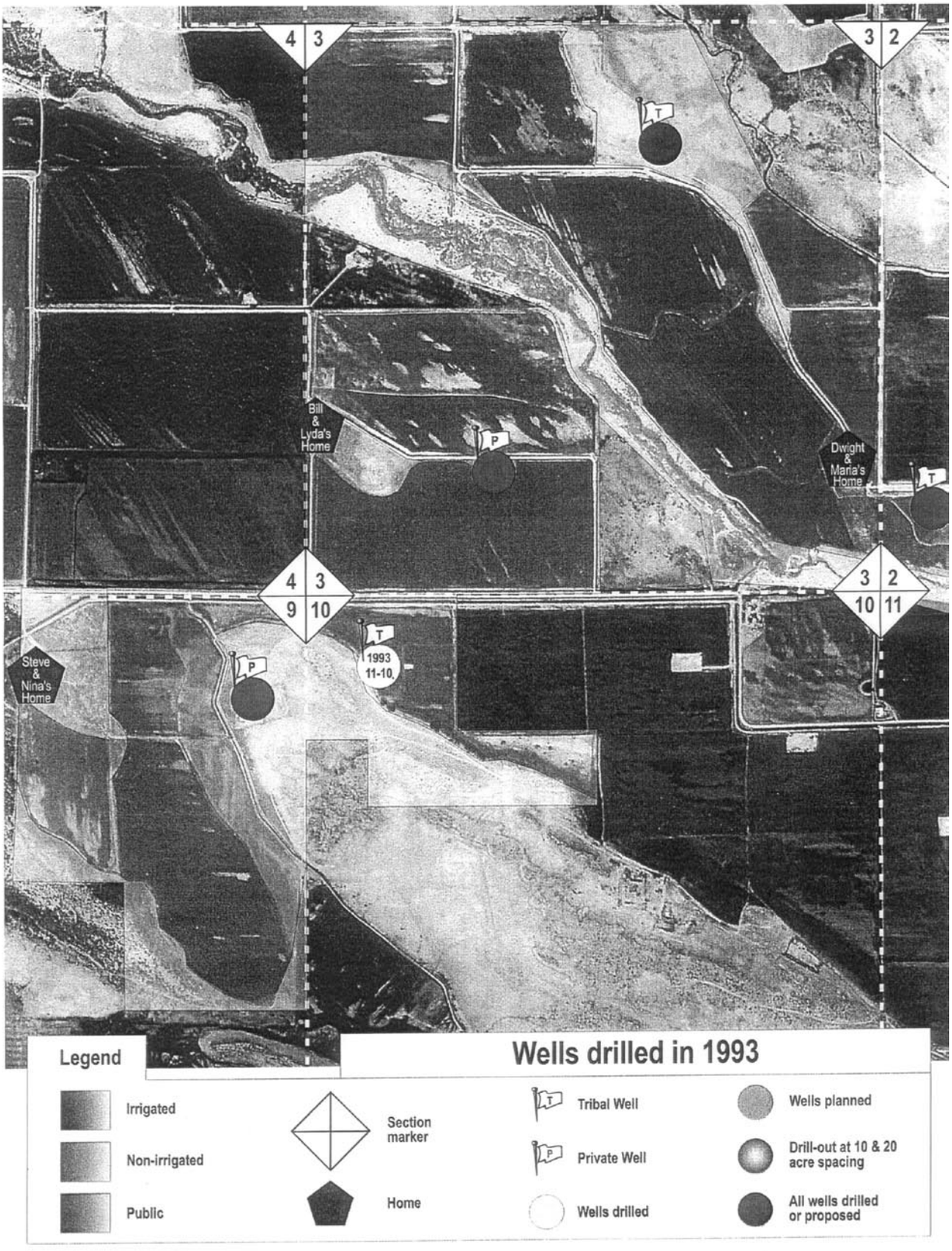
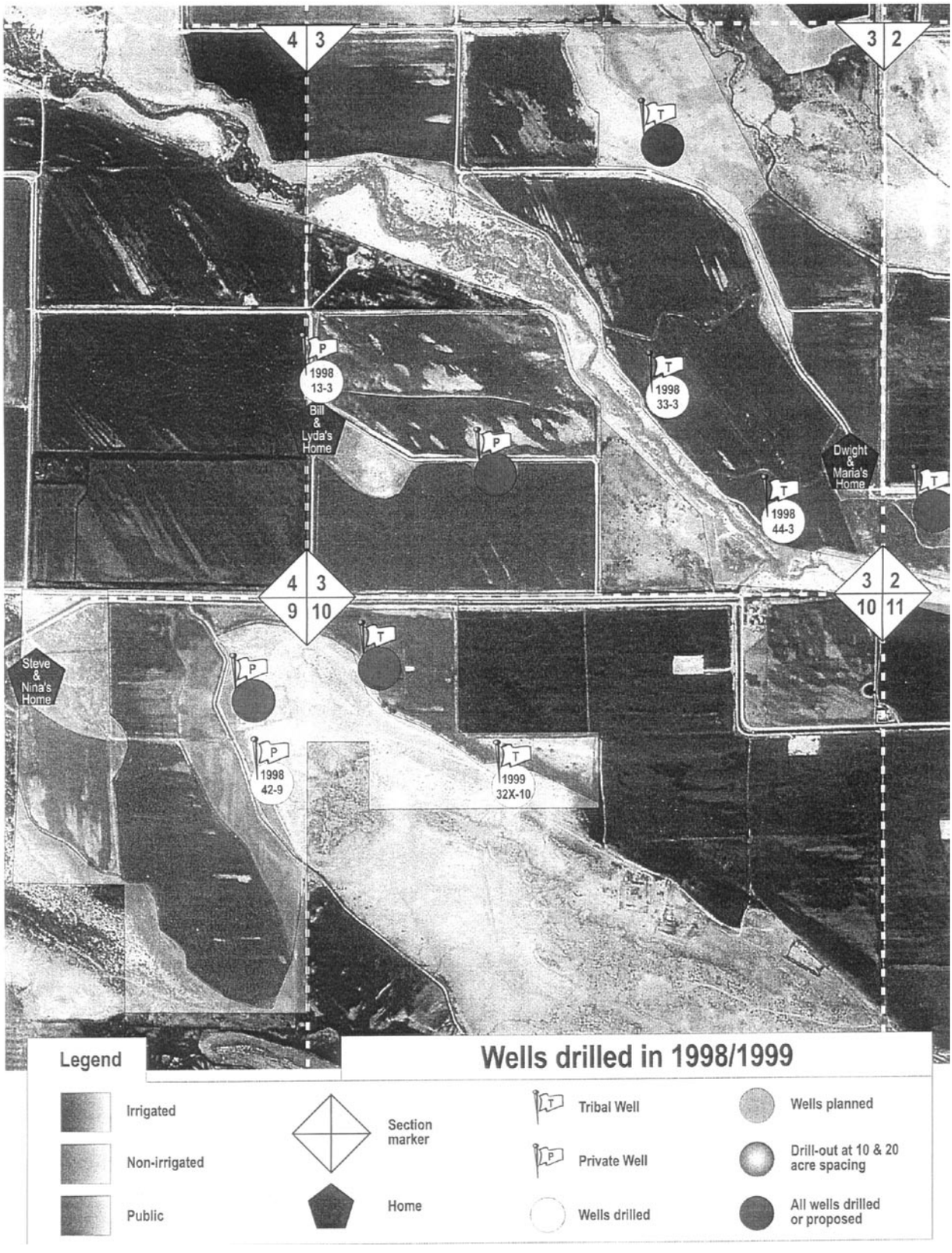
1970's
41-9
Legend
Wells in place at time of ranch purchases
Irrigated
Non-irrigated
Public
Section
marker
Home
Tribal Well
Private Well
Wells drilled
Wells planned
Drill-out at 10 & 20
acre spacing
All wells drilled
or proposed

EVIDENCE 2


4 3
3 2
Bill & Lyda's Home
Dwight & Maria's Home
4 3
9 10
3 2
10 11
1993 11-10
Steve & Nina's Home
Legend
Wells drilled in 1993
Irrigated
Non-irrigated
Public
Section marker
Home
Tribal Well
Private Well
Wells drilled
Wells planned
Drill-out at 10 & 20 acre spacing
All wells drilled or proposed

EVIDENCE 3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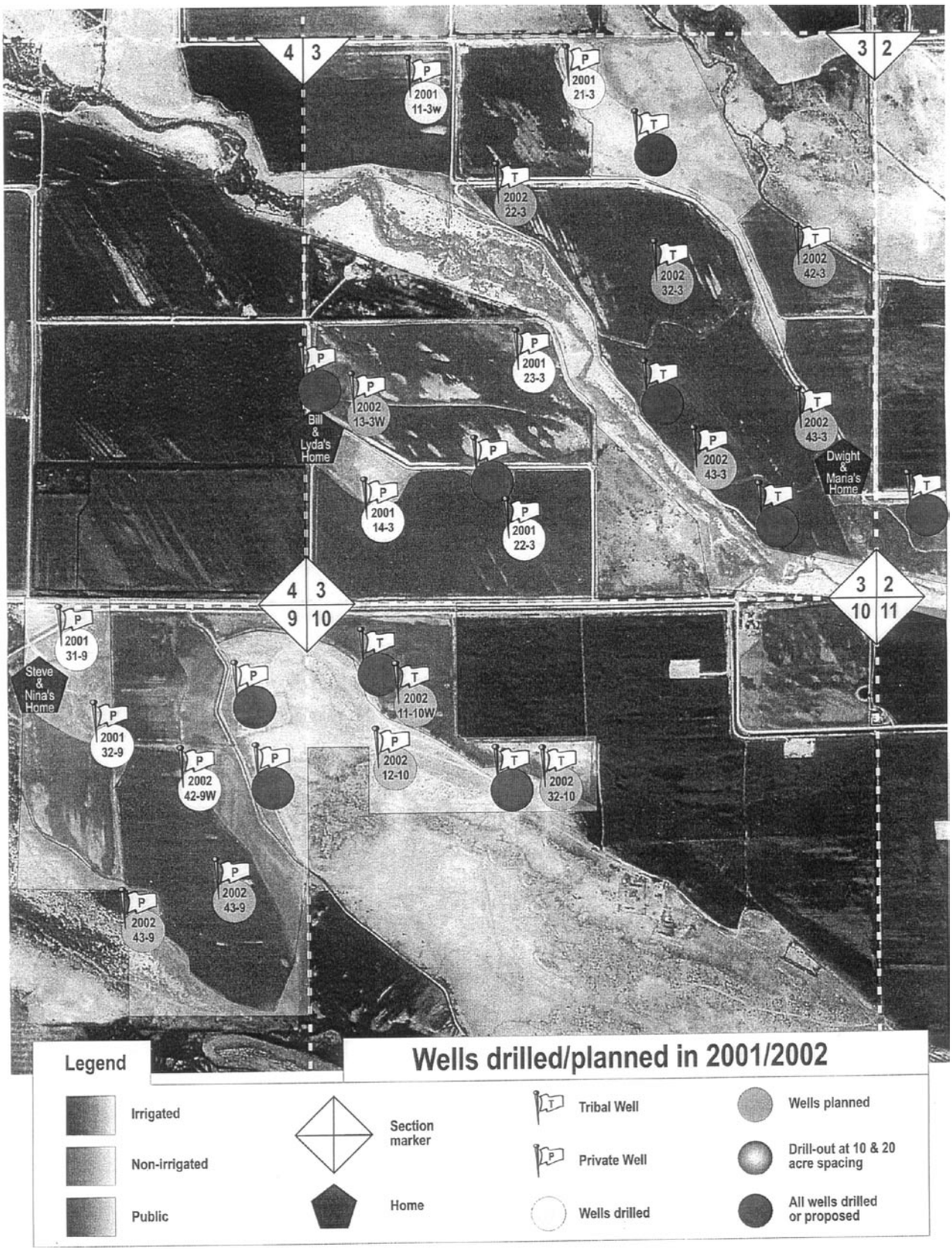
13-3
Bill
&
Lyda's
Home
1998
33-3
Dwight
&
Maria's
Home
1998
44-3
4 3
9 10
3 2
10 11
Steve
&
Nina's
Home
1998
42-9
1999
32X-10
Legend
Wells drilled in 1998/1999
Irrigated
Non-irrigated
Public
Section marker
Home
Tribal Well
Private Well
Wells drilled
Wells planned
Drill-out at 10 & 20 acre spacing
All wells drilled or proposed

EVIDENCE 4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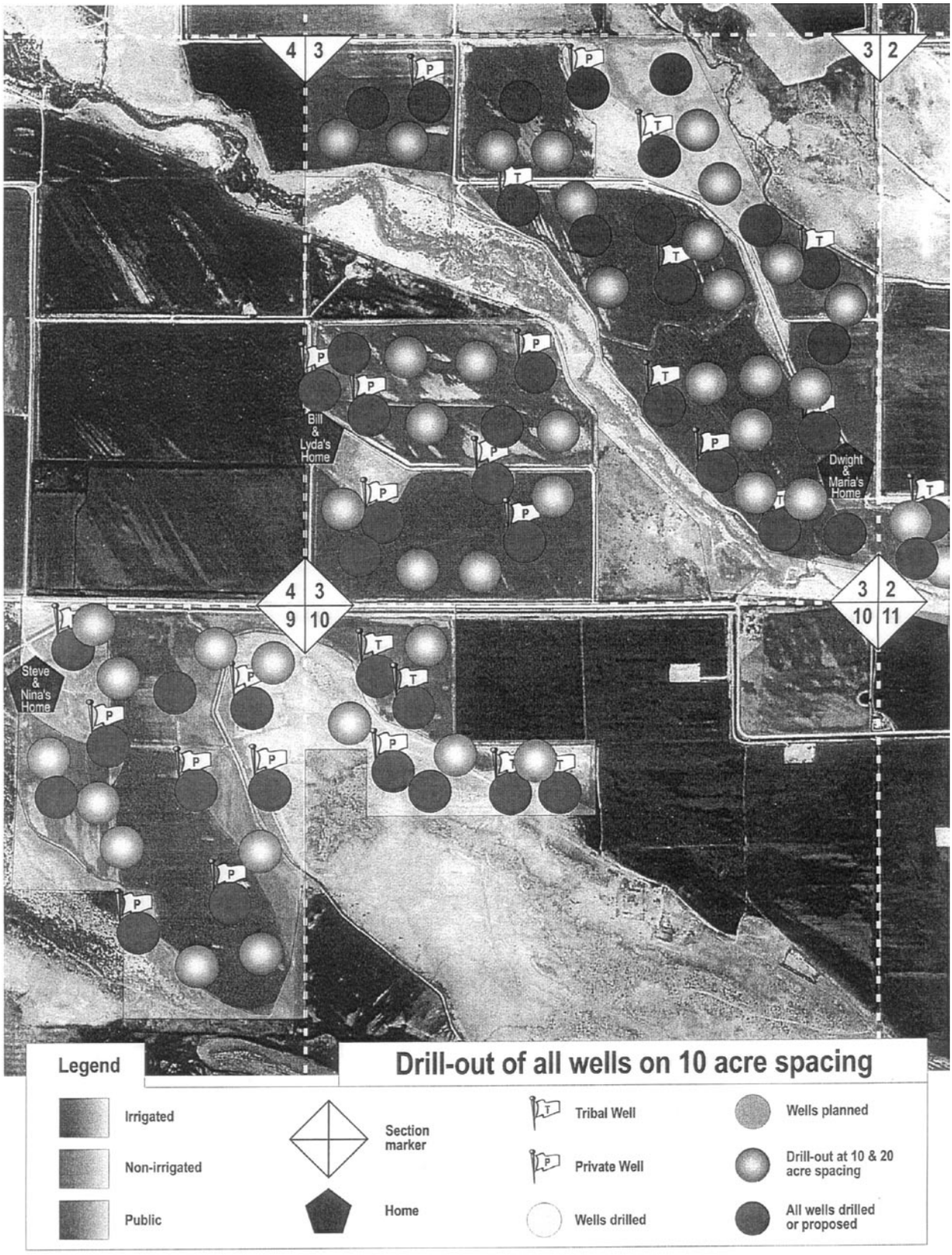
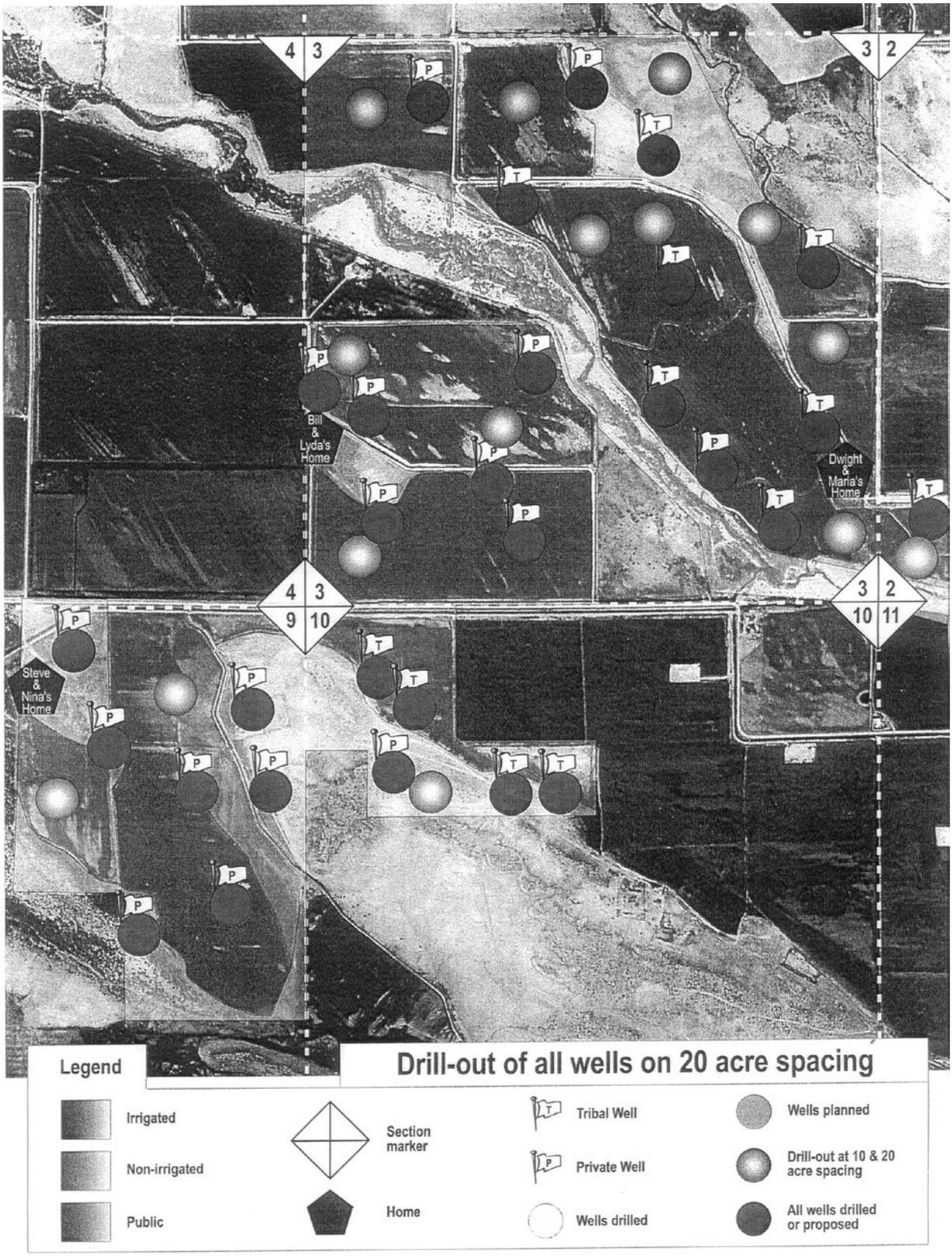
2001 11-3w
2001 21-3
2002 22-3
2002 32-3
2002 42-3
2001 23-3
2002 13-3W
Bill & Lyda's Home
2001 14-3
2001 22-3
2002 43-3
Dwight & Maria's Home
2001 31-9
Steve & Nina's Home
2001 32-9
2002 42-9W
2002 11-10W
2002 12-10
2002 32-10
2002 43-9
2002 43-9
Legend
Irrigated
Non-irrigated
Public
Section marker
Home
Tribal Well
Private Well
Wells drilled
Wells planned
Drill-out at 10 & 20 acre spacing
All wells drilled or proposed
Wells drilled/planned in 2001/2002

EVIDENCE 5


4 3
3 2
4 3
9 10
3 2
10 11
Bill & Lyda's Home
Dwight & Maria's Home
Steve & Nina's Home
Legend
Drill-out of all wells on 10 acre spacing
Irrigated
Non-irrigated
Public
Section marker
Home
Tribal Well
Private Well
Wells drilled
Wells planned
Drill-out at 10 & 20 acre spacing
All wells drilled or proposed

EVIDENCE 6


4 3
3 2
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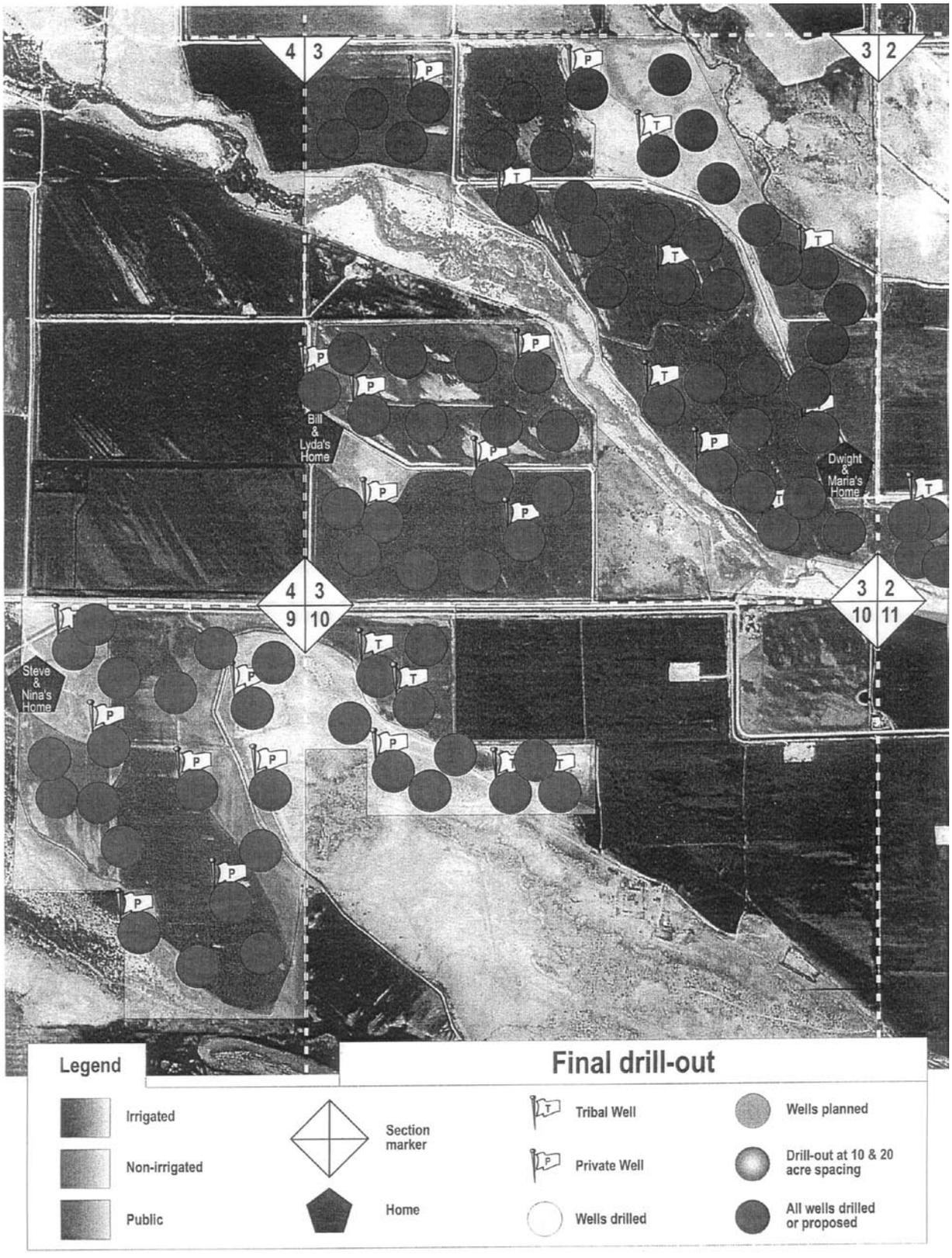
9 10
3 2
10 11
Bill & Lyda's Home
Dwight & Maria's Home
Steve & Nina's Home
Legend
Drill-out of all wells on 20 acre spacing
Irrigated
Non-irrigated
Public
Section marker
Home
Tribal Well
Private Well
Wells drilled
Wells planned
Drill-out at 10 & 20 acre spacing
All wells drilled or proposed

EVIDENCE 7


4 3
3 2
4 3
9 10
3 2
10 11
Bill & Lyda's Home
Dwight & Maria's Home
Steve & Nina's Home
Legend
Final drill-out
Irrigated
Non-irrigated
Public
Section marker
Home
Tribal Well
Private Well
Wells drilled
Wells planned
Drill-out at 10 & 20 acre spacing
All wells drilled or proposed

TRANSCRIPT 3

TESTIMONY

HYDROCARBON AND SALT CONTAMINATED SOIL RESOURCES ASSOCIATED WITH GAS WELL DEVELOPMENT ON LANDS NEAR PAVILLION, WYOMING

Prepared By

Douglas J. Dollhopf, Ph.D.
6736 Rocky Road
Bozeman, MT. 59718

August 11, 2004

For these past 30 years, Douglas J. Dollhopf has been a Professor of Soil Science and Land Rehabilitation at Montana State University. He has led numerous research projects pertaining to reclamation of the soil, plant and water resources in the Northern Plains. He teaches land rehabilitation science at MSU.

This statement serves to report two impacts to soil resources emanating from gas well development in the vicinity of Pavillion, Wyoming. It is hoped this knowledge will trigger steps to minimize future land resource impacts.

HYDROCARBON CONTAMINATED SOIL RESOURCES

Soil contaminated with hydrocarbon concentrates, exceeding state action level criteria, has been buried at gas well development sites in the presence of shallow groundwater.

During gas well development and production, liquid concentrates containing hydrocarbons and salts were contained in an open pit. At some juncture after wells began production, metal tanks were used to store concentrates. Recent observations indicate hydrocarbon wastes in these open pits were i) not removed, and ii) failure to line these pits permitted concentrates to permeate into surrounding soil resources and potentially into shallow groundwater resources.

On the Five Mile Ranch near Pavillion, WY., approximately 17 gas well sites are present. During July 2004 efforts on behalf of the land owners, Bill and Steve Garland, were made to determine whether soils remained contaminated with concentrates years after well completion.

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EXHIBIT
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8-11-04 EIS

Test pits were opened at several well sites and hydrocarbon contamination was observed near gas wells numbered 41-9 and 24X-3.

Site 41-9 is immediately adjacent to land used for flood irrigated alfalfa production. Hydrocarbon contaminated soil was present from 4.5 feet to at least the 10 foot depth increment, the maximum depth of excavation. Site 24X-3 is located in an area where the operator removed the well pad and returned the land use to the irrigated alfalfa. Alfalfa failed to establish and hydrocarbon contaminated soil was present just 6 inches beneath the surface to the maximum depth of the open pit which was 24 inches. As shown in Tables 1 and 2, soil samples collected from the contaminated zones at each location exceeded state action levels that trigger clean-up investigation. Given that the depth to groundwater in irrigated alfalfa fields is only a few feet, it is likely that a connection is present between hydrocarbon contaminated soil and groundwater resources.

The extent of contamination is unknown at a given well site and across the ranch boundary. Potentially, hydrocarbon contamination is present at each gas well drill site. Residents in this valley area attain their domestic water from wells.

It is recommended that the Environmental Impact Statement for this area address hydrocarbon contaminated soil and water resources by assessing risk to human health and set-forth procedures that preclude dissemination of well concentrates into the environment. 1

SALT CONTAMINATED SOIL RESOURCES

During drill pad construction, soil resources were not stockpiled for use in land reclamation. This practice resulted in elevated salt levels in soils used for irrigated alfalfa production.

At Colorado State University, Al-Wardy (1995) found as soil salt content exceeded 0.35 mmhos/cm, alfalfa yield decreased 8 % for each 1.0 mmhos/cm increase in soil salinity. Thus, lands used for alfalfa production must be carefully managed to preclude any increase in soil salinity.

At the Five Mile Ranch near Pavillion, WY., 1.0-2.0 acre gas well development pads have been constructed by either i) placing earthen fill (6-46 inches) over irrigated alfalfa fields, or ii) grading upland areas with a cut/fill procedure. In either case, the soil resource was not

TRANSCRIPT 3 continued

Table 1. Total extractable petroleum hydrocarbon of soil material near two gas well development sites on the Five Mile Ranch near Pavillion, WY.

Drill Pad Number	EPH-Screen Extractable Petroleum Hydrocarbons (ppm)
41-9	3030
24X-3	4210
Wyoming Action Level[1]	30-1000
Montana Action Level[2]	50

[1] Site assessments are required to determine the risk and action level as a function of environmental factors. Acton levels presented are those often utilized when hydrocarbon is in contact with groundwater. Both the Wyoming DEQ and Oil and Gas Commission address issues related to hydrocarbon contamination at well sites and action levels may differ between these two agencies.
[2] Montana Department of Environmental Quality, Helena, MT. (2004).

Table 2. Volatile petroleum hydrocarbon content of soil material near two gas well development sites on the Five Mile Ranch near Pavillion, WY. All concentrations in mg/kg.

Volatile Petroleum Hydrocarbon	Montana Maximum Contaminant Limit[1]	Drill Pad Number	
		41-9	24X-3
MTBE	0.1	ND	ND
Benzene	0.05	ND	ND
Toluene	10	ND	ND
Ethylbenzene	10	7.8	ND
m+p-Xylenes	-	48	27
o-Xylene	-	16	ND
Xylene, total	20	64	27
Naphthalene	9	ND	ND
C9-C10 Aromatics	8	725	1900
C5-C8 Aliphatics	10	473	391
C9-C12 Aliphatics	70	1140	3840
Total Purgeable Hydrocarbons	-	2500	5680

[1] Montana Department of Environmental Quality, Helena, MT. (2004). The Wyoming DEQ may not have contaminant limits for these volatile hydrocarbon products.
ND = Not detected at the laboratory reporting limit.

Table 3. Drill pad fill salinity versus irrigated alfalfa field native soil at the Five Mile Ranch near Pavillion, WY.

Soil Salinity Range, mmhos/cm	
Irrigated Alfalfa Field Adjacent To Drill Pads	Drill Pad Fill[1]
0.98-1.49	1.90-5.96

[1] Drill pad identification numbers 14-3X, 24X-3, 24-3B, 32-9W, 11-10.

stockpiled to facilitate land reclamation. As shown in Table 3, fill material placed over irrigated alfalfa fields had salinity levels 0.4-5.0 mmhos/cm greater than native soils in alfalfa production. This represents an environmental risk that the native soil salinity will be increased as a result of drill pad construction practices. Native soils may become contaminated with salt as a result of leaching processes or in the course of earth moving equipment inadvertently mixing fill into native soil during either pad construction or removal.

At two locations on the Five Mile Ranch, a portion of the drill pad fill was removed to allow land to be returned to alfalfa production. As shown in Table 4, soil salinity levels in the pad fill removal area were 100 % to nearly 400 % greater compared to the native soil immediately adjacent to the removal area. Although these pad fill removal areas were seeded to alfalfa, these areas failed to establish an alfalfa crop.

Table 4. Change in soil salinity as a result of drill pad construction and removal on irrigated alfalfa fields at the Five Mile Ranch near Pavillion, WY.

Drill Site Location	Depth Increment (inches	Soil Salinity, mmhos/cm	
		Irrigated Alfalfa Field Adjacent To Drill Pad	Drill Pad Removal Area Returned To Alfalfa Land Use
24X-3	0-7	0.98	3.84
11-10	0-2	1.49	3.00

It is recommended that the Environmental Impact Statement for this area identify best management practices for drill pad construction in order to minimize impacts to soil resources. In upland areas, soil resources should be characterized and stockpiled for use during reclamation in order to reestablish grass production. In irrigated alfalfa production areas, imported fill should be physically separated from underlying native soils using a geomembrane, or similar concept, to insure underlying soils are not contaminated by salt. Alternatively, irrigated native soils could be characterized and stockpiled for use during land reclamation. Construction of drill pads on irrigated alfalfa fields should be

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TRANSCRIPT 3 continued

minimized using directional /angular drilling methods from positions adjacent to alfalfa production.

REFERENCES CITED

Al-Wardy, M. M. 1995. Determination of salinity response of two alfalfa cultivars. M.S. Degree Thesis, Colorado State University. 134 p.

LETTER 17

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET- SUITE 300
DENVER, CO 80202-2466
Phone 800-227-8917
http://www.epa.gov/region08

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BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

Ref: 8EPR-N

Mr. Ramon A. Nation
Bureau of Indian Affairs
Wind River Agency
P.O. Box 158
Fort Washakie, WY 82514

RE: Comments on the Draft Environmental Impact Statement for Wind River Natural Gas Field Development - CEQ#040324

Dear Mr. Nation:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA), 42 U.S.C. Section 4321, et. seq., and Section 309 of the Clean Air Act, the Region 8 office of the Environmental Protection Agency (EPA) has reviewed the referenced Draft Environmental Impact Statement (DEIS) for Wind River Natural Gas Field.

EPA thanks Bureau of Indian Affairs for the opportunity to review the DEIS for the proposed gas field development. Generally, our review of the DEIS found the document to be a well written comprehensive analysis of potential environmental impacts. Our enclosed comments are designed to clarify technical discussions for the air quality analysis.

Based on the procedures EPA uses to evaluate the potential effects of proposed actions and the adequacy of the information in the DEIS, the Proposed Actions identified by the DEIS for the Wind River Gas Development, will be listed in the Federal Register in the category EC-1. The EPA review has identified air quality and visual environmental impacts that could be avoided in order to fully protect the environment. We believe that such impacts may be reduced by requiring the mitigation measures identified in the analysis. I have enclosed a copy of the EPA Rating System for Draft Environmental Impact Statements for additional information.

LETTER 17 continued

If you have any questions concerning the rating or the enclosed comments, please contact Gregory Oberley at (303) 312-7043.

Sincerely,

Larry Svoboda
Director, NEPA Program
Ecosystems Protection and Remediation

Enclosures

Cc: Burton Hutchinson, Sr., Chairman, Northern Arapaho Business Council
Vernon Hill, Chairman Eastern Shoshone Business Council
Don Aragon, Director Wind River Environmental Quality Commission
Connelly Mears, Director EPA Region 8 Tribal Assistance Program

EIS Chapter 4, Section 4.4, Air Quality

1. Section 4.4.1, Introduction, page 4.4-1, first paragraph. The paragraph introduces the information on air-quality impacts. The information presented covers the impacts of project emissions when they are added to background concentrations. Although the technical documents on the near- and far-field analyses show the results of analyses of cumulative impacts, Chapter 4 of the DEIS does not. In some cases, the projected cumulative impacts exceed thresholds. The EIS should include a section that discloses the analyses of cumulative air impacts. Also, please explain why the near-field analysis produced a comparison to Prevention of Significant Deterioration (PSD) increments while the far-field analysis did not (see additional comments below). **1**

2. Section 4.4.1.1, Significance Criteria, page 4.4-2, last paragraph. A sentence in this paragraph reads, "It should be noted that the recently promulgated standards for $PM_{2.5}$ and ozone (8-hour) will not be enforced by the Wyoming Department of Environmental Quality (WDEQ) until the EPA issues implementation rules." The air-quality impact assessment in this DEIS does not address the $PM_{2.5}$ and eight-hour ozone standards. EPA promulgated national designations for the eight-hour ozone standard on April 30, 2004 (69 FR 23858). We also promulgated the final rule to implement Phase I for the eight-hour ozone standard on April 30, 2004 (69 FR 23951). Both rules were effective on June 15, 2004. Designations under the $PM_{2.5}$ standard are pending. Furthermore, air-quality impact assessments for other recent NEPA actions in Wyoming (e.g., South Piney, Jonah Infill, Atlantic Rim, and Seminoe Road) have included or are including assessments of $PM_{2.5}$ and eight-hour ozone impacts. We request that BIA address these air quality standards in future NEPA actions. **2**

3. Section 4.4.3, Far-Field Air Quality, page 4.4-21, second paragraph. This is the introduction to four subsections that summarize the potential air-quality impacts of the proposed action and three alternatives. While the treatment of the combined impact of construction and production impacts is discussed in the technical documents on the near- and far-field analyses and the emissions inventory, Chapter 4 of the DEIS does not address this issue (see related comments below). We recommend including a brief treatment of it here. **3**

4. Section 4.4.3.7, Additional Mitigation Measures, page 4.4-57 The document states, "Air quality related impacts would result primarily from NO_x emitted from **4**

LETTER 17 continued

compressor and drill rig engines in conjunction with particulate matter generated from construction activities and vehicle travel on unpaved roads." Please continue to summarize that the potential impacts from these emissions are an estimated consumption of PSD Class I increment for NO_x and visibility impacts in Class I areas such as Bridger and the Tribal Class I areas including Owl Creek and Wind River Canyon.

Additionally, the air quality analysis points out that the 2 days of visibility impacts to Bridger Wilderness Area were generated during the construction phase of the project. Therefore, in addition to reducing compression emissions the table below could include reducing drilling related NO_x emissions. We suggest including electric drill rigs and new technology diesel engines.

5. Table 4.4-72, pages 58-66 The table should also include the possibility of purchasing wind-generated electricity rather than only considering non-renewable generated electricity. Renewable energy credits are an alternative to standard practices and have the potential to actually reduce emissions and not move them to another source.

6. Table 4.4-72, pages 58-66 The table should include a column that indicates the qualitative ability of the mitigation measure to reduce or eliminate the adverse impact identified in the analysis and not just the potential to reduce emissions. For example, would employment of a particular mitigation measure significantly reduce or eliminate visibility impacts to Bridger Wilderness or Tribal Class I areas?

7. EPA would also encour age the Tribes to investigate and consider developing their own renewable electricity generation capability to power tribal related projects to reduce air emissions. The Tribe's unique ability to oversee and integrate gas development projects with other sustainable projects such as wind-powered electrical generation could provide the Tribe with revenue during gas production to help cover capital costs for power generation and provide additional revenue generation after gas production royalties have diminished.

Emissions Inventory

1. Section 2.0, Wind River Project-Related Sources, page EI-3, last paragraph. The last two sentences of the bullet read: "For purposes of the emission inventory and modeling, it was assumed that all successfully drilled and completed wells would be producing at the same point in time. In actuality, some wells drilled and completed early in the project may no longer be in operation by the time the last wells are drilled." Emissions from production and construction activity, including drilling, will occur simultaneously. Probably the greatest actual air quality impacts of the project will occur at a time when both production and construction are occurring. We presume that the CALPUFF runs for the proposed action and

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alternatives described in the far-field assessment (i.e., WRPP, WRAA, WRAB, and WRNA) included construction emissions, but we could not find a clear statement to that effect in the DEIS or the support documents. Elsewhere in the DEIS, it is shown that the CALPUFF run for the post-construction case (WRPC) showed lower impacts than the impacts of the proposed action itself. If the model runs for the proposed action and the alternatives included construction emissions, please describe this aspect of the modeling in Chapter 4.

2. Section 2.0, Wind River Project-Related Sources, page EI-4, first paragraph. This bullet refers to the typical drilling programs that were fashioned for each development area. Table 5-4 of the technical document of the near-field analysis shows a drilling program for the proposed action and reveals how the emissions were scaled to represent an average drilling rate for each area. The DEIS should disclose that, in actuality, emissions from drilling engines in different development areas will vary with time, causing localized impacts that are difficult to predict but will exceed the average impacts.

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Near-Field Air Quality Technical Report

1. Section 2.0, Project Description, page NF-3, first paragraph. Various uses of the phrase "compression and treatment" appear in the DEIS and the support documents. In this paragraph, the power requirement (14,600 hp) refers to compression and not treatment. On the other hand, evidently the gas will require only field treatment with separators and dehydrators in order to meet pipeline quality; that is, the project will require no additional capacity at a regional gas processing plant. Please edit the references to compression and treatment and, if appropriate, include in the EIS a statement that the gas leaving the central production facilities will require no additional treatment at a gas processing plant.

2. Section 4.1.1, Model Setup, page NF-11, first paragraph. The second and third sentences of the paragraph read: "As shown in Table 2-1, the annual level of development would be nearly identical for all alternatives. Therefore, the short-term impacts associated with development activities would be identical for all alternatives." Please revise the third sentence to read "nearly identical" instead of "identical." (Please make the same change in Section 5.3, which refers to identical drilling rates.)

3. Section 4.1.2.2, Drilling, page NF-12, third paragraph. This section describes how the sub-grid impact assessment treated the drilling of wells. While the introductory material in Section 4.1.1 mentions PM_{10} emissions during construction and other sections address NO_x emissions from drilling engines, this section introduces SO_2 without explaining why. Evidently the analysts concluded that SO_2 was the main criteria pollutant that would be emitted by drilling engines which would have significant impacts on the sub-grid scale. Please give the reason for including SO_2 in the sub-grid analysis of drilling engine emissions.

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LETTER 17 continued

4. Section 4.3, Traffic Impacts, page NF-27, first paragraph. Similarly, the paragraph on traffic impacts does not explain the rationale for including only SO_2 and CO in Table 4-15. Please explain why these pollutants were considered important for the analysis of traffic impacts.

5. Section 5.2.1, Compressor Stations, page NF-32, Table 5-2. A spot-check of calculations suggests that the analysts assumed an emission rate of 1.0 gram of NO_x per horsepower-hour for all compressor engines. Emission rates of compressors and other engines in grams per horsepower-hour are useful in the context of permitting as well as NEPA discussions. Please cite the NO_x (and CO) emission rates in these units somewhere in the EIS or the support documents.

6. Section 5.2.2, Well Pads, and Section 5.2.3, Drilling Rigs, page NF-33. These subsections under the discussion of the mid-range impact assessment introduce the emissions shown in Tables 5-3 and 5-4. For separators, the total emission rates depend upon other factors in addition to the numbers of separators and the unit emission rates given in Table 5-3. For drilling rigs, the total emission rates depend upon other factors in addition to the number of drilling rigs per pad and the unit emission rates given in Table 5-4. In Sections 5.2.2 and 5.2.3, please describe how the total emissions appearing in Tables 5-3 and 5-4 were calculated. (Table 5-7 has similar information to Table 5-3 and should also be explained; see additional comments regarding Section 5.3 below.)

7. Section 5.2.3, Drilling Rigs, page NF-35, Table 5-4. Although the title of the table refers to the proposed action, which assumes an annual development rate of 38 wells, the aggregate drilling rate of this table is 39 wells per year. This suggests that the data actually apply to alternative A, which assumed a development rate of 39 wells per year. Please check the source of the data and revise the title accordingly.

8. Section 5.3, WRPA Alternative A Emissions Sources, page NF-36, first paragraph. Section 5.3 consists of a paragraph describing how emissions under alternative A would differ from those under the proposed action without discussing the emissions under alternatives B and C. Tables 5-5 through 5-7 address alternative A only. While Section 5.3 and Table 5-5 describe increased demand for compression power under alternative A, there is no table of compressor emissions for this alternative, even though there is a table of separator emissions (Table 5-7). We suggest expanding Section 5.3 to describe how the emissions of alternatives B and C would differ from the proposed action, or at least explain why only alternative A received the expanded discussion. Appropriate tables should be included to support the text, including the part about increased compression demand under alternative A.

9. Section 5.4, Modeling Results, page NF-39, first and second paragraphs. This section uses the word "background" to refer to different concepts. The first paragraph cites as "background sources" the non-project emissions that are called "permitted sources," "oil and gas well emissions," or "reasonably foreseeable development" in the emissions inventory document. Footnotes to Table 5-8 and 5-9 in the same section cite ambient air measurements as "background." Because the accounting of emissions can be confusing without mixing terminology, please revise this section to use consistent terms.

10. Section 5.4, Modeling Results, page NF-40, Table 5-8. This table presents cumulative NO_x impacts relative to the Prevention of Significant Deterioration (PSD) Class II increment for NO_2 as well as the National Ambient Air Quality Standard (NAAQS) for NO_2. The cumulative, maximum modeled concentrations presented in this table are a combination of project impacts and the non-project impacts and background concentrations mentioned in the previous comment. Although it is not stated in the text, the cumulative impacts appear to include a non-project component of about 28 to 36 $\mu g/m^3$. The table compares the project impacts to the NAAQS and the PSD Class II increment, but compares the cumulative impacts only to the NAAQS. While the project impacts alone exceed the increment under none of the alternatives, the cumulative impacts exceed the PSD increment under all of the alternatives. Please add to the text an explanation of the contribution of non-project sources to the cumulative impact and the reason for the variation in this component (i.e., the maximum combined impacts of project and non-project emissions occur at different receptors and under different meteorological conditions, depending upon the alternative). Also, revise the table to include a column comparing cumulative emissions to the PSD increment, and disclose the information in this table in Chapter 4 of the EIS (see comment #1 above regarding disclosure).

Far-Field Air Quality Technical Report

1. Section 1.1, Overview of Approach, page FF-1, last paragraph. The far-field analysis used meteorological data from a single year (1995). Long-range transport analysis is significantly affected by year-to-year meteorological variations, and EPA has been recommending to preparers of air-quality analyses under NEPA that three to five years of data be used in future modeling to broaden the range of dispersion conditions, consistent with current guidance.

2. Section 5.1, APPEND, CALSUM, and POSTUTIL Programs, page FF-25, Table 5-1. While the preceding text, the table title, and the column headings refer to ammonia (NH_3) the table lists the chemical formula for the ammonium ion (NH_4). The conversion from $\mu g/m^3$ to parts per billion by volume suggests that ammonium is correct; please revise the section accordingly.

14 15 16 17 18 19 19 con't 20 21 22

LETTER 17 continued

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements Definitions and Follow-Up Action*

Environmental Impact of the Action

LO - - Lack of Objections: The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC - - Environmental Concerns: The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO - - Environmental Objections: The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU - - Environmentally Unsatisfactory: The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 - - Adequate: EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 - - Insufficient Information: The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 - - Inadequate: EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

LETTER 18

United States Department of the Interior

BUREAU OF RECLAMATION
Great Plains Region
Wyoming Area Office
P.O. Box 1630
Mills, Wyoming 82644-1630

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

WY-1105
ENV-6.00

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SEP 15 2004
BIA/WIND RIVER AGENCY
FORT WASHAKIE, WY

SEP 14 2004

MEMORANDUM

To: Ramon A. Nation, Bureau of Indian Affairs, Wind River Agency, P.O. Box 158, Fort Washakie, WY 82514

From: John H. Lawson
Area Manager, Mills, WY

Subject: Draft Environmental Impact Statement, Wind River Gas Field Development Project, Fremont County, Wyoming

Thank you for providing the opportunity to review and comment on the above-mentioned DEIS. The Bureau of Reclamation Wyoming Area Office reviewed the document as it pertains to Reclamation lands and operations. At this time, we have no comments regarding the DEIS. 1

LETTER 19

United States Department of Agriculture
NRCS

Natural Resources Conservation Service
Federal Building
100 East B Street, Room 3124
P.O. Box 33124
Casper, WY 82602

Date: October 19, 2004

RECEIVED
OCT 22 2004
BIA WIND RIVER AGENCY
FORT WASHAKIE, WY

United States Department of Interior
Bureau of Indian Affairs
Wind River Agency
P.O. Box 158
Fort Washakie, Wyoming 82514

Dear Mr. Gover,

The Natural Resources Conservation Service has reviewed Draft Environmental Impact Statement (DEIS) on the proposed Wind River Natural Gas Field Development Project.

The NRCS does not have any comments on the project.

If you have any questions, or need to discuss this comment with us, please contact either myself at 307-233-6750 or please contact Doug Gasseling, Conservation Agronomist, Cheyenne, Wyoming, at 307-772-2320, ext. 101.

Sincerely,

LINCOLN "ED" BURTON
State Conservationist

Cc:
Diane E. Gelburd, Director, Ecological Sciences Division, Washington, D.C.

1

SECTION 5: RESPONSE TO COMMENTS

Responses to comments are organized by responder and are numbered in the order received. Page and section numbers, unless otherwise noted, refer to the draft EIS issued in July 2004. Comments are noted by general topic here for continuity of response to comment. For full comment text refer to the subject letter number in Section 4. For text revisions to the DEIS, refer to Section 2 of this FEIS.

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Letter	Comment	General Topic	Response
1	1	NRCS – No Comment.	Thank you for responding.
2	1	Pre-1950 water rights.	The text referred to has been changed for the FEIS. Thank you for the information.
3	1	Determination of minor, short-term impacts to wildlife, Executive Summary, p. x.	Page x of the Executive Summary of the DEIS summarizes the environmental consequences (direct and indirect impacts) to wildlife as minor and short term. (Note that these determinations do not include cumulative effects). The Wyoming Game and Fish Department strongly disagrees with the effects determination in the DEIS. The determination of direct and indirect impacts for this EIS was based on the definitions in the introductory section of Chapter 4 (Environmental Consequences). Short-term impacts are defined as "effects of short duration that would occur during construction, drilling, completion and reclamation of a (single) well." Long-term impacts are those that persist beyond the construction, drilling and reclamation phases, or continue for the life of the project." Minor is defined as "changes in resource condition, quality, or quantity that are measurable, but small and localized." The direct and indirect impacts from a single well were considered minor because the initial loss of potential wildlife habitat from construction of a well pad, access road to the well, and section of pipeline from a well to a gathering line was estimated to be 5.84 acres/well for the Muddy Ridge, Sand Mesa, Sand Mesa South, and Coastal Extension fields. The disturbance is less for the Pavillion Field. The residual loss of potential wildlife habitat from a single well was calculated to be 2.3 acres/well, which is a fraction of a percent of the WRPA. The WGFD noted in its comments that the vegetation common in the WRPA, such as sagebrush and desert shrub, which is important as forage for game species, may take decades to completely recover in an area with less than 7" annual rainfall. However, irrigated crops (such as alfalfa) also are used as forage by game species, recover quickly through irrigation and comprise approximately 45 percent of the five development areas. Since sagebrush and desert shrub also account for about 45 percent of the five fields, and the recovery time of these species is long term, the duration of direct and indirect impacts from construction of a well have been changed to short- to long-term in the FEIS, depending on the species. The magnitude of direct and indirect

Letter	Comment	General Topic	Response
			impacts varies from minor to moderate, depending upon the species. However, the initial disturbance from all wells under the Proposed Action is 1,982 acres or only 2.15 percent of the WRPA and 5.2 percent of the five development areas. The greatest concern of the WGFD is the cumulative impacts of the existing wells, residential development, the proposed project, future oil and gas field development and other potential future activities, which "could have a significant impact on wildlife habitat" (G. Anderson, WGFD, personal communication, October 8, 2004). The BIA agrees that the cumulative impacts may be greater for some wildlife species (e.g., game species) and has revised the cumulative effects determination to minor to moderate, depending on the species.
3	2	Determination of minor, short-term loss of recreational opportunity, Executive Summary, p. xi.	Please see response to letter #3, comment #1 for discussion on definitions of impacts. Recreational opportunities in the WRPA are considered to be moderate (G. Anderson, WGFD, personal communication, October 8, 2004). Since recreation is closely related to the health of large and small game species, the direct and indirect impacts have been changed to range from short- to long-term in the FEIS, to conform with the revisions that have been made to wildlife impacts. The WGFD also expressed concern about locating the proposed wells within the Sand Mesa Wildlife Habitat Management Area. The Sand Mesa WHMA in the WRPA is located along Fivemile and Muddy Creeks and Middle Depression Reservoir (see Table 3.10-1). The estimated width of the WHMA along Muddy Creek ranges from approximately 150 to 3,000 feet, and the width along Fivemile Creek ranges from approximately 50 to 2,000 feet, based on existing GIS data. In accordance with agency requirements and Operator-committed mitigation measures, the Operators will not drill wells within 500 feet of Muddy Creek and Fivemile Creek.
3	3	Existence of quantitative data on past disturbances to the WRPA, Executive Summary, p. xvi.	The WGFD requested that aerial photographs, historic maps, etc. be used to assess how habitat disturbances have increased above past levels. The BIA agrees that these data would be helpful, but the USGS and other sources contacted indicated that such data were not available for the WRPA.

Letter	Comment	General Topic	Response
3	4	Total disturbance to wildlife habitat within the WRPA, p. 2.1-6.	The WGFD requests that disturbance from existing roads, residences, buildings and other facilities be calculated. As indicated in the response to letter #3, comment #3, Geographic Information System (GIS) data and aerial photographs needed to estimate the amount of the area occupied by other structures are not available. Since these data are unavailable, the significance of the loss of undeveloped lands as a result of the Proposed Action cannot be quantified.
3	5	Mule Deer Herd Unit within WRPA, p. 3.8-2.	The GIS maps provided to us by the WGFD, Cheyenne, did not identify a Mule Deer Herd Unit. The BIA appreciates the updated information provided by the WGFD, Lander office and has revised the text to indicate that the WRPA is located within the area identified as the Project Mule Deer Herd Unit. The FEIS has also identified the Herd Unit for the Pronghorn antelope as the Project Pronghorn Antelope Herd Unit.
3	6	White-tailed deer within the WRPA, p. 3.8-3.	The GIS map of white-tailed deer received from the WGFD, Cheyenne identified the WRPA as "NOH." The metadata included with the GIS data specified that areas identified as NOH (no herd unit) "have no documented use by the species in question …..". Tom Ryder (WGFD, personal communication, October 6, 2004) stated that the information from these maps is outdated and that white-tailed deer are common in the WRPA and adjacent areas and inhabit the area year-round. White-tailed deer are generally found along Muddy Creek and Fivemile Creek during the day and feed in the croplands at night. The WGFD has also provided us with updated information on number of white-tailed deer hunting licenses issued in Hunt Area 157, which includes the WRPA (Tom Ryder (WGFD, personal communication, October 6, 2004). Section 3.8 (wildlife) and Section 3.10 (recreation) has been changed to reflect the information received from the WGFD, Lander subsequent to the publishing of the DEIS. The statements on direct and indirect effects and cumulative impacts to white-tailed deer and recreational activities have been revised in the FEIS. See response to letter #3, comment #1 for further discussion.
3	7	Mitigation in areas where 4-5 wildlife species are present, p. 4.8-	The WGFD expressed concern that the DEIS stated that more consideration would be given to mitigating impacts in areas where 4-5 wildlife species are present. The agency commented that the EIS should recognize that there are important habitats where only one or two

Letter	Comment	General Topic	Response
		3.	species may be present in very high densities. The FEIS has been clarified to indicate that determination of the need for mitigation will be based on several factors, including number of wildlife species present and presence of high density of a single wildlife species. The option of offsite mitigation has been presented in the FEIS. The BIA will contact the agencies to discuss the potential for offsite mitigation.
3	8	Seasonal use of big game habitat, reclamation of wildlife habitat, p. 4.8-5.	As indicated in the responses to comments above, the data utilized in this DEIS on large game species are outdated. Sections 3.8 and 4.8 have been revised to reflect the new information we have received from the WGFD on pronghorn antelope, mule deer and white-tailed deer. In addition, the WGFD states that the agency has had difficulty in restoring disturbed sagebrush habitats in the Sand Mesa WHMA due to the extremely dry conditions and sandy soils in this area and high potential for invasion by noxious weeds. Appendix D in the DEIS provides detailed information on the reclamation program for the WRPA. On BOR surface (i.e., the Withdrawal Area), the BLM and the BOR specify the seed mixtures that will be used to restore the disturbed land. Table D-2, for example, specifies that the seed mixture consists of western wheatgrass, bluebunch wheatgrass, bottlebrush squirreltail, Indian ricegrass, needle-and-thread, gooseberryleaf globemallow, cicer milkvetch, Wyoming big sagebrush, antelope bitterbrush, and fourwing saltbush. Seed mixtures vary by habitat type. Appendix D also describes the Performance Standards that would be used to determine the attainment of successful revegetation, as well as the monitoring and maintenance program. The discussion on invasive and noxious weeds appears in section 3.6.6 of the DEIS. The BIA works closely with the Fremont County Weed and Pest Control District (FCWPCD) on weed control. The BOR requirements are followed to control the spread of weeds on BOR surface. Section 4.8 of the DEIS will be revised to include reference to Appendix D, which identifies the seed mixture that will be used in disturbed sagebrush habitat. The Operators indicate that vegetation reclamation has been successful, but that the sagebrush takes years to recover (S. Mansur, TBI, personal communication, October 13, 2004). In light of the length of time required for sagebrush recovery, the impact to wildlife that feed on sagebrush has been changed to

Letter	Comment	General Topic	Response
			"long term" in the FEIS.
3	9	Impacts to big game species from noise, p. 4.8-6.	The WGFD states that impacts to big game species from noise should be classified as significant and long term, since game species, as specified in Section 4.8.3.1, may avoid areas with increased human activity. The citations presented in Section 4.8 indicate that some studies show that mule deer do not avoid oil fields (Easterly 1991) and that pronghorn antelope habituate to noise (Reeve 1984, Sagerstrom 1982, Deblinger 1988). Although some research indicates that deer avoid areas with a high level of human activity during oil and gas operations, they quickly moved back into such area following completion of work (Hayden-Wing Associates 1994). Therefore, impacts of noise from construction activities to deer and antelope will not be changed. Although elk are sensitive to noise, which could result in long-term displacement from their seasonal habitat, their presence within the WRPA is sporadic (Tom Ryder, WGFD, personal communication, October 6, 2004). Thus, it would be unlikely that noise would have adverse impacts to elk in the WRPA.
3	10	Impacts to wildlife from increased vehicle traffic, p. 4.8-6.	The WGFD states that the impacts from increased traffic should be changed to "significant" based on the information provided in Section 4.8.3.1. The study cited in the DEIS indicated that roads generally reduce the habitat value for mule deer to a distance of 0.06 to 0.5 mile (Rost and Bailey 1979). In Section 4.14 the average annual daily traffic (AADT) was estimated to increase from <1 percent to 14 percent (Midvale), with an average increase of 2.9 percent (See Table 4.14-2). The greatest increase in traffic would occur during construction of a well, which would result in short-term direct and indirect impacts. Section 4.8.3.1 states that impact from traffic would be minor. It also identifies the impact as negligible. This inconsistency has been corrected and the impacts from traffic are defined as "minor."
3	11	Reclamation of wildlife habitat, p. 4.8-12.	Please see response to letter #3, comments #1 and #8. Because of the difficulty of sagebrush reclamation in extremely dry, sandy habitats, the duration of impact has been changed to long term for wildlife species that forage on sagebrush..
3	12	Supporting data for bullets 2, 3,	The WGFD indicate that no supporting data was provided for bullets 2, 3, and 4 in the Impacts Summary

Letter	Comment	General Topic	Response
		and 4 in Impacts Summary, p. 4.8-15.	section (Section 4.8.7). The BIA appreciates the comment and has omitted those three bullets from the FEIS.
3	13	Suggested mitigation measures for wildlife habitat and recreation losses.	The BIA appreciates the suggestions for additional mitigation measures for wildlife and recreation. See response to letter #3, comment #8 on noxious weed control. The BIA works closely with the Fremont County Pest and Weed Control Department (FCPWCD) and the BOR on weed control. The BIA and the Operators will meet with the WGFD to discuss the agency's Private Lands/Public Wildlife Program for acquiring additional hunting areas for public use.
3	14	Lack of documentation of disturbance activities for cumulative impacts analyses, p. 5.1-46.	Chapter 5 (cumulative effects) identifies the past, present, and reasonably foreseeable future activities. They include oil and gas development, agriculture, sand and gravel mining, residential development, livestock grazing, and commercial development. As indicated in the response to letter #3, comment #3, aerial photographs are not available for the WRPA and neighboring areas, so that the impacts from past and present activities could not be quantified. As a result, all the information obtained on past, present, and reasonably foreseeable future activities on the Wind River Indian Reservation and the WRPA was based on personal communications with the BIA, BOR, BLM, other agencies, and the Tribes.
3	15	Mitigation measures to protect aquatic habitat, Chapter 2, Section 2.8.2.5.	The BIA appreciates the suggestions for additional mitigation measures to protect surface and ground water resources. However, most of these mitigation measures are addressed in the DEIS. Comments to the suggested bullets are provided here. Bullet 1 – recommends use of a closed mud system: Re-circulation of drilling muds is standard operating procedure. It has been clarified in the FEIS. Bullet 2 – preparation of a SPCC Plan: The last bullet in section 2.8.2.5 (water mitigation) states that if storage capacity exceeds criteria in 40 CFR Part 112, a SPCC plan would be developed. Bullet 3 – Groundwater availability. Development of the wells in the WRPA has not resulted in the uncontrolled release of groundwater to date. If surface discharge of groundwater would occur, the Operators would obtain a discharge permit from the WDEQ or US EPA, depending on land ownership. The WDEQ is responsible for surface water discharge permitting on private surface and the US EPA is responsible for permitting on tribal

Letter	Comment	General Topic	Response
			surface. If an individual or agency wishes to utilize a well as a water source after abandonment, such arrangements could be made with the Operators. However, the groundwater is frequently not potable (S. Mansur, TBI, personal communication, October 13, 2004). Bullets 4 and 5 – Stream crossings BIA and BLM requirements for stream crossings are followed by the Operators. The pipeline construction techniques that have been used by the Operators for stream crossings, include boring under perennial streams or overhead pipelines perpendicular to the streams. In a dry streambed trenching would be considered and utilized if approved by the BLM and BIA (S. Mansur, TBI, personal communication, October 13, 2004). Bullet 6 – Riparian areas are limited to Muddy and Fivemile Creeks. The Operator-committed mitigation specifies that development would not occur within 500 feet of these streams. Bullet 7- A 100-year floodplain has not been designated for the WRPA. Bullet 8 - In riparian areas the width of pipeline ROWs would be reduced, or constructed alongside existing roads and ROWs, where possible, to minimize their impact.
3	16	Importance on non-game fish to the ecosystem, Section 3.10.3.2.	This comment refers to the recreation section (3.10). Please note that the information on fish species appears in Section 3.8. Table 3.8-3 lists the game and non-game species occurring in the State of Wyoming and Section 3.8.3.2 provides a brief discussion of each of the fish species reported to be present in the WRPA. Appendix J-3 also provides the results of a fish survey conducted in Muddy Creek, Fivemile Creek and Cottonwood Creek in August-September 2003. A sentence has been added to the FEIS in Section 3.8.3.2 stating that non-game fish are an important component of the ecosystem, including serving as prey for game fish and raptors, and as bait for fishermen. Some fish species also forage on aquatic plants and keep growth of these plants in check (D. Dufek, WGFD, personal communication, October 13, 2004).
3	17	Results of Spring 2004 fish survey, Table 3.8-4.	The BIA thanks you for providing us with the results of the WGFD Spring 2004 fish survey in Muddy and Fivemile Creeks using electrofishing gear. These data have been included in the FEIS.
4	1	Cumulative Impacts Class I Airsheds	Thank you for your comment. Please see Section 5.3.3 of the DEIS for the results of the cumulative air quality

Letter	Comment	General Topic	Response
			impact assessment.
4	2	Land and Water Conservation Fund	Thank you for your comment. The BIA has contacted the administrator for the L&WCF for Wyoming. There are no potential conflicts with the L&WCF Act because there are no relevant lands affected. (Moore, 2004)
5	1	Drilling pace.	The number of wells drilled annually under the Proposed Action and alternatives will be determined by various factors, including commodity prices, pipeline capacity, capital requirements, rig/service availability. The estimated number of wells to be drilled annually under each of the alternatives in this EIS was based on information provided by the Operators at the time the draft EIS was first prepared. These numbers were used as assumptions for the purpose of developing the alternatives for this EIS. The intent of the estimated numbers of wells to be drilled in the DEIS was not for the purpose of mandating the pace of development by the Operators. It will be clarified in the FEIS that the pace of development (i.e., phased development) is an assumption, and specify that the actual pace of development would be determined by various factors, such as commodity price, rig/service availability, pipeline capacity, and capital requirements.
5	2	No activity within 1000 feet of a water body. Midvale irrigation and TBI have an agreement to not drill within 500-ft of Midvale's main irrigation canal, and within 500-ft of Five Mile Creek.	Thank you for this comment – The text will be revised to reflect the agreement between TBI and the Midvale Irrigation District, as well as Wyoming regulations. It will also be noted that Wyoming Oil and Gas Statutes state in **Chapter 3, Section 22, General Drilling Rules "**to prevent contamination of streams and potable water and to provide additional protection to human health and safety in instances where drilling operations are conducted in close proximity to water supplies, residences, schools, hospitals, or other structures where people are known to congregate. Pits, wellheads, pumping units, tanks, and treaters shall be located no closer than three hundred fifty feet (350') from any of the aforementioned items. In addition, 25 CFR 227.22 states the lessee shall "not drill any well within 200 feet of any house or barn on the premises without the lessor's written consent", which would apply to leases under the 1938 Act. The Supervisor may impose greater distances for good cause and likewise grant exceptions to the 350-foot rule". Where the project would involve tribal minerals leased under laws other than the 1938 Act and private surface, the siting of wellheads and other

Letter	Comment	General Topic	Response
			natural gas facilities would have to be negotiated between the surface owner and the operator; the terms of this agreement should be codified in the Surface Damage Agreement.
5	3	Little difference in Proposed Action and Alternative B.	Thank you for your comment. Alternative B was chosen for study as the minimum development scenario, as Alternative A was chosen as a maximum development scenario. As stated in Section 1.3, the DEIS is not a decision document. The Record of Decision will be the decision document for this NEPA process.
5	4	Little difference in Proposed Action, Alternative A, and Alternative B.	See response to letter#5, comment #3.
5	5	Alternative B as "phased development"	See response to letter#5, comment #3.
5	6	Split Estate, Landowner Conflicts	BIA has no authority to regulate the surface on private lands with or without mineral rights. BIA discloses the potential effects to these lands, but points out that land owners and Operators would negotiate construction and operational practices. The EIS discloses the voluntary mitigation measures that the Operators would employ. In addition, split estate issues, impacts of gas development, on agricultural productivity and net income, and impacts of resource extraction on rural character are discussed in Sections 3.13 and 4.13.
5	7	Greka vs. Saba Energy	Saba Energy is still shown as Operator of Record in BIA records. No change.
5	8	Clarify that interim development is allowed prior to ROD.	Development of minerals within the jurisdiction of the BIA will be allowed as detailed in a Memorandum of Agreement, effective December, 2003 between the Wind River Natural Gas Development Project Operators, BIA, the Shoshone and Arapaho Tribes Joint Business Council, and BLM for an Interim Activity Plan. Minerals outside the jurisdiction of the BIA (private minerals) are not within the scope of this EIS and so interim actions involving those minerals are not constrained by this process.

Letter	Comment	General Topic	Response
5	9	Clarify that interim development is allowed prior to ROD.	See response to letter #5, comment #8.
5	10	Correct to read "Communitiza-tion Agreement"…	Text in the Executive Summary has been revised to reflect this correction.
5	11	Correction to verbiage Geo/Paleo…	The FEIS text has been revised to read "…would be minor in the short or long term…."
5	12	Hydrogen Sulfide Leaks	The Executive Summary was revised to reflect this comment.
5	13	Correct 2nd sentence to … the amount of development…	Text in the Executive Summary has been revised to reflect this correction.
5	14	Corrections to text regarding casino construction and 8X8 feet pad size in Pavillion irrigated lands.	Text in the Executive Summary has been revised to reflect these corrections.
5	15	Add abbreviations.	These abbreviations have been added to the Abbreviations and Acronyms list for the FEIS.
5	16	Water Quality impacts due to Proposed Action and Alternatives.	It is agreed that there is a very low probability that groundwater in the vicinity of drilling operations would be impacted. However, because accidents can happen, there is a slight chance of groundwater being impacted – this potential impact, however, is considered "negligible." Verbiage in the statement above has been changed to reflect the low probability of such an event occurring.
5	17	Formation of Transportation planning committee.	An interagency effort consisting of BIA, BLM, Fremont County, BOR, WYDOT, and landowners would be the best composition for this committee. Many such committees are currently operating in Wyoming with good success in planning for the transportation needs of all parties. The source of any necessary funding would be determined by the parties on the committee.
5	18	Saba Energy; Interim	See response to letter #5, comments #7 and #8.

Letter	Comment	General Topic	Response
		development.	
5	19	Remove references to reserve pits on agricultural ground.	The text has been corrected in the FEIS.
5	20	Well count not well established.	See response to letter #5, comment #1.
5	21	Corrections	Text in FEIS has been corrected.
5	22	No mention of "removing and replacing topsoil"	In Section 2.7.2.2, the DEIS states "All available topsoil suitable for reclamation (up to 12 inches) would be stripped from the well pad area and stored adjacent to the well pad." In addition, Section 2.8.2.3, p. 2-59 under Soils Mitigation states "Selectively strip and salvage topsoil or the best suitable medium for plant growth up to a depth of 12 inches from all areas to be disturbed for construction of well pads and facilities."
5	23	Interim development.	See response to letter #5, comment #7.
5	24	Well count.	See response to letter #5, comment #1.
5	25	Interim development.	See response to letter #5, comment #7.
5	26	Well count.	See response to letter #5, comment #1.
5	27	Correction	Text in FEIS has been corrected.
5	28	Well count.	See response to letter #5, comment #1.
5	29	Is a project-specific EA required if we have an EIS?	Project- and location-specific environmental analyses are still required for all APDs, ROWs, and other actions in the project area as part of the NEPA process. These environmental documents are usually very simple, and meant to account for site-specific resource conservation, and the application of Conditions of Approval for the proposed action. The DEIS, FEIS, and ROD for the WRPA will be the controlling documents for allowable actions, and will serve as a starting point for analysis of mitigation and minimization measures required for the action.
5	30	Access road construction correction	Text in the FEIS has been corrected as suggested.
5	31	"post	Road width disturbance for the WRPA were calculated

Letter	Comment	General Topic	Response
		construction" disturbance.	using 16 feet for Pavillion irrigated land and 35 feet for all other project areas. The text was revised to reflect this in the FEIS.
5	32	Plan of Development	A plan is required to be submitted, whether to BLM or WOGCC, for the development of a well during the APD process in accordance with Onshore Order No. 1 and 43 CFR 3160. No change.
5	33	Add "but not limited to"…	Text in the FEIS was revised as suggested.
5	34	Add "but not limited to"…	Text in the FEIS was revised as suggested.
5	35	Reference to source for drilling water should be stricken.	The delineation of the source for drilling and other water required for the gas development project is necessary for proper analysis of impacts to surface and subsurface water resources. No change.
5	36	Service trailers use BLM/BIA approved envirotech system when not self contained.	Text in the FEIS has been revised as suggested.
5	37	Correct reclaimed pad size.	Text in the FEIS has been revised as suggested.
5	38	Adopt a different reclaimed pad size for Muddy Ridge locations drilled below a certain depth?	The commenter offers no reason or rationale for the reclaimed pad size in the Muddy Ridge area to exceed the size of that shown in Figure 2-14 of the DEIS, regardless of the total depth of the well, nor does the BIA see any. No change.
5	39	Correct mitigation on private surface	Text in the FEIS has been revised to "…applied on privately owned/surface/tribal minerals, unless otherwise….." as suggested.
5	40	Correct precon-struction planning verbiage	Text in the FEIS has been revised to "unless the surface owner, whether BIA, BOR, or private surface/tribal minerals, landowners whichever is applicable, specifies otherwise" as suggested.
5	41	Correct verbiage in 2.8.2.1, 2nd bullet	Text in the FEIS has been revised to "…on fee surface lands overlying tribal minerals these activities…" as suggested.

Letter	Comment	General Topic	Response
5	42	Correct 6th bullet in 2.8.2.3 to add "wellsite" to facilities.	The subject mitigation is meant for all facilities, not just wellsite facilities. No change.
5	43	Phased development	See response to letter #5, comment #1
5	44	Corrections to 2.9.4	The FEIS text has been changed to "…private surface/tribal minerals are established with the individual surface owner."
5	45	Reference to "irrigated" Pavillion land	The FEIS text has been changed to reflect "irrigated" land in the Pavillion area. No "larger pad for other wells completed below a specified depth" language has been added.
5	46	Fill material on irrigated land.	Fill material would be either purchased from the landowner, or acceptable to the landowner. Language describing a barrier between fill and agricultural soil was added to the FEIS.
5	47	Revise 2.8.5 to 2.9.5.	Text in the FEIS has been revised as suggested.
5	48	Add reference to State of Wyoming regulations for patented lands?	The applicable State of Wyoming regulation is Wyoming Oil and Gas Conservation Commission Statute §30-5-109, Rules and Regulations Governing Drilling Units.
5	49	Revise "Stratigraphic"	The FEIS has been revised to reflect the correct spelling.
5	50	Primary Land Cover Types, Figure 3.6-1.	The source of the primary and secondary land cover data is (Analysis, Wyoming Gap, 19961201, Land Cover for Wyoming: University of Wyoming, Spatial Data and Visualization Center, Laramie, Wyoming). We assume that these data are valid.
5	51	Hunting Areas, Figure 3.10-2	The figure legend has been qualified to indicate that hunting on tribal lands is restricted to tribal members.
5	52	Waterfowl Hunting Areas, Figure 3.10-3	The figure legend has been qualified to indicate that hunting on tribal lands is restricted to tribal members.
5	53	Add statement about Ethete	The FEIS has been revised as suggested.
5	54	No Tribal or Wyoming Severance tax shown.	The Shoshone and Arapaho tribes did not provide information on royalty and severance tax receipts, therefore a summary of historic revenues from oil and gas production was not developed. Section 3.13.5.5 discusses Fremont County assessed valuation from oil

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			and gas production, statewide oil and gas severance tax receipts and Fremont County total severance tax receipts.
5	55	Page Header correction	The FEIS has been corrected.
5	56	Delete phased drilling reference.	Please see response to letter #5, comment #1.
5	57	Delete phased drilling reference.	Please see response to letter #5, comment #1.
5	58	Delete phased drilling reference.	Please see response to letter #5, comment #1.
5	59	Delete phased drilling reference.	Please see response to letter #5, comment #1.
5	60	Delete phased drilling reference.	Please see response to letter #5, comment #1.
5	61	Phased Drilling	Please see response to letter #5, comment #1
5	62	WOGCC change to State of Wyoming?	This item is correct as written. Under W.S. 30-5-116, a 0.8 of value at the wellhead is levied on oil and gas production to support the operations of the Wyoming Oil and Gas Conservation Commission.
5	63	Split Estate	Please see response to letter #5, comment #14
5	64	Number of private parcels seems high.	The number of 106 parcels included in whole or in part in the Pavillion field was obtained from Fremont County Assessor GIS records. In some cases, multiple parcels may be owned by one owner.
5	65	Pavillion model only	Please see response to letter #5, comment #14.
5	66	Phased Drilling	Please see response to letter #5, comment #1
5	67	Phased Drilling	Please see response to letter #5, comment #1
5	68	Phased Drilling	Please see response to letter #5, comment #1
5	69	Phased Drilling	Please see response to letter #5, comment #1
5	70	WOGCC change to SOW?	Please see response to letter # 5, comment #62

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5	71	Well pad size	Please see response to letter #5, comment #14
5	72	Punctuation correction.	The FEIS has been corrected as suggested.
5	73	Reword	The word "assumed" has been added to the first sentence in Section 4.14.2.1, as suggested.
5	74	Correction	The statement has been changed in the FEIS to read "Under the Proposed Action, drilling is assumed to occur…"
5	75	Development phase impacts	The word "assuming" has been added in the suggested place in the FEIS.
5	76	Development phase impacts	The word "assuming" has been added in the suggested place in the FEIS.
5	77	Development phase impacts	The word "assuming" has been added in the suggested place in the FEIS.
5	78	Include EAs from SOCO or incremental 3D activity	Reference to these documents has been added to the FEIS.
5	79	Correction to casino language	The FEIS has been corrected as suggested.
5	80	Reference to 8X8 feet reclaimed well only	The Operators have committed to reclaiming all Pavillion irrigated land wells to an 8X8 foot area.
5	81	Appendix B misspelling	The FEIS has corrected the spelling error.
5	82	Table C-1 update wellpad size	No update is necessary, as Appendix C reflects action and no action alternatives.
6	1	Phased Development	Please see response to letter #5, comment #1.
6	2	Geophysical Operations	The proponents requested no geophysical operation as a part of the Proposed Action, or any action alternative, so none was analyzed. Should conditions change, it is appropriate to delay analysis until more information regarding the action is available.
6	3	Applicant Committed Measures (ACM)	The Operators have "committed" to apply the ACMs in order to reduce or "mitigate" impacts to resources. The BIA considers these ACMs appropriate for the high level of activity that the Operators are proposing. Future

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			project analyses would use these measures as a starting point (tier to the EIS), and their specific analyses may or may not propose their use appropriate for their action alternatives.
6	4	Land use – private surface	Thank you for your comment. As you noted, the BIA recognizes the agreements between Operators and property owners.
6	5	Driver training on potential vehicle collisions with wildlife	The text has been clarified to specify that the Health and Safety training given by the Operator to company staff and contractors prior to working in the project area would include a discussion of the potential for vehicle collisions with wildlife and threatened and endangered species.
6	6	Rig lighting	The BIA agrees with PAW that downward-directed and shrouded lights should be installed on temporary drilling rigs should be applied only after considering safety. The statement in the EIS has been modified to include safety considerations.
6	7	Transportation planning committee.	Thank you for your comment.
6	8	Noise	PAW makes a good point. The wording has been revised to “near existing residences”. In absence of a regulatory noise limit, the 55 dBA noise level is generally recognized as a reasonable noise level produced by industrial facilities at established residences.
6	9	Directional Drilling	Thank you for your affirmative comment.
6	10	General monitoring program, p. 2-80, 2.9.4.	The commenter expressed concern that the paragraph “… a monitoring program would be undertaken during drilling and production for evaluating the potential effects of the Proposed Action….” was a new stipulation. This is not a stipulation. However, as the information in this paragraph is inaccurate, it has been deleted. The sentence in the paragraph above referring to black-footed ferret surveys has been changed, since the US FWS no longer requires black-footed ferret surveys in areas (including the WRPA) that have been given a ‘block clearance’ by the agency.
6	11	Supporting information requiring increased	Thank you for this comment. After further evaluation and in conformance to agreements between TBI and Midvale Irrigation District as well as Wyoming regulations, this statement as well as others in the text

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		protection of water bodies from 500 ft to 1,000 ft.	has been revised as per the response to letter #5, comment #2.
6	12	Additional wildlife mitigation measures, p. 4.8-16, 4.8.8	Concern was expressed about the following statement "In areas where four wildlife resources of concern overlap, the BIA may consider avoidance of these areas in order to reduce impacts." The additional mitigation measures are suggestions, not requirements. It is not a "significant new stipulation," as suggested by the commenter. It simply states that the BIA may consider additional mitigation. The agency does not intend to change the existing lease conditions.
6	13	Additional mitigation measures for mountain plover, p. 4.9-13, 4.9.8	Thank you for the comment. The "additional" mitigation measure for the mountain plover ("… restore mountain plover habitat by …") is a suggested mitigation measure, which the BIA may consider, if necessary. It is correct that the mountain plover is no longer proposed for listing under the Endangered Species Act. However, the mountain plover is protected under the Migratory Bird Treaty Act and is characterized as a "species of special concern" by the State of Wyoming.
6	14	Additional mitigation measures for sage grouse, p. 4.9-13, 4.9.8	As indicated in the response to letter #6, comment #13, the additional mitigation measures in Section 4.9.8 are suggestions, not requirements. The BIA will consult with the WGFD and US FWS, as appropriate, if the agency believes that additional mitigation measures are necessary for protection of the sage grouse, as well as other wildlife species identified as species of special concern by the State of Wyoming. In addition, the greater sage-grouse has been recently petitioned for listing under the Endangered Species Act. The US FWS announced a positive finding and has initiated a status review of this species (69 FR 21484).
6	15	Lighting at compressor stations	Thank you for your comment. Our response to letter #6, comment #6 also addresses this comment. In addition, stations are normally unmanned at night, so lighting should be utilized on an "as needed" basis for both environmental and economic reasons.
6	16	Split Estate	BIA thanks PAW for their input. People involved in potential conflicts can contact a member of the Wyoming Split Estate Initiative for assistance in resolving conflicts.

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6	17	Benefit to Wyoming residents.	Thank you for your comment.
6	18	Gas production not able to meet demand.	Thank you for your comment. BIA also takes the National Energy Policy seriously, and intends to continue to utilize the natural resources of the project area in an environmentally acceptable manner.
7	1	Air quality mitigation.	The BIA thanks the Forest Service for their comments. Please note that the greatest air quality impacts are predicted to occur on tribal lands and potential impacts at Bridger, Popo Agie, Cloud Peak, and Fitzpatrick Wilderness areas are much less in comparison. Therefore the BIA and the Tribes have a vested interest in mitigation and monitoring efforts.
7	2	Cumulative impacts.	Thank you for your comment. The BIA believes that the scope of the cumulative impacts analysis is appropriate given the regions of influence of the impacts.
7	3	Impacts determination	Thank you for your comment. Recommended mitigation measures in the first and third bulleted items of the comment require coordinated action with the land managers of many projects, as the contribution of the Wind River Gas Field Development Project alternatives to the cumulative impacts is negligible. It is respectfully suggested that the FS take the initiative for coordinating mitigation and monitoring measures with the State, NPS, BLM and the operators of other projects affecting this wilderness. The BIA would consider participating is such an effort. As for the use of best available control technology and control of fugitive dust mentioned in the second bulleted item, mitigation is detailed in section 2.8.2.4, p. 2-60 of the DEIS to cover those aspects.
7	4	Mitigation for wilderness areas.	Thank you for your comment.
7	5	AQRV trends.	Thank you for your comment. The BIA appreciates your offer of assistance.
7	6	Air quality mitigation.	Thank you for your comment. The BIA appreciates your offer of assistance.
7	7	Federal Land Manager (FLM) responsibility in determination of	The BIA acknowledges the duty of each FLM to determine the significance of potential impacts to lands under their management. Chapter 2 of the document was revised to include a discussion of the roles and

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		impact significance.	responsibilities of the FLMs.
7	8	Fox document usage.	In consideration of your comments, references to "red" and "green" line values were deleted from the final analysis. We respectfully suggest that the needs of the Forest Service and other FLMs can best be met if the agencies participate in the protocol process or otherwise provide input at the beginning of the analysis process.
7	9	Ozone impacts.	The Tribes and BIA are very interested in implementing criteria pollutant monitoring, including ozone monitoring, within tribal lands. The implementation of a monitoring station would allow for the documentation of baseline air quality conditions and serve as a point of reference for comparison with impacts from future development. Any technical expertise and resources for funding that the Forest Service can contribute towards this effort would be greatly appreciated.
7	10	Difference between Proposed Action and Alternative B.	We ask the Forest Service to note that Table 4.4-21 presents ozone impacts, not emissions. Potential impacts presented in Chapter 4 represent full development of the Alternative, not just the development that may occur during any one year. As discussed throughout the document, Alternative B would develop fewer wells in total (233) than the Proposed Action (325). As a result, potential ozone impacts for Alternative B are less than the impacts predicted for the Proposed Action.
7	11	Please clarify if the deposition discussed here is just project related	Section 4.4 in its entirety presents potential air quality impacts for only the Proposed Action and Alternatives (including existing project related development within the project area). Cumulative air quality impacts are discussed in Chapter 5. As presented in the first paragraph of Section 4.4.3.1, the potential deposition impacts are for the Proposed Action only.
7	12	Visibility impacts.	The BIA thanks you for your comment and will take your comment into consideration for future documents. We respectfully suggest that the needs of the Forest Service and other FLMs can best be met if the agencies participate in the protocol process or otherwise provide input at the beginning of the analysis process.
7	13	Table 4.4-40 error?	The data presented in Table 4.4-40 are correct. The actual predicted sulfur deposition at Wind River Canyon is 0.0000029 kg/ha/yr which is rounded to 0.00000 in the

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			table.
7	14	Tables should reference sources.	Table 5.3-1 has been referenced to the Emission Inventory report as requested. Emissions from individual well facilities were considered in the analysis. Section 4.0 of the Emission Inventory presents details of the well emissions used in the study. In order to prevent double counting emissions from well facilities, permitted wellsites were not included in the permitted source inventory.
7	15	O_3 one-hour standards.	At this time the EPA recommends the use of the CALPUFF set of models for long range transport. Unfortunately, CALPUFF is not capable of modeling the complex chemical reactions necessary to predict ozone impacts. Therefore, it is not feasible at this time to complete a Far-Field analysis for ozone.
7	16	NO_2 cumulative levels.	The Wind River analysis most probably does not include all emissions sources that would be evaluated by the State in a regulatory PSD increment analysis of Cloud Peak Wilderness. However, the converse also holds true. The Wind River analysis most probably includes many emission sources that would be excluded from a regulatory PSD increment consumption analysis. Therefore it is not possible to determine if a regulatory PSD increment analysis would indicate impacts greater than or less than the impacts predicted in the Wind River analysis.
7	17	Cumulative ANC at Florence Lake.	The BIA appreciates the Forest Service's concerns about acid deposition at Florence Lake, especially in light of the results presented in the Powder River Basin Oil and Gas EIS (BLM 2003). As the Forest Service is the primary FLM responsible for Cloud Peak Wilderness and Florence Lake, it is respectfully suggested that the FS take the initiative for coordinating mitigation and monitoring measures with the State, NPS, BLM and the operators of other projects affecting this wilderness. The BIA would consider participating is such an effort.
7	18	Visibility impairment in wilderness areas.	The BIA appreciates the Forest Services' concerns and would consider participation in monitoring and mitigation coordination efforts initiated by the FS.
7	19	Visibility impairment in	The BIA appreciates the Forest Services' concerns and would consider participation in monitoring and mitigation

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		wilderness areas.	coordination efforts initiated by the FS.
7	20	O_3 and NO_2 levels.	Please refer to the response for letter #7, comments #15 and #16.
7	21	ANC Florence Lake.	The BIA appreciates the Forest Services' concerns and would consider participation in monitoring and mitigation coordination efforts initiated by the FS.
7	22	Visibility impairment in wilderness areas.	The BIA appreciates the Forest Services' concerns and would consider participation in monitoring and mitigation coordination efforts initiated by the FS.
7	23	Same as comment on table 5.3-3	Please refer to the response to letter #7, comment #16.
7	24	Same as comments on table 5.3-10	Please refer to the response to letter #7, comment #21.
7	25	Visibility impairment in wilderness areas.	The BIA appreciates the Forest Services' concerns and would consider participation in monitoring and mitigation coordination efforts initiated by the FS.
7	26	Same as comment on table 5.3-3	Please refer to the response to letter #7, comment #16.
7	27	Same as comment on table 5.3-10	Please refer to the response to letter #7, comment #21.
7	28	Visibility impairment in wilderness areas.	The BIA appreciates the Forest Services' concerns and would consider participation in monitoring and mitigation coordination efforts initiated by the FS.
7	29	Same as comment 5.3-3	Please refer to the response to letter #7, comment #16.
7	30	Same as comment 5.3-10	Please refer to the response to letter #7, comment #21.
7	31	Visibility impairment in wilderness areas.	The BIA appreciates the Forest Service's concerns and would consider participation in monitoring and mitigation coordination efforts initiated by the FS.
7	32	Same as comment on table 5.3-3	Please refer to the response to letter #7, comment #16.
7	33	Same as comments on	Please refer to the response to letter #7, comment #21.

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		table 5.3-10	
7	34	Visibility impairment in wilderness areas.	The BIA appreciates the Forest Service's concerns and would consider participation in monitoring and mitigation coordination efforts initiated by the FS.
7	35	PM-10 emissions.	The purpose of Table 5.3-28 is to allow the reader to directly compare the predicted impacts from Cumulative sources and Project sources. As the predicted impacts values are not being directly compared to the NAAQS, the addition of background values is unnecessary and would only obscure the differences between the Alternatives. The PM-10 concentrations presented in the subject table are correct. PM-10 emissions accounted for only a small fraction of the cumulative source inventory and therefore predicted PM-10 impacts are comparatively small.
7	36	Nitrogen impact significance determination.	The BIA acknowledges the duty of each FLM to determine the significance of potential impacts to lands under their management. Chapter 2 of the document was revised to include a discussion of the roles and responsibilities of the FLMs. The definition of "minor" is provided on page 4.1-2.
7	37	Impact significance determination.	The BIA acknowledges the duty of each FLM to determine the significance of potential impacts to lands under their management. Chapter 2 of the document was revised to include a discussion of the roles and responsibilities of the FLMs .The definition of "moderate" is provided on page 4.1-2.
7	38	ANC at Florence Lake.	The BIA appreciates the Forest Services' concerns and would consider participation in monitoring and mitigation coordination efforts initiated by the FS.
7	39	Impact significance determination	The BIA recognizes Forest Service authority under FLPMA to evaluate the significance of impacts on the lands they manage.
7	40	Emissions from flaring.	The operators have indicated that during completion operations the wells would be vented rather than flared. Venting emissions were included in the Emission Inventory report and referenced in the Near-Field report.
7	41	Similar, but not "identical."	Thank you for your comment. The emissions would be very similar, if not identical, given the assumptions and

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			the level of uncertainty in the emission inventory. A 2.6% difference in the emission inventory (one well out of 38) is insignificant when compared to the uncertainty inherent in the applied dispersion models. Also please keep in mind that the development rates for the Proposed Action and Alternatives are best estimates. The actual number of wells developed each year would vary by more than one well per year.
7	42	Dust suppression.	The Near- and Far-Field analyses utilized predicted emission rates directly from the Emission Inventory report. All assumptions applied to the emissions inventory, including 50% dust suppression on lease roads, are applicable to the Near- and Far-Field analyses.
7	43	Similar, but not "identical."	Please refer to the response to letter #7, comment #41.
7	44	Proposed Action and Alt A are approaching the NAAQS for O_3	Thank you for your comment. The BIA appreciates your concern for potential ozone impacts. Please note that these maximum ozone impacts are predicted to occur on tribal lands, not Forest Service lands.
7	45	Well venting.	It was assumed that 20% of the wells would require venting on a weekly basis for the life of the project.
7	46	Emissions from the existing development.	Thank you for your comment. The purpose of Table 2-1 was to provide readers with a comparison of the potential emissions for the Proposed Action, each Alternative, and existing development. Summing the existing emissions with the Proposed Action and Alternatives would only obscure the differences between the different alternatives and existing sources.
7	47	Wells included in analysis.	The Oil and Gas inventory includes wells drilled after January 2001 on lands not located within the boundaries of previously approved NEPA actions. The wells included in the inventory may be located on State, private, BLM, Forest Service, tribal, or other federal lands. NEPA approved wells drilled before the January 2001 baseline date were not accounted for as it was assumed that emissions from these wells were accounted for in the background conditions applied for the analysis. We did not attempt to quantify the number of wells excluded from the analysis.
7	48	Wells excluded in analysis.	To prevent double counting well emissions in both the Oil and Gas Inventory and the permitted source

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			inventory, emissions from wellsites were excluded from the permit inventory. In order to avoid accidentally excluding emissions from well compressors, only permits with emissions less than 3 tpy were excluded. Furthermore, many of the excluded well permits may have been issued before the January 2001 inventory date.
7	49	Produced water tank separate?	Produced water may be stored in the same tank as the condensate or stored in a separate tank.
7	50	Ozone background.	An ozone concentration of 49 ppb equates to approximately 96 ug/m3. This concentration is less than the assumed 1-hour average background level of 169 ug/m3 measured in southwest Wyoming. The 49 ppb ozone concentration applied for missing data was derived from the average of the CASTNET ozone data applied in the analysis.
7	51	Background ammonia concentration	A background ammonia concentration of 1 ppb was assumed in the CALPUFF model in accordance with IWAQM guidance. As explained in Section 5 of the Far-Field report, Post-processing of the CALPUFF output data utilized ammonia concentrations measured at CASTNET sites to repartition nitric acid and nitrate concentrations.
7	52	ANC at lakes increasing.	The BIA appreciates the Forest Service's concerns and would consider participation in monitoring and mitigation coordination efforts initiated by the FS.
7	53	Fox document.	Please refer to the response for letter #7, comment #8.
7	54	Transmittal letter needs to state contact for comments	Thank you for your constructive comment. BIA will attempt to assure that the "Dear Reader" letter clearly states a contact for response in the future.
7	55	Request full hard copy	Thank you for your request. BIA will forward you a full hard copy of the FEIS.
8	1	DEQ-AQD has reviewed DEIS.	We thank the DEQ for their review of the DEIS and we note that the State has a new 8-hour ozone designation. The ozone analysis methods applied for this study are not appropriate for comparisons to the new 8-hr standard. Furthermore, the simulation of ozone

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			formation and transport is a highly complex and resource intensive exercise and the application of the EPA recommended CMAQ or EKMA models are beyond the scope of this project. The BIA contends that the current analysis discloses potential ozone impacts and provides sufficient information to make an informed decision.
8	2	Cumulative impact comparisons inappropriate.	Comment noted and the FEIS revised accordingly.
8	3	"exhaust" to be removed.	Comment noted and the FEIS revised accordingly.
8	4	Remove "proportionally."	Comment noted and the FEIS revised accordingly.
8	5	"minor", "moderate" and "major" used with impacts.	The terms "minor", "moderate" and "major" are defined in Section 4.1 of the DEIS.
8	6	Please modify the sentence.	Comment noted and the FEIS revised accordingly.
8	7	Please delete the "s" at the end of "Cloud Peak".	Comment noted and the FEIS revised accordingly.
8	8	More recent SO_2 data available.	We thank the DEQ for the more current data. As the background values utilized in the analysis are greater than the Lost Cabin data, and therefore more conservative, the analysis was not revised.
8	9	The footnote regarding PM2.5 and 8-hour O_3 is no longer correct.	Comment noted and the subject footnote deleted as requested.
8	10	NOx is a nitrate?	We refer the State to N.N. Greenwood and A. Earnshaw, Chemistry of the Elements, 1984, Page 509.
8	11	Fox document.	We defer to the Forest Service's comments on this issue – please see response to letter #7, comment #8.
8	12	How are 5 year averages calculated?	Comment noted and the FEIS revised accordingly.
8	13	Please modify the sentence.	Comment noted and the FEIS revised accordingly.
8	14	Confusing statement.	Comment noted and the FEIS revised accordingly.

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8	15	Ozone standard.	Please refer to the response provided to letter #8, comment #1.
8	16	Delete two sentences p. 4.4-10	Comment noted and the FEIS revised accordingly.
8	17	Difference between project impacts analysis and the "post-construction" impacts analysis	Comment noted and the FEIS revised accordingly.
8	18	It is not acceptable to compare PSD Class III areas to PSD Class I increments.	Comment noted and the FEIS revised accordingly.
8	19	Comparison to Class II increments.	Comment noted and the FEIS revised accordingly.
8	20	Comparison to Class II increments.	Comment noted and the FEIS revised accordingly.
8	21	"Total" vs. "cumulative."	In order to avoid confusion, the word "cumulative" was replaced with the word "total"
8	22	"Use of oxidation catalysts…"	Comment noted and the FEIS revised accordingly.
8	23	Cumulative clarifications.	Comment noted and the FEIS revised accordingly.
8	24	"minor", "moderate" and "major"	The terms "minor", "moderate" and "major" are defined in Section 4.1 of the DEIS.
9	1	Directional Drilling as minimization of threat to wildlife.	The BIA explored mandated directional drilling as an alternative but eliminated it from further study as detailed in Section 2.9.2 of the DEIS. We appreciate your comment, but feel that this technology is of sufficient cost and technical risk in this complex geological area to only require it as shown in the DEIS. However, should site specific environmental analyses at the APD level suggest that directional drilling would conserve rare natural resources, the BIA may stipulate it at that time.
9	2	Reclamation	Appendix D states that "In most cases, final reclamation

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		timing.	measures would be applied concurrently as sections of the project are completed." The intent within the action alternatives is for final reclamation to take place as soon as construction, production, and natural conditions allow. Temporary reclamation measures would be utilized in order to stabilize areas that are at risk, but conditions do not allow final reclamation (reference Appendix D). Also, refer to Section 4.8.3.5 of the DEIS, which states "Reclamation of disturbed habitats would commence immediately after the completion of construction, drilling and completion activities, and continue throughout the 13-year drilling period…"
9	3	Threatened and endangered species - black-footed ferret and Canada lynx, Executive Summary, p. x.	The US FWS states that the black-footed ferret and Canada lynx would not be considered as experimental populations in the WRPA and have full protection under the Endangered Species Act. This error is acknowledged and has been corrected in the FEIS.
9	4	Well spacing adversely affects wildlife	Section 4.8.7 of the DEIS states "Impacts to wildlife species resulting from the Proposed Action or Alternatives would be expected to be negligible to minor following implementation of the mitigation…" In addition, Section 4.9.7 states "Impacts resulting from the development of the Proposed Action, or Alternatives A, B, and C are not expected to adversely affect threatened, endangered, and state-sensitive species following implementation of the mitigation measures…" The BIA position is that with mitigation and monitoring in place as detailed in the DEIS, impacts to wildlife will be avoided or minimized in the project area.
9	5	Analysis should reflect full field development	The DEIS analyzes a wide range of field development in the WRPA, from No Action (100 new wells) to Alternative A (485 new wells). The Operators have not indicated that more wells would be developed in a time frame to be included in the current analysis. However, should some of the exploratory wells be successful and more development requested by the Operators, environmental analysis commensurate with the requested action would be completed per NEPA and CEQ requirements at that time.
9	6	Directional drilling	Please see the response to letter #9, comment #1. There is not enough experience with successful directional drills in the project area to state that it is

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			"feasible" at this time.
9	7	New wells drilled on existing pads.	As plans of the Operators are not definite at this time, BIA cannot determine where and how many new wells would be located on existing disturbances. However, analysis at the APD level will be utilized to minimize new disturbances and impacts to wildlife and special status species.
9	8	Threatened and endangered species – mitigation measures, p. 2-57, 2.8-1.	The US FWS states that effects to listed and proposed species should be minimized or avoided, but cannot be mitigated for. The FEIS has been revised to use the terms avoidance and minimization measures, instead of "mitigation measures", when referring to threatened, endangered and proposed species. In addition, the US FWS requests that the Final EIS be revised to reflect that minimization measures for listed and proposed species were developed through coordination with the Service's Cheyenne and Lander Field Offices. This statement has been added to the FEIS.
9	9	APD on federal (i.e., BOR) surface, or tribal surface/tribal minerals	The meaning of the statement questioned is that for BOR-managed surface, tribal surface or tribal minerals, the APD is submitted to the BLM for approval. The BLM will coordinate with the appropriate surface management agencies or private surface owner for input. For private surface and minerals, the APD is submitted to the WOGCC for approval. The BIA intends to closely scrutinize actions on private surface/minerals for interdependency.
9	10	Protection Measures – Water Resources, p. 2-61, Section 2.8.2.5.	The US FWS states that netting or fencing reserve pits is not mentioned under water resources mitigation. This mitigation measure is mentioned under wildlife mitigation. However, it has also been added to the list of mitigation measures for water resources.
9	11	Directional drilling for protection of raptors, p. 2-63, Section 2.8.2.8.	The BIA acknowledges the concern of the US FWS. One of the conditions for directional drilling identified in the DEIS is a high potential of impact to threatened, endangered and sensitive species. The BIA will exercise that option, to minimize the possibility of "take."
9	12	Use of artificial nest structures, p. 2-2-63, Section 2.8.2.8.	The US FWS states that if removal of a raptor nest is required during the construction or development operations, utilization of artificial nest structures is not allowed without a permit. A baseline raptor survey conducted in Spring 2003 did not report any raptor nests

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			within the five development areas (see Figure 3.8-6). However, if raptor nest removal is necessary, the BIA will contact the Service's Migratory Bird Office in Denver, Colorado to determine if a permit can be issued. If a permit cannot be issued, other options will be considered to minimize the potential of take of migratory birds or eagles, their young, eggs, or nest. Bullet 2 in section 2.8.2.8 has been revised to clarify that a permit from the US FWS is required prior to raptor nest manipulation.
9	13	Minimization of electrocution potential to raptors from electric power lines, p. 2-63, Section 2.8.2.8.	The US FWS requests that electric facilities meet standards presented in "Suggested Practices for Raptor Protection on Power Lines. The State of the Art in 1996" (Edison Electric Institute/Raptor Research Foundation) to minimize electrocution potential. It is not anticipated that new power lines would be constructed for the proposed project. However, Bullet 3 has been modified to indicate that, if electric power lines are planned, the above guidance would be followed.
9	14	Removal of road- killed animals from roads, p. 2-63, Section 2.8.2.8.	The US FWS requests that animals killed by vehicles be promptly removed from roads, ROWs, and highways associated with the proposed project. The Bullet 4 in the FEIS has been changed to specify that the Operator would "promptly" remove dead animals from Operator-controlled roads. The Operator cannot remove carcasses from county, state or private roads without permission from the parties.
9	15	Netting of reserve pits to protect wildlife, p. 2-63, Section 2.8.2.8.	The US FWS refers to a report that indicates that flagging over reserve pits does not minimize wildlife mortalities. The Operators have successfully used flagging to-date to minimize mortality to wildlife. However, if wildlife mortalities are observed, the pits would be covered with netting. This bullet has been clarified.
9	16	Use of the terms avoidance and minimization for threatened and endangered species, rather that mitigation, p. 2-64, Section 2.8.2.9.	In accordance with the comment of the US FWS, the terms avoidance and minimization have been used in the Final EIS, instead of the term mitigation when referring to threatened, endangered and proposed species.

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9	17	Minimization of electrocution potential to raptors from electric power lines, p. 2-64, Section 2.8.2.9.	Please see response to letter # 9, comment # 13.
9	18	Protection of nesting bald eagles, p.2-64, Section 2.8.2.9.	The US FWS suggested that, although no disturbance within one mile of bald eagle nests between February 1 and July 31 would protect most active nests, these dates should be more flexible to accommodate unusual nesting activity. This bullet has been clarified to include flexibility of these dates.
9	19	Prohibition of pets due to canine distemper	Thank you for your comment. The FEIS includes prohibition of pets on federal (BOR) and tribal surface to minimize impacts to wildlife.
9	20	Protection of sage grouse nesting and brood-rearing habitat, p. 2-64, Section 2.8.2.9.	The US FWS recommends that protection of sage grouse nesting and brood-rearing habitat be added to protection of sage grouse leks. Protection of sage grouse nesting and brood-rearing habitat has been added in the FEIS.
9	21	Measures to protect mountain plovers, p. 2-64, Section 2.8.2.9.	The US FWS suggests that the mountain plover be further protected by the following measures (1) avoidance of suitable habitat during the plover nesting season (April 10 through July 10), (2) prohibition of ground disturbing activities in prairie dog towns, and (3) prohibition of any permanent above-ground structures that may provide perches for avian predators or deter plovers from using preferred habitat. We appreciate these suggestions, but believe that the mitigation measures specified in the DEIS would protect the mountain plover: “No activities would occur within ¼ mile of identified mountain plover nesting habitat from April 1 to July 10. Identification and avoidance of mountain plover nesting areas and minimization of disturbance to prairie dog colonies would reduce the potential for disturbing mountain plover habitats.”
9	22	Black-footed ferret surveys, p. 3.9-2 to 3.9-6.	The US FWS states that black-footed ferret surveys are no longer recommended in white-tailed prairie dog towns in the WRPA, based on the letter attached to the agency’s comments. However, the US FWS encourages protection of prairie dog towns for their value to the prairie ecosystem and their value to future black-footed ferret reintroduction. The information

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			provided by the U.S. FWS has been included in the FEIS.
9	23	Anti-perching structures for bald eagles, p. 4.9-2	The US FWS expressed concern about the statement in the DEIS that wells and facilities will create optimal viewing perches for bald eagles throughout the WRPA. The agency states that the availability of perch or nest sites on these facilities may bring raptors into areas where they do not normally occur and subject them to increased mortality. The US FWS suggests that anti-perching structures be installed on all above-ground structures that may attract raptors. The BIA will consider this option to discourage raptor use, if it appears that raptors preferentially use these facilities. The sentence has been revised to indicate that if bald eagles are observed to perch on production facilities, tanks, or other structures, their use would be discouraged by installing anti-perch structures. These structures would only be utilized, if necessary.
9	24	Wildlife Mitigation Guidelines, Appendix B-2.	The BIA appreciates the US FWS comment on Appendix B. The BIA intends to use discretion in the granting of exceptions to mitigation guidelines. Resource specialists would assess each exception request and only grant exceptions where adverse impacts to wildlife and special-status species are negligible. However, the mitigation guidelines in Appendix B-2 are BLM (1987) standard guidelines.
9	25	US FWS mitigation requirements for listed species, Appendix B-2.	The US FWS stated that it does not have mitigation measures for listed species. The BIA attached this document "U.S. Fish and Wildlife Service Mitigation Requirements for Threatened and Endangered Species in the Wind River Project Area (U.S. FWS 2002)" to a memo sent to the BLM on January 21, 2004. However, we have replaced the FWS (2002) document with the list of minimization measures recommended in the US FWS comment letter (August 30, 2004).
9	26	Raptor and sage grouse surveys, Appendix J.1-8.	Sage grouse lek surveys are conducted annually by the US FWS, Lander on the Wind River Indian Reservation (WRIR). The lek sites reported by the US FWS are located west of the WRPA in T4N R1E. Sage grouse leks also have been documented by the WGFD in T3N, R4-5E in the BOR Withdrawal Area, south of the WRPA. No leks have been reported within the WRPA. Since the US FWS and the WGFD conduct sage grouse lek surveys, the BIA does not believe that it is necessary to

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			conduct additional surveys. However, we have deleted the paragraph from the conclusions section of Appendix J.1 that states that no further ground truthing surveys would be necessary. The last sentence of the following paragraph on the black-footed ferret has also been changed to conform with the new guidance by the US FWS regarding black-footed ferret surveys.
9	27	Topics that should be included in the Wind River Biological Assessment, Appendix L.	Thank you for providing us with a list of topics to be included in the Biological Assessment. We believe that the revised Biological Assessment submitted to the US FWS in September 2004 addresses these topics. This revised BA and concurrence letter have been included in the FEIS as Appendix G.
9	28	Annual raptor surveys and protection of bald eagle nest and roost sites, Biological Assessment (Appendix L).	The Biological Assessment has been revised to address measures to minimize or avoid adverse impacts to bald eagle nests and roost sites. According to the US FWS, Lander, bald eagles have not been reported to nest in the WRPA. If bald eagles are observed to nest within the WRPA, a one-mile buffer would be established. Individual bald eagles have been observed in the WRPA in the winter. If a bald eagle roost site is reported within the WRPA, a one-mile buffer would be established.
9	29	Preparation of a Raptor Mitigation and Monitoring Plan, Appendix P.	The US FWS recommended the preparation of a Raptor Mitigation and Monitoring Plan to include: (1) baseline aerial and/or ground surveys of nesting and roosting areas to determine raptor concentration areas; (2) annual surveys of nesting and roosting areas for five consecutive years within the WRPA to determine raptor use trends within the WRPA; (3) site-specific surveys within one mile of proposed disturbance associated with each application for permit to drill; (4) construction of alternate nest structures in the event a nest may be negatively impacted at a rate of two alternate nest structures to one impacted nest; (5) implementation of a 0.5-mile disturbance-free buffers (1 mile for bald eagles and ferruginous hawks) to protect existing nest sites; (6) review and approval of raptor mitigation and monitoring plan by the US FWS; (7) review and possible amendment to the plan after five years. BIA responds as follows: (1) We conducted a baseline aerial raptor nest survey in Spring 2003. Although the six raptor nests observed were within the WRPA, none of them were within the five

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			development areas (see Figure 3.8.6). (2) The DEIS proposes raptor surveys every five years, since no raptor nests were located within the five development areas. If the BIA in consultation with the US FWS, Lander determines that more frequent surveys are necessary, surveys would be conducted more frequently. (3) A raptor survey would be conducted in conjunction with the APD, if the US FWS, Lander; BIA; and BLM believe that such a survey is necessary. (4) The raptor nest survey conducted in Spring 2003 identified a total of six raptor nests, of which only two were active. Based on the low number of active nests within the WRPA, we do not believe that ANSs are necessary. However, if the US FWS, Lander; BIA; and BLM agree that ANSs are necessary, then such structures would be constructed. (5) Appendix P in the DEIS specifies such a buffer. (6) A Raptor Mitigation and Monitoring Plan has been included in the Final EIS and is available for review by the US FWS. (7) The plan will be re-submitted to the US FWS for review after five years.
9	30	Disturbance-free buffers for raptor nests, Table P-3, Appendix P.	Table P-3 has been revised in the FEIS (Appendix F in the FEIS) for consistency to include a 0.5-mile buffer for most raptor nests, with a 1-mile buffer for ferruginous hawks and bald eagles. If burrowing owls are observed within the WRPA, a 0.5-mile buffer would also be established.
9	31	Black-footed ferret monitoring, Table P-1, Appendix P.	Black-footed ferret surveys would not be conducted, since the WRPA is included in a “block clearance” (US FWS 2004). However, if surveys are determined to be necessary the 1989 Black-footed Ferret Survey Guidelines would be followed.
9	32	Survey methods for greater sage-grouse, Table P-1, Appendix P.	As recommended by the US FWS, the BIA has contacted a local biologist to review the proposed methods for sage grouse surveys.
9	33	Inventories and monitoring protocols for bald eagles, Appendix P.	If bald eagle nest and/or roost sites are observed by the US FWS (Lander) within the WRPA, annual surveys would be conducted for the threatened bald eagle.
9	34	Change in status of the mountain	The US FWS commented that the mountain plover is no longer a proposed species. The discussion on the mountain plover has been removed from the sections on

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		plover, Appendix P.	T/E species and placed in the wildlife sections of the Wildlife Monitoring/Protection Plan.
9	35	Protective measures for raptors, Appendix P.	Please see response to letter #9, comment #18.
9	36	Consultation on threatened and endangered species, Appendix P.	The BIA submitted a letter to the US FWS on September 20, 2004 requesting informal consultation with the US FWS on the Wind River Gas Field Development Project Biological Assessment.
9	37	Consideration of impacts to the pygmy rabbit.	The US FWS recommended that the EIS include information on the status of the pygmy rabbit (*Brachylagus idahoensis*), since it has been petitioned for listing under the ESA. The FEIS has included a discussion on the pygmy rabbit in Section 3.8 (wildlife). However, the "Atlas of Birds, Mammals, Reptiles, and Amphibians in Wyoming" (WGFD 1999) does not indicate that this species is present in the north-central part of Fremont County, the location of the WRPA.
9	-	Letter regarding black-footed ferret surveys, (FWS 2004)	The BIA thanks the US FWS for providing the February 2004 letter on the change in the requirements for black-footed ferret surveys in white-tailed prairie dog colonies.
10	1	August 26, 2004 Executive Order, Public Input	The commenter did not suggest, even in a general way, how the EIS should be revised, and no revisions are necessary. The BIA respects the interests of the surface owners in the use of their land, and has accounted for that use in the impact analysis and possible mitigation measures, most of which are directed at mitigation of impacts to the surface. The surface owners are not the only "persons with ownership or other legally recognized interests" involved in this proposed action, however. The Eastern Shoshone and Northern Arapaho Tribes own the beneficial interest in most of the mineral estate and part of the surface (both of which the private surface owners were aware of when they bought their surface interest), and the Operators have leasehold interests in that mineral estate (and associated surface). A major, longstanding principle of property law holds that the mineral estate is dominant over the surface estate. Thus, if there is a conflict between the interests of the owner of the surface estate and the interests of the owner(s) of the mineral estate, the law generally rules in favor of the owners of the mineral estate. This EIS does not hold that hard line, however, but attempts to balance

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			the competing interests in the range of reasonable alternatives (more development and royalties for the Tribes versus less development and royalties for the Tribes), as required by the Executive Order.
10	2	BOR and Midvale Irrigation District	Please see letter #18: BOR reviewed the DEIS and had no comments. The Midvale Irrigation District did not submit a comment letter. The Supreme Court of the United States ruled concerning the effects on Bureau of Reclamation projects of the Secretary's exercise of the trust responsibility in *Nevada v. United States*, 463 U.S. 110 (1983). In that case, involving the longstanding dispute over Pyramid Lake between the Pyramid Lake Paiute Tribe and the Truckee-Carson Irrigation District, the Court ruled as follows: This Court has long recognized "the distinctive obligation of trust incumbent upon the Government" in its dealings with Indian tribes, see, *e. g., Seminole Nation* v. *United States*, 316 U.S. 286, 296 (1942). These concerns have been traditionally focused on the Bureau of Indian Affairs within the Department of the Interior. *Poafpybitty* v. *Skelly Oil Co*., 390 U.S. 365, 374 (1968). See 25 U.S.C. § 1. But Congress in its wisdom, when it enacted the Reclamation Act of 1902, required the Secretary of the Interior to assume substantial obligations with respect to the reclamation of arid lands in the western part of the United States. Today, particularly from our vantage point nearly half a century after the enactment of the Indian Reorganization Act of 1934, 48 Stat. 984, 25 U.S.C. § 461 *et seq*., it may well appear that Congress was requiring the Secretary of the Interior to carry water on at least two shoulders when it delegated to him both the responsibility for the supervision of the Indian tribes and the commencement of reclamation projects in areas adjacent to reservation lands. But Congress chose to do this, and it is simply unrealistic to suggest that the Government may not perform its obligation to represent Indian tribes in litigation when Congress has obliged it to represent other interests as well. In this regard, the Government cannot follow the fastidious standards of a private fiduciary, who would breach his duties to his single

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			beneficiary solely by representing potentially conflicting interests without the beneficiary's consent. The Government does not "compromise" its obligation to one interest that Congress obliges it to represent by the mere fact that it simultaneously performs another task for another interest that Congress has obligated it by statute to do. 463 U.S., at 127-28. Thus, the BIA agrees with the commenter that it has to balance its trust responsibility to the Tribes with its obligations under the Reclamation Act. As the Supreme Court noted, that is the choice that Congress made. The BIA has had much experience with this balance, and continues to struggle with it, but there is no reason to think that it will not fulfill all of its trust and statutory responsibilities. The DEIS describes the affected environment for agricultural production, soils, water and vegetation in Chapter 3. The impacts of environmental and socioeconomic impacts to irrigators, farmers, and ranchers are addressed in Chapter 4 of the DEIS.
10	3	Socio-economic cost/benefit analysis	The Proposed Action would allow the Arapaho and Shoshone tribes to receive royalty and severance tax revenue from their mineral resources. A monetary cost-benefit analysis is not required for an EIS under either the Council on Environmental Quality (CEQ) regulations implementing NEPA or the BIA NEPA Handbook. In fact, the CEQ Regulations note that such an analysis should *not* be included in an EIS "when there are important qualitative considerations." 40 C.F.R. § 1502.23. In this case, these considerations would include, but not be limited to, the quantified and unquantified environmental impacts analyzed in the EIS, in addition to the trust responsibility of the United States towards the Tribes. (The BIA notes that, despite the commenter's rhetoric, the purpose of the proposed action is to allow the Tribes to realize more revenue from their mineral resources, not to allow for the Operators to profit.) In addition to these important qualitative considerations, many of the elements the commenter would include in such an analysis are not appropriate for a NEPA review. For example, an analysis of the length and pay scale of potential jobs, where workers are likely to live, and the transience or permanence of their residence would require the Department to engage in undue speculation. CEQ guidance notes that "if there is

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			total uncertainty about the identity of future land owners or the nature of future land uses, then of course, the agency is not required to engage in speculation or contemplation about their future plans." Question 18, "Forty Most Asked Questions Concerning the NEPA Regulations", 46 Fed. Reg. 18026, 18031 (March 23, 1981). The BIA is required to "insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements." 40 C.F.R. § 1502.24. Including an analysis based on pure speculation would impugn the scientific integrity of the EIS. The BIA cannot do so. Under the 1916 Act, the IMLA, and the IMDA, the DOI has a fiduciary responsibility to assure that the Tribes receive the maximum economic benefit from the minerals on their lands. Neither CEQ regulations nor BIA statutes require preparation of a cost benefit analysis. As stated in the DEIS Executive Summary, "Economic impacts from the proposed development would be both beneficial and adverse." The DEIS provides information about potential beneficial effects such as increased personal income and increased royalty income for tribal members, fee mineral owners, and some area business owners and increased tribal, state and local tax revenues, which range from minor under Alternative C to major under the Proposed Action and Alternative A. The DEIS also discusses potentially moderate and long-term adverse impacts from the proposed development including split estate conflicts, reductions in net income from agricultural activities and change in the rural character in the five gas development areas. Employment effects of the Proposed Action are primarily described in sections 4.13.2.1 and 4.13.2.2. The IMPLAN model used for the assessment estimates both direct and indirect employment. The employment impacts are estimated on a place-of-work basis in Fremont County. Residents of other areas who commute to work on a daily or weekly basis would hold some of the jobs, particularly those in the gas fields. Because the gas industry is already established in Fremont County, the employment impacts will to a large extent manifest themselves by sustaining current employment that otherwise would decline as other gas exploration and development activities decline in

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			productivity. For direct employees, the companies would hire contractors based on a variety of factors including availability, qualifications and price. As noted in Section 3.13.4.2, "private businesses (including oil and gas companies and contractors) on the reservation must hire at least 50 percent of their workforce from reservation residents to comply with the provisions of Tribal Employment Rights Ordinances". Section 4.13.2.5 provides further support for the conclusion that many of the new jobs associated with the Proposed Action would be filled by local residents. The DEIS does not conclude that agricultural jobs would be lost as a result of the Proposed Action or any alternative. A relatively small amount of agricultural land would be permanently removed from production, and the discussion provided in Section 4.13.2.10 indicates that Operator mitigation measures would serve to avoid and minimize impacts on production on temporarily disturbed land. The most extreme example of speculation requested by the commenter, though, is the suggested analysis of alleged changes in culture, the perception of various recreationists or residents on any alleged change in community character, and alleged effects of such perception on property values. As indicated by the Supreme Court, to warrant consideration in an EIS, environmental effects must have a reasonably close causal relationship to a change in the physical environment. *Metropolitan Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, 774 (1983) (*PANE*). Therefore, this EIS must consider any effects on property values from the proposed action and alternatives only if those effects are caused by a change in the physical environment. The *PANE* case concerned alleged psychological impacts from the risk of a nuclear accident. The Supreme Court specifically ruled in PANE, however, that "*risk* of an accident is not an effect on the physical environment." *PANE*, 460 U.S. at 775 (emphasis in original). In a causal chain from any gas development to an effect on property values, any change in the "character" of the WRPA and its perception are necessary links. Consistent with the Supreme Court's decision in *PANE*, these links lengthen the causal chain

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			beyond the scope of NEPA. NEPA does not require analysis of the perception of any change in character of the WRPA or any potential impacts resulting from any such perception on property values, and the BIA will not include such an analysis in the Final EIS.
10	4	Air cumulative analysis.	The extent of the cumulative analysis extended far beyond the boundaries of the project area. We respectively suggest that the reader review the Far-Field Air Quality Impact Assessment report contained in Volume III of the DEIS. Section 4.1 of the report presents the extent of the cumulative analysis. Emission sources considered in the cumulative analysis are detailed in the Emissions Inventory report also contained in Volume III of the document.
10	5	New alternative	Please see the discussion in Section 3 of the FEIS under "Landowner's alternative" for BIA's response to the first part of this comment. Regarding the BLM's new guidance for the use of Best Management Practices (BMPs) at the APD stage, the following BMPs from Instructional Memorandum No. 2004-194, dated 6/22/04 are included in the mitigation in the DEIS: Interim reclamation of well locations and access roads soon after the well is put into production; Painting of all new facilities a color which best allows the facility to blend with the background, typically a vegetated background; Design and construction of all new roads to a safe and appropriate standard, "no higher than necessary" to accommodate their intended use; Final reclamation recontouring of all disturbed areas, including access roads, to the original contour or a contour which blends with the surrounding topography; Burying of flow lines in or adjacent to access roads; Centralizing production facilities; Noise reduction techniques and designs; Wildlife monitoring;

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			Seasonal restriction of public vehicular access; Avoiding placement of production facilities on hilltops and ridgelines; Use of common utility or right-of-way corridors. The BIA intends to utilize BMPs at the APD level in order to minimize impacts to resources in the WRPA. The BIA bonding protocol is contained in 25 CFR 211.24. Generally, the lessee or permittee is required to post a bond, either state-wide or nation-wide, "subject to approval in the discretion of the Secretary", to "ensure compliance with all of the terms and conditions of the lease(s), permit(s), or assignment(s) and statutes and regulations applicable to the lease, permit, or assignment." The Operators in the WRPA have posted these bonds since the beginning of development. In the WRPA, bonds for individual wells have been required in some circumstances. In addition, 25 CFR 211.24(e) states that "The required amount of bonds may be increased in any particular case at the discretion of the Secretary." The bonding authority of the BLM is not applicable to the tribal minerals contained in the project area.
10	6	Well Density. Directional drilling	BLM is a multiple use agency on public lands under the mandates of the Federal Land Policy and Management Act of 1976. However, BIA is not a public land management agency and does not fall under these multiple use mandates. BIA's objective is to administer the United States' trust responsibility to the Tribes to balance natural resource income with resource protection in the WRIR. As stated in section 1.5.2, p. 1.1-41: "The leasing of tribal minerals is governed by the following objectives: Orderly and timely resource development Environmental protection Minimal cultural impacts associated with development. These objectives are accomplished through proper planning and oversight of development operations by agencies of the Department of the Interior, including BIA, BLM, and Minerals Management Service (for collection

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			of royalties)." Directional drilling is not "simply a matter of cost" for industry. Technical challenges abound in this often misunderstood method of natural gas development. Section 2.7.2.4, p. 2-30 of the DEIS describes conditions when the Operators may utilize directional drilling. Additional insight into directional drilling is available at the following website: http://www.wy.blm.gov/nepa/rsfodocs/vermbasin/VBPA-well-architecture-letter.pdf. Under 25 C.F.R. § 211.28(h) and 43 C.F.R. § 3162.3-1, a producer of Indian minerals is required to comply with BLM spacing orders. Producers of private minerals would comply with State of Wyoming spacing orders. BLM spacing orders would logically be consistent with state orders since production is from the same fields and formations. Chapter 1, Table 1-2 of the DEIS gives a complete listing of spacing orders in the WRPA. Refer to BLM Docket 1-2000, Docket 1-2001, and Docket 3-2002 for BLM spacing orders applicable to certain sections in the Pavillion development area. These spacing orders and those approved by the WOGCC in contiguous areas allow additional wells (16 to 32 wellbores) to be drilled in each 640 acre spacing unit. The commenter is correct that older spacing orders do not specify surface spacing. More recently, however, BLM has begun to issue orders with requirements intended to better address surface impacts. (Please also see the response to letter #10, comment #5 regarding Best Management Practice direction under new BLM guidance). Because spacing orders are intended to address the maximization of extraction of the resource, as noted above, revision of those orders may not be the best way to address surface impacts. A better way would be through negotiation between the Operator and the surface landowner. For example, the BLM Spacing Orders mentioned above allow for placement of approved wells anywhere within the spacing unit (640 acres in most cases) to accommodate flexibility of the placement of surface locations due to surface resources, i.e. archeological concerns, agricultural conflicts, and topographic constraints. BIA's position is that section 2.8.5 FORTY-ACRE SPACING IN PAVILLION AND MUDDY RIDGE FIELDS of the DEIS describes accurate information regarding

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			this potential alternative that was eliminated from further analysis.
10	7	Surface Impacts grossly misleading	The BIA disagrees that the surface impacts of all alternatives analyzed have been presented as misleading. Section 2.3, p. 2.1-6 of the DEIS states, "While the short-term disturbance is a small percent of the total WRPA, these changes would be concentrated within the five development areas, increasing the percent of disturbed lands in those areas." Figures 1-4 through 1-6 clearly show the concentration of wells in those development areas. Impacts to resources are detailed in Table 2-17.
10	8	Scope of Analysis	The BIA disagrees that the scope of analysis is not clear. Section 4.1, p. 4.1-2 of the DEIS states "The evaluation of impacts in this chapter also takes into consideration the existing oil and gas development within the WRPA…" then goes on to define the existing disturbance details. Also, refer to Table 2-2 on p. 2.1-5. The BIA disagrees with the comment regarding the EIS not revealing impacts from reasonably foreseeable future actions. Page 5.1-2 of the DEIS details such actions as oil and gas development, sand and gravel mining, agriculture, residential and commercial development. Sections 5.2.2, 5.2.3, 5.2.4, 5.2.5, 5.2.6, and 5.2.7 describe these reasonably foreseeable future actions in detail for various areas within the WRPA; their impacts are analyzed in the remainder of Chapter 5.
10	9	Reclamation and existing hazardous materials.	These concerns are now addressed in the FEIS. Thank you. The presence of hazardous wastes at some reclaimed well sites that may be in buried reserve pits on private land is so noted. Private land owners on whose property these well sites occur and Tom Brown, Inc. are working towards resolution of these issues. Current practices as regulated by the Wyoming DEQ and enhanced by proponent voluntary mitigation actions will not result in burial of hazardous waste in the future. The specific analyses requested by the commenter are either unnecessary for the EIS or already addressed in the EIS. To conduct the three studies of past contamination requested by the commenter BIA would have to gather a huge amount of new information, not only from former producers (in addition to the Operators), but also from surface owner interviews. BIA

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			would also have to engage in extensive research and site investigation, including excavations of multiple waste pits and large trenches on private surface owners' land. The cost of such studies would be exorbitant, in the millions of dollars, in addition to the severe impacts on surface landowners' properties and the delay to the Tribes in leasing their minerals and receiving royalties (which, as noted in the EIS, constitute a large portion of the income to the Tribes and their members). Since the studies would address past pollution, the extent and level of which would not change from alternative to alternative, the information would not be essential to a reasoned choice by the decisionmaker or the public among the alternatives. The exorbitant cost is, therefore, not justifiable. The fourth category of information (mitigation measures) requested by the commenter, however, were included in the DEIS. Included in the FEIS Section 2 is additional information on proponent proposed voluntary mitigative actions.
11	1	Drilling pace.	Please see response to letter #5, comment #1.
11	2	Tribal Minerals, drilling pace	Please see response to letter #5, comment #1.
11	3	No activity within 1000 feet of a water body. Midvale irrigation and TBI have an agreement to not drill within 500-ft of Midvale's main irrigation canal, and within 500-ft of Five Mile Creek.	Please see response to letter #5, comment #2.
11	4	Little difference in Proposed Action and Alternative B.	Please see response to letter #5, comment #4.
11	5	Alternative B as "phased development"	Please see response to letter #5, comment #1.
11	6	Split Estate	Please see response to letter #5, comment #6.

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11	7	Greka vs. Saba Energy	Please see response to letter #5, comment #7.
11	8	Clarify that interim development is allowed prior to ROD.	Please see response to letter #5, comment #8.
11	9	Clarify that interim development is allowed prior to ROD.	Please see response to letter #5, comment #9.
11	10	Correct to read "Communitiza-tion Agreement"…	Please see response to letter #5, comment #10.
11	11	Correction to verbiage Geo/Paleo…	Please see response to letter #5, comment #11.
11	12	Hydrogen Sulfide Leaks	The Executive Summary was revised to reflect this comment.
11	13	Correct 2nd sentence to … the amount of development…	Please see response to letter #5, comment #13.
11	14	Corrections to text regarding casino construction and 8X8 feet pad size in Pavillion irrigated lands.	Please see response to letter #5, comment #14.
11	15	Add abbreviations.	Please see response to letter #5, comment #15.
11	16	Water Quality impacts due to Proposed Action and Alternatives.	Please see response to letter #5, comment #16.
11	17	Formation of Transportation planning committee.	Please see response to letter #5 , comment #17
11	18	Saba Energy; Interim	Please see response to letter #5, comment #18.

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		development.	
11	19	Remove references to reserve pits on agricultural ground.	Please see response to letter #5, comment #19.
11	20	Well count not well established.	Please see response to letter #5, comment #20.
11	21	Corrections	Please see response to letter #5, comment #21.
11	22	No mention of "removing and replacing topsoil"	Please see response to letter #5, comment #32.
11	23	Interim development.	Please see response to letter #5, comment #23.
11	24	Well count.	Please see response to letter #5, comment #24.
11	25	Interim development.	Please see response to letter #5, comment #25.
11	26	Well count.	Please see response to letter #5, comment #26.
11	27	Correction	Please see response to letter #5, comment #27.
11	28	Well count.	Please see response to letter #5, comment #28.
11	29	Is a project-specific EA required if we have an EIS?	Please see response to letter #5, comment #29.
11	30	Access road construction correction	Please see response to letter #5, comment #30.
11	31	"post construction" disturbance.	Please see response to letter #5, comment #31.
11	32	Plan of Development	Please see response to letter #5, comment #32.
11	33	Add "but not limited to"…	Please see response to letter #5, comment #33.
11	34	Add "but not limited to"…	Please see response to letter #5, comment #34.
11	35	Reference to source for drilling water should be stricken.	Please see response to letter #5, comment #35.

Letter	Comment	General Topic	Response
11	36	Service trailers use BLM/BIA approved envirotech system when not self contained.	Please see response to letter #5, comment #36.
11	37	Correct reclaimed pad size.	Please see response to letter #5, comment #37.
11	38	Adopt a different reclaimed pad size for Muddy Ridge locations drilled below a certain depth?	Please see response to letter #5, comment #38.
11	39	Correct mitigation on private surface	Please see response to letter #5, comment #39.
11	40	Correct preconstruction planning verbiage	Please see response to letter #5, comment #40.
11	41	Correct verbiage in 2.8.2.1, 2nd bullet	Please see response to letter #5, comment #41.
11	42	Correct 6th bullet in 2.8.2.3 to add “wellsite” to facilities.	Please see response to letter #5, comment #42.
11	43	Phased development	Please see response to letter #5, comment #43.
11	44	Corrections to 2.9.4	Please see response to letter #5, comment #44.
11	45	Reference to “irrigated” Pavillion land	Please see response to letter #5, comment #45.
11	46	Fill material on irrigated land.	Please see response to letter #5, comment #46.
11	47	Revise 2.8.5 to 2.9.5.	Please see response to letter #5, comment #47.
11	48		Please see response to letter #5, comment #48.
11	49	Revise “Stratigraphic”	Please see response to letter #5, comment #49.

Letter	Comment	General Topic	Response
11	50		Please see response to letter #5, comment #50.
11	51		Please see response to letter #5, comment #51.
11	52		Please see response to letter #5, comment #52.
11	53	Add statement about Ethete	Please see response to letter #5, comment #53.
11	54	No tribal or Wyoming Severance tax shown.	Please see response to letter #5 , comment #54
11	55	Page Header correction	Please see response to letter #5, comment #55.
11	56	Delete phased drilling reference.	Please see response to letter #5, comment #1.
11	57	Delete phased drilling reference.	Please see response to letter #5, comment #1.
11	58	Delete phased drilling reference.	Please see response to letter #5, comment #1.
11	59	Delete phased drilling reference.	Please see response to letter #5, comment #1.
11	60	Delete phased drilling reference.	Please see response to letter #5, comment #1.
11	61	Phased Drilling	Please see response to letter #5, comment #1.
11	62	WOGCC change to SOW?	Please see response to letter #5, comment #62.
11	63	Split Estate	Please see response to letter #5, comment #14.
11	64	Number of private parcels seems high.	Please see response to letter #5, comment #64.
11	65	Pavillion model only	Please see response to letter #5, comment #14.
11	66	Phased Drilling	Please see response to letter #5, comment #1.
11	67	Phased Drilling	Please see response to letter #5, comment #1.
11	68	Phased Drilling	Please see response to letter #5, comment #1.

Letter	Comment	General Topic	Response
11	69	Phased Drilling	Please see response to letter #5, comment #1.
11	70	WOGCC change to SOW?	Please see response to letter #5, comment #62.
11	71	Well pad size	Please see response to letter #5, comment #14.
11	72	Punctuation correction.	Please see response to letter #5, comment #72.
11	73	Reword	Please see response to letter #5, comment #73.
11	74	Correction	Please see response to letter #5, comment #74.
11	75	Development phase impacts	Please see response to letter #5, comment #1.
11	76	Development phase impacts	Please see response to letter #5, comment #1.
11	77	Development phase impacts	Please see response to letter #5, comment #1.
11	78	Include EAs from SOCO or incremental 3D activity	Please see response to letter #5, comment #78.
11	79	Correction to casino language	Please see response to letter #5, comment #79.
11	80	Reference to 8X8 feet reclaimed well only	Please see response to letter #5, comment #80.
11	81	Appendix B misspelling	Please see response to letter #5, comment #81.
11	82	Table C-1 update wellpad size	Please see response to letter #5, comment #82.
12	1	Wildlife Monitoring responsibility	Appendix P states “Considerable effort will be required by the agencies and Operators…for plan implementation.” Later in Appendix P: “When annual wildlife inventory, monitoring and protection data are collected by contractors and other agencies…” BIA recognizes the limits of manpower and budgets, and since the action alternatives are proposed by the Operators, the Operators would bear their share of the work for the monitoring program.
12	2	Coastal Extension be exempted from	Thank you for your comment. The BIA will take your recommendation into account when finalizing the ROD

Letter	Comment	General Topic	Response
		drilling	for this action.
12	3	Multiple wells per pad	Thank you for your input. Please see response to letter #9, comment #1.
13	1	CBM and other production issues	No coalbed methane development is a part of any of the action alternatives. Drilling would commence upon expiration of BIA's mandatory 30-day appeal period subsequent to issuance of the Record of Decision for this NEPA process. Wastewater (produced water) management is described in Section 2.7.2.3, p. 2-29: "The produced water is injected in the Tribal PN #16-34 SWD located in T4N, R2E, Section 16 SWSE, which was converted into an underground injection well for storing produced water from all fields. On occasion, the produced water may be used in drilling a well. However, the produced water is not discharged into the environment." Compensation for surface damage would be negotiated with the Operator of the development on your land. Site reclamation is described in Section 2.7.2.11, p. 2-46. Generally, disturbed areas would be cleaned up, restored to approximate original contour, ripped to a depth of 12 to 18 inches, stockpiled topsoil replaced, seeded with approved seed mix, and fertilized.
13	2	Likely and highest well densities for T3N, R2E, Sec. 14	Existing well spacing orders for that section show 16 wells per 640 acres for the Wind River Formation and 16 wells per 640 acres for the Fort Union Formation. The BIA does not forecast closer spacing than these spacing orders allow.
13	3	Insists upon reviewing building plans	Surface use agreements with landowners are executed prior to approval of APD's on private surface/tribal minerals. The landowner has the right to include surface use mitigation measures in the Permit to Drill.
T1	1	What kind of data did you collect on air samples and ground water samples.	During the EIS process, no ground water samples were taken. Ground water quality was based on literature and data available from the USGS, the tribe, and other sources as referenced in the text. No air quality sampling was conducted. The air quality analysis relied upon existing data approved and provided by the Wyoming Department of Environmental

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			Quality – Air Quality Division.
T1	2	Buried Production Pits	Section 3.0 has been revised to acknowledge that contamination may be present at various existing natural gas wells, pits, and production facilities within the WRPA. Historic practices with respect to handling of produced water, condensate, drips, and other liquids with potentially hazardous constituents no longer take place in the WRPA. At present, and with the proposed project, the Operators would use tanks, liners, berms and other types of containment to properly collect, store, and haul produced liquids to appropriate processing or disposal facilities. Section 4.15 describes the various procedures that would be implemented to minimize the potential for spills or releases of hazardous materials into the environment.
T1	3	Are you aware if any operator is burying hydrocarbon sludge and heavy metals on the well pads in this area?	During the EIS process we were not made aware of any evidence that hydrocarbon sludge and heavy metals were currently being buried on well pads in this area. Current practices, Wyoming DEQ regulations, and proponent voluntary mitigation measures do not allow or result in burial of hydrocarbon sludge and heavy metals on well pads in the project area. Also, please see response to testimony #1, comment #2.
T1	4	Jurisdiction for contaminated soil	Jurisdictional issues are discussed in Section 1.5.1 and Table 1-6 of the EIS. Although these issues are especially complex in the WRPA because of split estates, the relevant regulatory agencies are accustomed to working together to resolve such issues and will continue to do so.
T1	5	Jurisdiction for water	Please see response to testimony #1, comment #4.
T1	6	Jurisdiction	Please see response to testimony #1, comment #4.
T1	7	Did you consider the cumulative effect of the number of wells in the EIS?	The cumulative effect of the number of wells on geology, minerals, paleontology, and soils was considered in the EIS in Chapter 5, Section 5.3 for each alternative. Yes, the air quality impact analysis considered the total number of wells, both existing and proposed. We respectfully refer the reader to the Emission Inventory report in Volume III which contains a detailed description of the project and cumulative emission sources

Letter	Comment	General Topic	Response
			considered in the analysis. For socioeconomics, both existing and proposed wells and production were included in the BLM reservoir management group modeling, the IMPLAN modeling and other sections of the assessment. For transportation impacts the trip estimates for existing gas field activities were included in the cumulative assessment. Effects on highways, county roads and private roads were discussed in Chapter 3.14 and used as a basis for the assessment in Chapter 4.14. Yes, the cumulative impact of well quantity was evaluated as to the impact to both surface and ground water in the WRPA and presented in detail in Chapter 5. Cumulative impacts to cultural resources were addressed in Section 5.3.11. Execution of the proposed natural gas development in conjunction with other reasonably foreseeable future activity in the WRIR is unlikely to have substantial cumulative impacts to cultural resources under the Proposed Action or Alternatives A, B, and C. Cumulative effects related to health and safety were addressed in Section 5.3.14. Cumulative impacts of the existing development, proposed development, and reasonably foreseeable future development is discussed in Chapter 5 of this EIS.
T1	8	Proximity of wellheads to structures	The answer to this comment varies depending on surface and mineral ownership. In the case of private surface and private mineral ownership, State of Wyoming Oil and Gas Conservation Commission rules apply. According to Chapter 3, Section 22(b) General Drilling Rules of the WOGCC, “Pits, wellheads, pumping units, tanks, and treaters shall be located no closer than three hundred fifty feet (350') from any of the aforementioned items (water supplies, residences, schools, hospitals, or other structures where people are known to congregate). However, in the case of tribal mineral ownership, regardless of surface ownership, 25 CFR 227.22 applies to leases under the 1938 Act, and requires a setback of 200 feet from a house or barn unless written consent is obtained from the lessor. Where the project would involve tribal minerals leased

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			under laws other than the 1938 Act and private surface, the siting of wellheads and other natural gas facilities would have to be negotiated between the surface owner and the operator; the terms of this agreement should be codified in the Surface Damage Agreement.
T1	9	Jurisdiction	Please see response to testimony #1, comment #8.
T1	10	How do you define residual disturbance?	Residual disturbance is defined as surface disturbance remaining after final reclamation has been completed and accepted as successful (refer to Appendix D of the DEIS for detailed descriptions of reclamation). Residual disturbance has a term of life of project (LOP), so that after the project is completed (all proposed wells have ceased production), the residual disturbance is also reclaimed.
T1	11	So there is no consideration for surrounding surfaces that are no longer useful for their intended purpose? For example, I'm thinking of part of an irrigation field that will no longer drain and –and in essence, goes to weeds because of well pad placing and stuff like that?	Thank you. This comment is duly noted. In the EIS much effort was spent in describing the management practices which will be used to limit the impact to soils, surface water, and ground water. Of primary concern would be the potential of sediment deposition during construction and other activities on adjacent lands. By containing sediment on site using berms and other engineered structures, the potential for affecting adjacent lands should be minimized. In addition, after completion of drilling operations the portion of the well pad that is no longer needed will be reclaimed to the landowner's specifications. In irrigated agricultural areas in the Pavillion Field, the well pad will be reclaimed to 8x8 feet. The Operators will also consider reducing well pads on irrigated lands in the other development areas to similar dimensions, where feasible. Current practices, Wyoming DEQ regulations and proponent voluntary mitigation (Section 2.3) are in place to reclaim lands that are not needed for oil and gas production. These measures are described in Section 2.7.2.11. Specific mitigation measures for soils to reduce impacts are described in Section 2.8.2.3. Potential impacts to cultural resources are addressed in Sections 4.12.2 through 4.12.8, including direct impacts that could include erosion of cultural resource properties, siltation resulting in burying or degradation of cultural resource sites, chemical degradation of sites and structures, and visual impacts to historic structures and prehistoric rock art sites (Section 4.12.2). As stated in

Letter	Comment	General Topic	Response
			Section 4.12.8, destruction or damage to significant archaeological resources sites is permanent, and the cultural information contained in those sites is usually lost. Any impacts to cultural resources sites should be considered to be residual. However, development under the Proposed Action or any of the Alternatives is expected to have minor impacts to cultural resources. Additionally, Sections 3.13.6.4 and 4.13.2.10 state that agricultural areas adjacent to disturbed areas may also be affected by gas development.
T1	12	Directional drilling	Please see response to letter #9, comment #1 and letter #10, comment #6.
T1	13	Is there a well density associated with the Proposed Action number of 325 wells?	Table 1-2, p. 1.1-10 through 12 details well spacing orders for the WRPA. Figure 1-7 gives a geographic representation of the current spacing orders. The Proposed Action would not increase the well density allowed in the existing spacing orders.
T1	14	Guidelines for proximity of facilities to occupied residences.	Please see response to testimony #1, comment #8.
T1	15	Will this EIS define the process for conflict resolution between agencies?	Conflict resolution procedures are worked out on a case-by-case basis, depending on the issues and the parties involved, and are outside the scope of this EIS.
T1	16	There isn't a location in Muddy Ridge that is 8' X 8'.	The Operators have estimated that a Muddy Ridge well location would have an approximate reclaimed size of 327' X 222', or approximately 1.67 acres (refer to Appendix C, Table C-2 in the DEIS).
T1	17	In the EIS, was the removal of top soil prior to well pad building discussed?	In Section 2.7.2.2, the DEIS states "All available topsoil suitable for reclamation (up to 12 inches) would be stripped from the well pad area and stored adjacent to the well pad." In addition, Section 2.8.2.3, p. 2-59 under Soils Mitigation states "Selectively strip and salvage topsoil or the best suitable medium for plant growth up to a depth of 12 inches from all areas to be disturbed for construction of well pads and facilities."
T1	18	What is	Thank you for this comment. Currently, TBI and Midvale

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		considered a water body?	irrigation have an agreement to restrict drilling within 500 ft of the main irrigation canal and Five Mile Creek. Drilling will not be limited due to any other canals, laterals or streams. The use of the term water body in the DEIS has been changed accordingly.
T1	19	What is considered a water body?	Please see response to testimony #1, comment #18.
T1	20	What is considered a water body?	Please see response to testimony 1, comment #18.
T1	21	What is the well spacing?	Please see response to testimony #1, comment #13.
T1	22	Will the private mineral rights be developed independent of the EIS?	The action alternatives described in the DEIS include all of the development on all surface/minerals ownership proposed by the Operators in the WRPA. Should the BIA deny the action alternatives, and opt for the No Action Alternative as the agency-preferred action, private surface/private minerals, through the WOGCC APD process, and tribal minerals to offset drainage, through the BIA/BLM APD process, could still be developed (see Section 2.6, p. 2.1-13 of the DEIS).
T1	23	What well density does the Proposed Action work out to?	Please see response to testimony #1, comment #13.
T1	24	Would the private minerals well spacing be regulated by this EIS?	Please see response to testimony #1, comment #13.
T1	25	This comment concerns well spacing and cumulative impacts.	We appreciate your concern, but although the current 2000 order from the Wyoming Oil and Gas Commission that allows variance for spacing within a 20 acre spacing Oil and Gas field, it is highly unlikely that all the wells would be drilled in the same spot. Cumulative impacts of development in each of the fields in terms of potential impact to surface and ground waters were addressed in detail in Chapter 5 of the EIS. The number of wells and spacing of the wells in each field was considered in this analysis. It is felt that if Best Management Practices are utilized during construction and operation of these impacts should be minimized.

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			Potential effects of increased well spacing on cultural resources are discussed in Section 4.12.2. The potential for direct impacts to eligible cultural resources is likely to increase with increased well density, because opportunities for avoidance will decrease in placement of wells, gathering pipelines, and access roads. This increased potential for direct impacts might be lessened by means of block surveys of relatively large areas of proposed well development areas, which would allow system planning to avoid cultural resources. Potential direct impacts to eligible cultural resources can be mitigated by preparation and execution of a mitigation plan approved by the responsible federal agency(ies) and, if appropriate, the Joint Business Council of the Shoshone and Arapaho Tribes. Cumulative effects related to health and safety were addressed in Section 5.3.14. The total project area that is evaluated in this EIS is approximately 92,000 acres. The Pavillion field covers 11,784 acres. The initial disturbance in the Pavillion field, under the Proposed Action, is estimated to be 472.1 acres or 4 percent of the Pavillion Field. The residual disturbance, after reclamation of the disturbed acres in the Pavillion Field, is 159.4 acres or 1.35 percent of the Pavillion Field. The cumulative impacts of past, present and reasonably foreseeable future activities are discussed in Chapter 5 of this EIS.
T1	26	Muddy Ridge wells are deep, and will not be reclaimed to 8" X 8".	That is correct. Please see response to testimony #1, comment #16.
T1	27	Will they please remove the topsoil and then bring it back like every other agency does.	Please see response to testimony #1, comment #17.
T1	28	Are they also going to farm it when they get through?	Requirements for the end land use would be negotiated between the Operator and the affected landowner
T1	29	Transportation within the WRPA	Chapter 3.14 identifies county roads and bridges that would be affected by the Proposed Action and alternatives, and describes their current condition. This

Letter	Comment	General Topic	Response
			information was obtained from the Fremont County Transportation Department. Section 4.14 describes the potential affects of gas development and operations-related traffic on county roads and bridges for each alternative. Traffic alternatives are only described as negligible for traffic impacts on state highways under Alternative C-No Action. Traffic impacts are assessed as potentially minor to moderate for county roads under all alternatives. The range between minor and moderate is necessary because some roads within the project area will be lightly used, while others will be heavily used. Impacts to certain roads would likely be substantial, but the effects would not be regional in nature, which is a criterion for classifying an impact as major.
T1	30	How is the public notified of the availability of the DEIS?	Chapter 6 of the DEIS discusses details on public notification of the project scoping, and availability of the DEIS was handled in the same way. The FEIS has a section (Section 3) describing the process of public consultation and coordination for the EIS.
T1	31	Is this coalbed methane?	The action alternatives have no CBM wells proposed for the WRPA.
T1	32	Transportation cumulative effects.	Cumulative transportation impacts were considered in Section 5.3.13
T1	33	Cumulative input into the environment from both air and water standpoints?	Input into the cumulative impact assessment to water resources included all development activities including road construction. Please see response to letter #10, comment #3. The air quality impact analysis included emissions from increased vehicle traffic associated with the project. We respectfully refer the reader to the Emission Inventory report in Volume III of the DEIS, which contains a detailed description of the project and cumulative emission sources considered in the analysis.
T1	34	Cumulative effects of residents of the area.	Cumulative socioeconomic impacts including impacts on residents are considered in Section 5.3.12.4.
T1	35	So the conclusion is there's no cumulative	Cumulative impacts are described in detail in Chapter 5 of the DEIS. A condensed description of cumulative impacts by resource area is available in the Executive

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		impact from this EIS?	Summary, pages xvi through xxiv.
T1	36	Why are we doing the EIS if you don't consider these things?	The EIS has considered all aspects of the action alternatives brought forth by the public, the interdisciplinary team, the Operators, and regulatory agencies that commented on scoping and the DEIS.
T1	37	You've made no decision, is that correct or not?	Section 1.3, p. 1.1-29 of the DEIS states "The EIS is *not* a decision document. The decision regarding the project will be documented in a Record of Decision (ROD) signed by the Regional Director, Rocky Mountain Region, Bureau of Indian Affairs." A decision will not be finalized until after the waiting period for the FEIS has passed.
T1	38	How can you draw conclusions if you don't know exactly how the rights are going to be developed?	Exact action descriptions are not required to perform environmental analyses. The WRPA EIS is not a project level document, it is a programmatic document. Site-specific impacts will be thoroughly reviewed under the NEPA regulations by tiering site specific environmental analysis to the Wind River Record of Decision (ROD). The regulations for implementing the procedural provisions of the National Environmental Policy Act, issued by the Council on Environmental Quality are found in 40 CFR Parts 1500-1508. 40 CFR 1502.2 States: "Agencies are encouraged to tier their environmental impact statements to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for decision at each level of environmental review (1508.28). Whenever a broad environmental impact statement has been prepared (such as a program or policy statement) and a subsequent statement or environmental assessment is then prepared on an action included within the entire program or policy (such as a site specific action) the subsequent statement or environmental assessment need only summarize the issues discussed in the broader statement by reference and shall concentrate on the issues specific to the subsequent action. The subsequent document shall state where the earlier document is available. Tiering may also be appropriate for different stages of actions. (40 CFR 1508.28)" The tiered EIS approach used with WRPA is consistent with the CEQ regulations found in 40 CFR. Section

Letter	Comment	General Topic	Response
			1508.28 states in part: "Tiering is appropriate when the sequence of statements or analyses is: (a) From a program, plan, or policy environmental impact statement to a program, plan, or policy statement or analysis of lesser scope or to a site-specific statement or analysis." The tiered approach used with WRPA is consistent with BIA agency direction including the NEPA Handbook. The BIA NEPA Handbook BIAM Release No. 9303 states in part, in 6.3 E (2): *"(c) EISs on Broad Actions. It may be appropriate to define in broad terms the action for which an EIS is prepared. Section 1500.4 (i) of the regulations states that agencies shall reduce excessive paperwork by using program, policy, or plan EISs and tiering from statements of broad scope to those of narrower scope in order to eliminate repetitive discussions of the same issues."*
T1	39	What is the recourse of the private landowner if the developer does not follow the EIS guidelines?	The BIA and BLM will enforce the mitigation, minimization, and best management practices mandated by the Record of Decision for the WRPA on federal (BOR) and tribal surface or tribal minerals, regardless of surface ownership, unless exceptions are granted or warranted by the private landowner or other surface management agency. Private surface/ private minerals issues would be negotiated with the Operator of the facilities.
T1	40	The mineral rights in the WRPA need to be developed responsibly, and this EIS is not going to help that happen.	The BIA disagrees with this statement. The EIS will provide the groundwork for management practices that are necessary for development in the WRPA. The BIA and BLM will have a programmatic environmental analysis to use as a starting point for site specific analysis, and a framework for issuing Conditions of Approval for each action, whether APD or ROW. In addition, on private surface/private minerals, landowners will have a tool to use in the formation of agreements with Operators on how the landowners want the developer to construct facilities on private property.
T1	41	The EIS has no substance.	The BIA disagrees with this statement. The Operators have put forth concrete plans for natural gas

Letter	Comment	General Topic	Response
			development in the WRPA. The interdisciplinary team of resource scientists has analyzed the affected environment (Chapter 3), the environmental consequences (Chapter 4), and the cumulative impacts (Chapter 5) of the action alternatives and the no action alternative. All of this analysis has been summarized in an understandable form in Table 2-17 (Impacts Summary) and the Executive Summary of the DEIS.
T1	42	How are you going to mitigate well density?	Well density cannot be mitigated. However surface impacts due to well density can be mitigated as described throughout the DEIS. With the application of mitigation and minimization measures as described in the DEIS, surface impacts can be minimized.
T1	43	Where well density is a major impact, it ought to be addressed in the EIS.	Please see response to testimony #1, comment #42.
T1	44	Cumulative impact is devastating to some of the farms.	Split estate issues, impacts of gas development, on agricultural productivity and net income, and impacts of resource extraction on rural character are discussed in Sections 3.13 and 4.13.
T2	1	Landowners should be taken off of the contributors list in Chapter 6.	The commenter has misinterpreted the Chapter 6 reference to the public. Landowners are not considered "contributors" or members of the project team. The project team consists of agency and consultant resource specialists performing the detailed analyses that make up the EIS. The public, including landowners in the WRPA, are referred to as follows: "The following agencies, organizations and individuals received the scoping notice and provided comments or were provided the opportunity to comment on the Proposed Action during the public scoping period." Scoping comments were received from members of the public, including landowners, as described in Section 1.6 and in Chapter 6 of the DEIS. Their concerns were noted and analyzed as part of the NEPA process. Public meetings were held locally prior to initiation of environmental analysis where landowners aired their views. Therefore, no change to the DEIS is necessary.
T2	2	Socioeconomic impacts cost/benefit	Please see response to letter #10, comment #3

Letter	Comment	General Topic	Response
		analysis.	
T2	3	Time for public comment to the DEIS.	The BIA has closely followed the requirements of the Council of Environmental Quality regulations in preparing this Draft EIS. The BIA has, in accordance with Section 1501.7 of the CEQ regulations, invited participation of all potentially affected parties during the scoping process to determine the scope of issues to be addressed and to identify the significant issues related to the Proposed Action. The BIA has considered the need for the Proposed Action (or alternatives) and the consequences of delay, as identified in Section 1501.8(b)(1)(iv) of the CEQ regulations. The BIA, as trustee for the Shoshone and Arapaho Tribes, is charged with maximizing the economic interest of the tribes, and any delay in implementing the Proposed Action or an alternative would have serious economic consequences to the tribes. The BIA believes that a 45-day review period, as established by Section 1501.8(b)(2) of the CEQ regulations, is adequate time for the general public and concerned landowners to comment on the DEIS, especially those sections that may be of particular concern. As stated in Section 1506.10(d), failure to file timely comments shall not be sufficient reason for extending a comment period. In accordance with Section 1503.1(b), the BIA may consider comments from the public after the close of the 45-day comment period, and prior to the publication of the final decision. However, the ability of the BIA to incorporate comments received after the close of the official comment period is contingent upon the timing for the preparation of the Final EIS. The BIA will also provide the public with an opportunity to comment on the Final EIS during a 30-day comment period, in accordance with Section 1503.1(b) of the CEQ regulations.
T2	4	Time for public comment to the DEIS.	Please see response to testimony #2, comment #3.
T2	5	Has the air quality analysis been in conjunction with	The affects of cumulative emission sources was considered in the analysis. We respectfully refer the reader to Section 5.3.3 of the DEIS. In addition, technical details concerning the cumulative air analysis

Letter	Comment	General Topic	Response
		the statewide cumulative analysis?	are documented in Volume III.
T2	6	Request of analysis that shows reduction of surface impacts by voluntary measures.	Proponent proposed mitigation is discussed in Section 2.3. Mitigation measures that may be required by the BIA, BLM, Tribe, or appropriate authorities are discussed by resource in Section 2.8.2. Dialogue to improve the relationship between the Operators and landowners is ongoing and encouraged. Individual land owners can negotiate site specific mitigation measures with the Operators. However, the analysis of these individual negotiations is outside the scope of this document. As explained in the document, the ability to effectively drill and operate directional wells in the Pavillion area is limited. The siting of wellheads and other natural gas facilities would have to be negotiated between the surface owner and the Operator; the terms of this agreement should be codified in the Surface Damage Agreement. The potential effect of directional drilling on cultural resources is specifically addressed in Section 4.12.6. Directional drilling could be used to avoid impacts to relatively large cultural resource sites that could not be otherwise avoided under conventional vertical drilling. As stated in Chapter 2 of the DEIS, directional drilling would be utilized under the following circumstances: 1) presence of topographic features where vertical drilling would not be technically feasible, 2) areas of high cultural/archaeological concern, 3) high potential for environmental impact (e.g., “take”) to threatened, endangered, and state-sensitive species, and 4) considerations of health and safety and environment associated with occupied residences. Surface use agreements are usually negotiated with landowners. Section 4.13.7 lists “regular meetings with surface owners and other residents of each field to describe upcoming drilling and development plans, discuss issues and receive landowner input” as an additional mitigation measure. Directional drilling is discussed in Section 2.9.2. BIA points out that it has no authority to dictate oil and gas operations on private lands. The Operators have proposed voluntary mitigation measures to minimize

Letter	Comment	General Topic	Response
			impacts. If a landowner believes that further mitigation would be required beyond the Operator's voluntary measures, conflicts may be resolved through the Wyoming Split Estate Initiative.
T2	7	Request analysis showing reduced surface impacts due to best management practices.	Directional drilling has been addressed under the response to letter #9, comment #1. The descriptions of Operator methods in Chapter 2, the mitigation detailed in Chapter 2 and throughout Chapter 4 represent best management practices utilized throughout the country in the production of natural gas. Analysis has assumed the utilization of these practices. Cost of production and value of products is detailed in Section 4.13.
T2	8	Reduced values of land.	Please see response to letter #10, comment #3.
T2	9	Scope of analysis	Please see response to letter #10, comment #8.
T2	10	Well spacing vs. surface disturbance.	Please see response to letter #10, comment #6.
T2	11	I'm concerned about reclamation and the water quality.	Water quality issues are addressed in detail in Chapter 4 of the EIS.
T2	12	Are the oil companies paying for the analysis?	The Operators are funding the EIS process, under agreement with the BIA, as is common practice in environmental analyses. In conformance with NEPA and the CEQ regulations, however, the contractors report to BIA, not the Operators; BIA is performing its own independent evaluation of the contractors' work product; and the EIS includes disclosure statements from the contractors that they have no financial or other interest in the outcome of the EIS.
T2	13	Well Spacing	Please see response to letter #10, comment #6. In addition, spacing orders are determined by the BLM and the Wyoming Oil and Gas Conservation Commission. Under NEPA, analyses are performed using existing laws and regulations. It is not, and cannot be, the intent of the EIS to evaluate the validity of current laws.
T2	14	Well development on the Garland Farm.	See response to letter #10, comment 9, and testimony #1 comments #2, 11 and #25.
T2	15	Removal of top	During surface action requiring excavation, topsoil would

Letter	Comment	General Topic	Response
		soil and burial of drill cuttings.	be removed and temporarily stockpiled, for reuse during reclamation, where appropriate. Current practices, Wyoming DEQ regulations, and proponent voluntary mitigation measures do not allow or result in burial of hydrocarbon sludge and heavy metals on well pads in the project area. Drill cuttings will be buried to a depth of at least 3 feet as described in Section 2.7.2.3.
T2	16	Salty soils	Please see response to testimony #3, comment #2.
T2	17	Impacts to farms	Please see response to testimony #1, comment #25.
T2	18	Why isn't it addressed that of the total project area, only a small portion would be developed?	Please see response to letter #10, comment #7.
T2	19	Are federal and tribal mineral wells combined with private mineral wells in the analysis?	The potential location of individual wells is not currently known. This EIS evaluates the effects of a full-field development for the Proposed Action and alternatives. Figure 1-9 shows the distribution of private mineral estates in the WRPA. By far, the greatest amount of private minerals are in the Pavillion Field. Therefore, the probability of drilling on private estate would be the highest in the Pavillion Field.
T2	20	How is the economic analyses determined?	Section 4.13.1.2 provides a description of the methods used for the economic assessment contained in the DEIS.
T2	21	Effects on landowners.	Thank you for the comment.
T2	22	Dr. Dollhopf's presentation of existing hydrocarbon contaminated sites in the WRPA.	We thank you for presenting this new information that has only become available after the draft document was completed. The information presented by Dr. Dollhopf is an important aspect of the existing environment and Chapter 3 was revised to include this new information. Also, please see the responses to letter #10, comment #9 and testimony #1, comments #2 and #3.
T2	23	See testimony #2, comment #22.	Please see response to testimony #2, comments #2 and #22.

Letter	Comment	General Topic	Response
T2	24	See testimony #2, comment #22.	Please see response to testimony #2, comments #2 and #22.
T2	25	See testimony #2, comment #22.	Please see response to testimony #2, comments #2 and #22.
T2	26	Operator management practices.	Please see the response to testimony #1, comment #11.
T2	27	Finding out what constitutes a hazardous level of hydrocarbon in soil was problematic.	We apologize for the difficulty you encountered. Unfortunately, this is symptomatic of the jurisdictional problems afflicting split estate properties in the WRPA.
T2	28	Is BIA's position that buried hydrocarbons will not be analyzed in the EIS?	Please see response to testimony #2, comment #22.
T2	29	Possible human risk requiring assessment in EIS.	Cumulative effects related to health and safety were addressed in Section 5.3.14. To date only anecdotal information on hydrocarbon contamination in the soil has been presented. A human health risk assessment is not warranted at this time.
T2	30	Soil salt content	Please see the response to testimony #3, comment #2.
T2	31	Dr. Dollhopf summation on soil best management practices.	Please see the response to testimony #3, comment #2.
T2	32	FEIS should inventory potential hazardous soil deposits in the WRPA.	Please see response to letter #10, comment #9.
T2	33	Landowner Proposed Alternative	Please see response to letter # 10, comment # 5.
T2	34	Request extension of comment	Please see response to testimony #2, comments #3 and #4.

Letter	Comment	General Topic	Response
		period.	
T2	35	Safety hazard of well facilities.	Please see the response to testimony #1, comment #8.
T2	36	Reclamation of agricultural lands.	Please see the response to testimony #1, comment #11. In addition, Operators plan to develop wells on irrigated agricultural land in the Pavillion Field during the winter when fields would lie fallow. On agricultural land, a well pad 185 x 275 feet would be constructed to drill and complete a well. Also, an access road would be constructed. The operators would coordinate with the land owner the location of both the pad and the access road to minimize disturbance to agricultural activities. After a well is drilled and completed on irrigated agricultural land in the Pavillion Field, the permanent pad size would be reduced to 8 x 8 feet. Reduction of the well pad to similar dimensions in irrigated fields in the other development areas will be considered by the Operators, where feasible. Condensate and water would be piped to a central location off irrigated agricultural land. See Section 4.13.2.10 for a discussion of compensation that would be paid for use of agricultural land.
T3	1	EIS address hydrocarbon contaminated soil and water resources.	As stated in the Proposed Action and Alternative, produced fluids will be contained in storage tanks. Unlined production pits will not be utilized in future operations. Quantifying potential risks resulting from past practices is beyond the scope of this analysis. Also see the response to letter #10, comment #9.
T3	2	EIS identify best management practices for drill pad construction in order to minimize impacts of soil resources.	Thank you for this comment. As provided in Chapter 4, Best Management Practices for topsoil and reclamation have been presented. Individual landowners may negotiate additional mitigation practices on a case-by-case basis. However, these negotiations are beyond the scope of this document. Salinity values for native soils of the project area range from 0 – 8 mmhos/cm. Values for the Apron-Lost Wells Soils association of sandy loams and sandy clay loams that underlies nearly level to sloping areas around Pavilion fall into these same values. Thus the values noted in Dr. Dollhopf's report fall within the range of salinities for soils within the project area. There may be other reasons for the increased salinity at the two locations described in his report other than drill pad

Letter	Comment	General Topic	Response
			construction practices. Concern with salinity issues is noted, however, and current practices, Wyoming DEQ regulations, and proponent voluntary mitigation (Section 2.3) are in place to reclaim lands that are not needed for oil and gas production. These measures are described in Section 2.7.2.11. Specific mitigation measures for soils to reduce impacts are described in Section 2.8.2.3. Topsoil will be stockpiled for reuse in reclamation. Directional Drilling is discussed in 2.7.2.4 and may be utilized under certain circumstances. Also see the response to letter #5, comment 22, testimony #1, comment #11, testimony #2, comment #6, and testimony #2, comment #16.
17	1	Cumulative air impacts.	See Chapter 5, Section 5.3.3 for cumulative air quality impacts. Class I PSD increment consumption is presented in Table 4.4-32 for the area, Wind River Canyon, where ambient air impacts for the Proposed Action and alternatives were predicted to be the greatest. The FEIS presents the PSD Class I and Class II increment consumption analysis for each Class I and Class II area, respectively.
17	2	PM 2.5 impacts.	BIA will include the referenced analyses in future NEPA actions.
17	3	Combined impacts.	A brief narrative addressing combined impacts was added as requested.
17	4	Air quality related impacts.	All near-field and far-field impacts resulting from the Proposed Action and alternatives have been disclosed in the preceding 57 pages of the DEIS. A summary of these impacts in the introductory mitigation section would be redundant. Additionally, the commenter refers to tribal Class I areas. The tribal areas included in the analysis do not have a Class I designation.
17	5	Additional mitigation measures.	Electric drill rig engines are impractical. Drill rigs would be used throughout the 92,000-acre project area. Additionally, a drill rig engine would be temporarily required for a range of 7 to 60 days at each site depending on the depth of the natural gas target formation. Therefore, the use of electric drill rig engines would require a complete electric power grid throughout

Letter	Comment	General Topic	Response
			the project area. The term "new technology diesel engines" is too generic to address specifically.
17	6	Purchasing wind-generated electricity	The local electricity provider, High Plains Power, Inc. does not produce wind-generated electricity. Furthermore, High Plains Power reports that they have never received a request to purchase renewable energy and therefore are uncertain how such a request would be fulfilled. Furthermore, as the use of electric drill rigs engines is not feasible, using renewable energy to power electric drill rigs is not feasible with the infrastructure that is in place and owned by High Plains Power. Mandating the use of renewable energy is beyond the scope of this EIS.
17	7	Add qualitative ability of the mitigation measures.	An extra column to include impacts reduction in addition to emissions reductions is redundant. Air quality impacts are directly related to emissions. Under the same meteorological and pollutant dispersion conditions, reduced emissions will always result in reduced impacts.
17	8	Renewable electricity generation.	Thank you for your comment. The Tribes' consideration to develop renewable electricity generation capability is beyond the scope of the EIS.
17	9	Emissions inventory assumptions	Predicted project impacts include emissions from both construction and production activities. This point was clarified in the FEIS.
17	10	Emissions from drilling engines.	The CO and NOx impacts resulting from drilling were evaluated. Maximum hourly emission rates were calculated for CO and NOx. These rates were used to determine impacts for the applicable averaging periods: 1 and 8 hours for CO, and annual for NOx. Therefore, the maximum short-term (1-hour and 8-hour) impacts were calculated where health-based ambient air quality standards have been established by the federal government and the State of Wyoming. The applicable annual average for NOx was also calculated. Since a shorter averaging period has not been established for NOx, there is no need to speculate about short term averages of NOx.
17	11	"Compression and treatment."	Each compressor station will have compressors and dehydrators. Dehydrators will further remove moisture from field gas to prepare it for transmission. Therefore,

Letter	Comment	General Topic	Response
			the term "compression and treatment" accurately describes the processes.
17	12	Correction: "nearly" rather than "identical".	Text has been revised to "nearly identical" rather than "identical" in Sections 4.1.1 and 5.3 in the TSD.
17	13	Well drilling treatment.	SO_2 emissions would be minor during the operational phase of the WRPA. The maximum SO_2 emissions and impacts would be associated with drilling activities and along project access roads during periods of maximum traffic during drilling activities. Therefore, SO_2 impacts were evaluated only for drilling activities and not during the combined construction and operational phase of the WRPA project. The maximum impacts associated with traffic have been added to Tables 4.4-9 and 4.4-10.
17	14	Only SO_2 and CO on Table 4-15.	CO emissions from vehicles are the highest of all criteria pollutants. Although SO_2 vehicle emissions are minor, they represent the maximum from any of the project activities. Therefore, the SO_2 and CO impacts were estimated for maximum traffic levels along a hypothetical mile of road in the WRPA.
17	15	Engine emission rates	A footnote, added to Table 5-2 in the Near-Field TSD, describes the compressor engine emission factors in grams/horsepower/hour.
17	16	Emission rates.	Tables 5-3, 5-4, and 5-5 have been updated to include the annual pollutant emissions from drill rigs and pad separators. The annual NOx emissions at each assumed location are the product of the number of days of drilling and the assumed number of drill rigs on a pad during the year. Because only one rig would operate at any time at each assumed location, the CO rates are simply the maximum hourly rate.
17	17	Check data on table.	The title of the table is correct. The difference between the annual drilling rate of the Proposed Action and Alternative A would be one well annually. The drilling rates would be variable based on many factors (success rate, world economics, world politics, national politics, etc.). Therefore, given the inherent variability of the drilling estimates, the difference between 38 or 39 wells per year would be insignificant.
17	18	Emissions differences between	Tables 5-5 and 5-6 describe the compressor engine parameters for Alternative A. Labeling has been changed to reflect Alternative A. Tables have been

Letter	Comment	General Topic	Response
		alternatives.	added for compressor engine emissions and modeling parameters for Alternatives B and C.
17	19	Mixing terminology.	Second sentence in first paragraph changed from "Cumulative impacts from the Project and modeled background sources were also modeled." to "Impacts from the Project and modeled cumulative sources were also modeled." In the second paragraph, the word "pollutant" was added between the words "background concentrations" to avoid confusion.
17	20	PSD.	As mentioned in the text, the maximum impacts are associated with a facility that was constructed before the NOx PSD baseline date. PSD increments evaluate the incremental increase above the ambient air pollutant levels when the NOx PSD baseline was created.
17	21	Single year meteorological data.	Thank you for your comment. The use of multiple meteorological data sets will be considered in future analyses.
17	22	Ammonia vs. ammonium.	The subject text was revised as appropriate.
18	1	USDI-BOR – No Comments	Thank you for responding.
19	1	NRCS – No Comments.	Thank you for responding.

APPENDIX A

CONDITIONS OF APPROVAL FOR APDs

Bureau of Land Management, Wyoming
General Conditions of Approval

1. Approval of this APD does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease, which would entitle the applicant to conduct operations thereon. In addition, approval of this APD does not imply that the operator has legal access to the drilling location. When crossing private surface 43 CFR 3814 regulations must be complied with, and when crossing public surface off-lease the operator must have approved rights-of-way.

2. This APD is valid for a period of one year from the date of approval or until the oil and gas lease expires/terminates, whichever occurs first. If the APD terminates, any surface disturbance created under the application must be reclaimed in accordance with the approved plan

3. All applicable local, state and/or federal laws, regulations, and/or statutes must be complied with.

4. Notifications to the Authorized Officer:

A. Construction Start up. The Authorized Officer and Surface Management Agency shall be verbally notified at least 48 hours in advance of access road/well pad construction, seeding, and the initiation of any reclamation work.

B. Spuddinq date. The Authorized Officer shall be verbally notified 24 HOURS PRIOR TO SPUDDING unless otherwise required in site specific conditions of approval. Verbal notification shall be followed by written notification on a Sundry Notice {Form 3160- 5) within 5 working days after the verbal notification.

C. Other notifications. Verbal notification shall be given to the Authorized Officer at least 24 hours in advance of formation tests, BOP tests, running and cementing casing {other than conductor casing), and drilling over lease expiration dates.

D. Progress. A progress report must be filed a minimum of once a month starting with the month the well was spud and continuing until the well is completed. The report must be filed by the 25th of each month on a Sundry Notice (Form 3160-5) .The report will include the spud date, casing information such as size, grade, weight, hole size, and setting depth, amount and type of cement used, top of cement, depth of cementing tools, casing test method, intervals tested, perforated, acidized, fractured, and results obtained, and the dates all work done.

5. The operator is responsible for informing all persons associated with this project that they shall be subject to prosecution for damaging, altering, excavating or removing any archaeological, historical, or vertebrate fossil objects or site. If archaeological, historical, or vertebrate fossil materials are discovered, the operator is to suspend all operations that further disturb such materials and immediately contact the Authorized Officer. Operations are not to resume until written authorization to proceed is issued by the Authorized Officer.

- Within five (5) working days, the Authorized Officer will evaluate the discovery and inform the operator of actions that will be necessary to prevent loss of significant cultural or scientific values.

- The operator is responsible for the cost of any mitigation required by the Authorized Officer. The Surface Management Agency will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the Authorized Officer that the required mitigation has been completed, the operator will be allowed to resume operations.

6. The operator shall be responsible for the prevention and suppression of fires on Federal land caused by its employees, contactors, or subcontractors. During conditions of extreme fire danger, surface use operations may be limited or suspended in specific areas.

7. All survey monuments found within the area of operations shall be protected. Survey monuments include, but are not limited to: General Land Office and Bureau of Land Management Cadastral Survey Corners, reference corners, witness points, U. S. Coast and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any survey monuments, the incident shall be reported in writing to the Authorized Officer.

8. Approved facilities on public lands that are no longer included within the lease, due to a change in the lease or unit-boundary, shall be authorized with a right-of-way or other appropriate authorization. The authorization will be subject to rental, or other financial obligation as determined by the authorized officer.

9. Operations that deviate from the approved APD shall receive prior written approval from the Authorized Officer. Emergency approval may be obtained orally but such approval does not waive the written report requirement.

APPENDIX B

MITIGATION MEASURES

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AVOIDANCE, MINIMIZATION AND MITIGATION MEASURES

Standard mitigation guidelines and stipulations have been developed by the BLM (1987) to avoid or minimize adverse effects to various resources from surface disturbing activities (e.g., oil and gas operations). Avoidance and minimization measures for protecting threatened and endangered species have been prepared by the USFWS (2004). The BIA (2004) prepared mitigation requirements for a proposal to drill a well on tribal minerals on the Wind River Indian Reservation. The guidelines of the BIA, BLM and USFWS are provided in Appendix A.

The mitigation measures are applicable to surface disturbance in the WRPA that has the potential to impact geological resources, water quality, air quality, land uses, vegetation, wildlife, threatened and endangered species, cultural resources, recreation areas, human health and safety, Wildlife Habitat Management Areas (WHMA), and other areas of high value. Agency-recommended or required mitigation measures will also be applied on privately owned surface, unless otherwise specified by the private surface owners. An exception to implementation of specific mitigation measures may be approved on a case-by-case basis. The exception will be approved only after a thorough site-specific analysis determined that the resource or land use will not be significantly impacted.

Pre-construction Planning and Design Measures

- The Operators, BIA, and BLM will make an on-site inspection of each proposed and staked well on tribal oil and gas leases, production facility site, new access road, and pipeline alignment plans within the WRPA, so that site-specific recommendations and mitigation measures can be developed.
- New road construction and maintenance of existing roads in the WRPA will be accomplished in accordance with BLM Manual 9113, unless the BIA, BOR, or private surface/tribal minerals landowners, whichever is applicable, specifies otherwise.
- The Operators will prepare and submit an Application for Permit to Drill (APD) for each proposed well site on tribal leases to the BLM for approval prior to initiation of construction. Prior to construction, the Operators or their contractors will submit a Sundry Notice and/or ROW application for each pipeline and access road segment on tribal leases. The APD will be complete in accordance with Onshore Oil and Gas Order Number 1, Approval of Operations on Onshore Federal and Indian Oil and Gas Leases, and 43 CFR 3162.3-1, Drilling Applications and Plans.. The APD, Sundry Notice, and/or ROW application will also itemize project administration, time frame, and responsible parties. In addition, a Reclamation Plan will be developed by the Operators for each facility in consultation with tribal, federal, and private surface owners.
- The Operators will utilize slope-stabilizing structures in areas of steep or unstable slopes, and obtain approval from the BIA prior to initiation of construction.

Operator-Committed Mitigation

- On irrigated farm land in the Pavillion field, wells will only be drilled in the winter months (November to April) to minimize the impact on the irrigated fields.
- On irrigated farm land in the Pavillion field, only the wellhead and flowline will be located in the crop field for new wells. The wellhead in irrigated farm areas will be reduced to 8x8 feet after construction and drilling have been completed.
- Production facilities will be centralized on dry ground or the edge of irrigated farm areas adjacent to the roads.
- After topsoil removal and stockpiling, fill material, purchased from the landowner or other

source acceptable to the landowner, will be used to pad the irrigated field during drilling operations to protect the crop land and will be removed before the spring thaw.

- The Operators will accommodate the landowners, as much as possible, in the location of the well pads, while maintaining well spacing required in the spacing orders.
- Existing rights-of-way will be used for pipeline construction, where possible.
- Closed mud systems for drilling will be used on irrigated farm lands to eliminate the need for a reserve pit.
- Reserve pit spoil material will be relocated as soon as drilling is completed (not applicable to irrigated farm lands).
- Private water wells will be tested for the presence of contaminants before and after drilling operations, when requested by the landowner.
- Unpaved Operator-controlled access roads will be watered on a frequent basis to minimize the release of dust into the air.
- Minor sources of air pollution will meet Best Available Control Technology (BACT) standards.
- No drilling will occur within 500 feet of perennial streams (i.e., Muddy and Fivemile Creeks and Wyoming Canal).
- New wells will be drilled on existing well pads, where possible.
- Speed limits will be reduced on Operator-controlled roads within the WRPA to reduce dust generation and noise levels.

Resource-Specific Mitigation

Geological and Mineral Resources

- Drilling and production activities proposed on federal or tribal lands that may impact geological or mineral resources will be conducted in accordance with regulations and guidelines of the BIA, BLM, or BOR, depending on which agency has jurisdiction. On fee surface lands these activities will be conducted according to regulations and guidelines of the WOGCC. The WOGCC permitting procedures require filing an APD with the WOGCC and obtaining ROW approval from the surface owner.
- The Operators will avoid precluding the development of other surface mineral resources. Conflicts between oil and gas development and other mineral interests that arise, will be mediated by the BIA or BLM.
- The BIA, BLM, or other agencies responsible for casing and cementing policies, may require additional protection of geological or mineral resources from the potentially adverse impacts from the Wind River Gas Field Development Project.

Paleontological Resources

- Areas of proposed ground disturbance within the WRPA that have been identified as containing the tertiary Wind River formation at the surface, will be surveyed for fossils by a professional paleontologist contracted by the Operator with a report of findings submitted to the BIA.
- If significant and scientifically important paleontologic resources are discovered in the WRPA during construction, construction activities in the vicinity of the discovery will cease and the BIA will be notified immediately. Work will not resume until a qualified paleontologist has evaluated the discovery and reported findings to the BIA..
- Fossils of scientific interest and significance that are collected during paleontological evaluation will be identified and placed into the retrievable collections of a museum or

institutional repository acceptable to the agency that holds jurisdiction. Associated geological and geographical data concerning the fossils will be collected and housed with the specimens.

Soils

- The Operators will reclaim all disturbed areas not needed for production activities. Portions of Operator-controlled access road ROWs, not needed in the function of the road, and those parts of the well pad not needed during production, will also be reclaimed.
- Where feasible, buried pipelines will be located immediately adjacent to roads to avoid creating separate areas of disturbance and to reduce the total area of disturbance.
- The Operators will avoid using frozen or saturated soils as construction material.
- The Operators will minimize construction activities in areas of steep slopes and other sensitive soils and apply special slope-stabilizing structures, if construction cannot be avoided in these areas.
- Selectively strip and salvage topsoil or the best suitable medium for plant growth up to a depth of 12 inches from all areas to be disturbed for construction of well pads and facilities.
- Where possible, minimize disturbance to vegetated cuts and fills on existing roads.
- Install runoff and erosion control measures, such as water bars, berms, and interceptor ditches, if needed, as described in the Reclamation Plan
- Install culverts for ephemeral and intermittent drainage crossings. Design all drainage-crossing structures to carry the 50-year discharge event, or as otherwise directed by the BIA or BLM.
- Implement minor routing variations during access road layout to avoid steep slopes adjacent to ephemeral or intermittent drainage channels. Maintain a 100-foot wide buffer strip of natural vegetation, where possible, between all construction activities and ephemeral and intermittent drainage channels.
- Include adequate drainage-control devices and measures in road design (e.g., road berms, drainage ditches, diversion ditches, cross drains, culverts, out-sloping, and energy dissipators) at sufficient intervals to adequately control and direct surface runoff above, below, and within the road environment, to avoid erosive concentrated flows. In conjunction with surface runoff or drainage control measures, use erosion-control devices and measures, such as temporary barriers, ditch blocks, erosion stops, mattes, mulches, and vegetative covers.
- Upon completion of construction activities, restore topography to pre-existing contours at the well sites, along access roads and pipelines, and at other facilities. Replace up to 12 inches of topsoil or suitable plant growth material over all disturbed surfaces and apply fertilizer, seed, and mulch, as specified in the Reclamation Plan.
- Current practices, Wyoming DEQ regulations, and proponent voluntary mitigation measures do not allow burial of hydrocarbon sludge and heavy metals on well pads in the project area. Drill cuttings will be buried to a depth of at least 3 feet as described in Section 2.7.2.3. Measures to prevent contamination are described in Section 2.7.2.11. Specific mitigation measures for soils to reduce impacts are described in Section 2.8.2.3. In addition, to mitigate potential soil salinity impacts, as described in Appendix B, topsoil will be stockpiled for future use in reclamation.

Air Quality

- Minimize air pollutant emissions through the application of Best Available Control Technology (BACT) as required by EPA or State of Wyoming air permitting programs.
- Apply water on unpaved well access roads and pads when necessary during construction operations to reduce fugitive dust.
- Prohibit on-site burning of trash.
- Post and enforce speed limits on roads controlled by the Operators to reduce road traffic dust.
- Utilize selective catalytic reduction on compressors.
- Increase water application rate to achieve 50% fugitive dust reduction.
- Utilize unpaved road dust suppressant treatments on Operator-controlled unpaved roads, as needed and authorized.
- Reduce speed limits on Operator-controlled unpaved roads.

Water Resources

- Limit construction of drainage crossings to no-flow or low-flow periods.
- Minimize the area of disturbance within ephemeral and intermittent drainage channels.
- Prohibit construction of well pads, access roads, and pipelines within 500 feet of perennial streams (i.e., Muddy Creek, Fivemile Creek, Wyoming Canal) and/or riparian areas. Exceptions will be granted by the BIA or BLM, based on an environmental analysis.
- Minor routing variations during access road layout will be implemented to avoid steep slopes adjacent to ephemeral or intermittent drainage channels. A 100-foot wide buffer strip of natural vegetation, where possible, will be maintained between all construction activities and ephemeral and intermittent drainage channels.
- Culverts will be installed for all ephemeral and intermittent drainage crossings, or as otherwise directed by the BIA or BLM.
- Design channel crossings to minimize changes in channel geometry and subsequent changes in flow hydraulics.
- Construction activities will be minimized in areas of steep slopes, and special slope-stabilizing structures will be applied, if construction cannot be avoided in these areas.
- Adequate drainage-control devices and measures will be included in road design (e.g., road berms and drainage ditches, diversion ditches, cross drains, culverts, out-sloping, and energy dissipators) at sufficient intervals to adequately control and direct surface runoff above, below, and within the road environment to avoid erosion concentrated flows. Erosion-control devices will also be used in conjunction with the surface runoff and drainage control devices, such as temporary barriers, ditch blocks, erosion stops, mattes, mulches, and vegetative covers. A re-vegetation program will be implemented as soon as possible to re-establish the soil protection afforded by a vegetation cover.
- Construct channel crossings for buried pipelines, such that the pipe is buried a minimum of four feet below the channel bottom.
- Regrade disturbed channel beds to the original geometric configuration with the same or very similar bed material.
- Upon completion of construction activities, the topography will be restored to near pre-existing contours at the well sites, along access roads, pipelines, and other facilities sites. Up to 12 inches of topsoil or suitable plant growth material will be replaced over all disturbed surfaces. Fertilizer, seed, and mulch will be applied, as specified in the Reclamation Plan.
- The project will comply with Executive Order 11990 (floodplains protection) and BIA or BLM management directives that relate to protection of water resources and include avoidance of

stream channels, to the maximum extent practicable. Where streams and floodplains cannot be avoided, the Operators will be required to show the BIA and BLM, during the APD process, how impacts will be minimized.

- All wells will be cased and cemented in accordance with Onshore Order No. 2 to protect accessible high quality aquifers (i.e., aquifers with known water quality of 10,000 ppm TDS or less). Include well casing and welding of sufficient integrity to contain all fluids under high pressure during drilling and well completion.
- Reserve pits will be constructed so that a minimum of one-half of the total depth is below the original ground surface at the lowest point within the pit. To prevent seepage of fluids, polyethylene liners will be utilized to line reserve pits. Liners will be of sufficient strength and thickness to withstand normal installation and use. The liner will be impermeable (i.e., having a permeability of less than 10^{-7} cm/sec) and chemically compatible with all substances, which may be placed in the pit. If leakage is found outside the pit, drilling operations will be shut down until the problem is corrected.
- Hydrostatic test water used in conjunction with pipeline testing and all water used during construction activities from tribal, federal or private sources will be sampled and analyzed, and disposed of lawfully according to the analytical results.
- Develop and implement a Storm Water Management Plan (SWMP) for storm water runoff at drill sites, as required by applicable law.
- The Operators must coordinate with the U.S. Army Corps of Engineers (COE) to determine the specific Clean Water Act (CWA) Section 404 permit requirements and conditions for each facility that occurs in Waters of the U.S. to prevent the occurrence of significant impact to such waters.
- Exercise stringent precautions against pipeline breaks and other potential accidental discharges of toxic chemicals into adjacent streams. If liquid petroleum products storage capacity exceeds criteria contained in 40 CFR Part 112, a Spill Prevention Control and Countermeasure (SPCC) plan will be developed.
- Environmental audits should be conducted periodically to ensure that reserve pit lining systems are functional and not leaking, SPCC Plans are implemented, and BMPs are being followed for all gas development activities.

Vegetation and Wetlands

- Use existing roads, corridors, and open areas to the extent possible.
- Seed and stabilize disturbed areas utilizing seed mixtures and treatment guidelines prescribed in the approved APD and ROW application and Reclamation Plan.
- Evaluate all project facility sites for occurrence and distribution of Waters of the U.S., special aquatic sites, and jurisdictional wetlands. All project facilities will be located out of these sensitive areas. If complete avoidance is not possible, minimize impacts through modification and minor relocations. Coordinate activities that involve dredge or fill into wetlands with the U.S. COE.
- Incorporate invasive/noxious weed management strategies in preconstruction planning and design process for all surface disturbance activities including road, pipeline, well pad, and ancillary facility construction.
- File noxious weed monitoring forms with the BLM and BIA, and implement a weed control and eradication program, if necessary.
- Obtain a Pesticide Use Permit before the application of herbicides or other pesticides for the control of noxious weeds.

- The restoration of the well pads, pipelines, and other disturbed areas will be monitored to ensure that native plants are re-colonizing the disturbed area and noxious weeds are eliminated.

Land Use

- Utilize off-site production facilities in irrigated farm areas to reduce impacts to landowners.
- Expedite construction and reclamation activities within irrigated farm lands to minimize total time of disruption to landowners. Concentrate construction activities during the non-productive crop seasons (i.e. winter).
- Avoid placement of wells and facilities in WHMAs to preserve the maximum amount of habitat for wildlife management and recreation.
- Short-term surface disturbance will be reclaimed promptly upon the completion of construction in order to reduce the total time of disruption to landowners and operators.
- In the rangeland areas of the WRPA access roads, wells and production facilities will be located to minimize impacts to rangeland operations and land use.

Wildlife

- No disturbance will be allowed within ½-1 mile of an active raptor nest (varies by species) during the raptor breeding season from Feb. 1–July 31 (varies by species). The nature of the restrictions and the protection radius will vary according to the raptor species involved and will be determined by the WGFD or USFWS. Where disturbance of a raptor nest is unavoidable, construction of artificial nest structures may be required by the BLM or BIA.
- Ensure that electric power lines and other transmission facilities used for oil/gas development activities are designed and constructed to minimize electrocution hazards to raptors.
- All carcasses on Operator-controlled access roads, shoulders and ROWs will be removed promptly to minimize collisions between vehicles and scavenger species.
- In order to protect migratory birds and wildlife, all reserve pits that contain potentially hazardous materials will be flagged or netted, in accordance with BIA and BLM requirements.
- Avoid disturbances to habitats of high value for fish and wildlife (e.g., riparian and native vegetation).
- Minimize noise from construction and drilling or traffic in wildlife breeding and brood-rearing habitats.
- All drivers will be informed about wildlife in the area that are susceptible to vehicular collisions, and the measures that can be employed to minimize them (i.e., reduced speed limits).
- Retain all live trees and snags within the WRPA as roosting or foraging perches for raptors, to the extent possible.
- Use appropriate weed control measures to prevent the introduction of invasive plants in known sage-grouse habitat.

Threatened, Endangered, and State-Sensitive Species

- A Biological Assessment (BA) has been prepared for all threatened and endangered species potentially impacted by the Wind River Gas Field Development Project. The USFWS has concurred with the conclusions of the BA (see Appendix F of this ROD).
- Ensure that electric power lines and other transmission facilities used for, oil/gas development activities are designed and constructed to minimize electrocution hazards to

bald eagle and state species of special concern.

- No disturbance will be allowed during the critical nesting season of the bald eagle (Feb. 1 – July 31) within 1 mile of an active nest.
- Carcasses of road-killed animals and birds will be removed promptly from Operator-controlled access roads, shoulders, and ROWs to minimize bald eagle exposure to vehicles.
- Do not use salt (NaCl) during winter plowing operations, to reduce big game mortality from vehicle collisions, which will attract bald eagles, wolves and grizzly bears to the road corridor.
- Observations, track sightings, and mortality of gray wolves and grizzly bears will be reported to USFWS.
- In accordance with the Operator's policy, no pets will be allowed in the WRPA to prevent outbreak of canine distemper, which would result in black-footed ferret mortality.
- All suspected observations of black-footed ferrets, their sign, or carcasses within the WRPA, however obtained, will be promptly reported to the USFWS.
- No activities will occur within ¼ mile of identified mountain plover nesting habitat from April 1 to July 10. Identification and avoidance of mountain plover nesting areas and minimization of disturbance to prairie dog colonies will reduce the potential for disturbing mountain plover habitats. If no mountain plovers are observed, then construction activities will be initiated.
- Flag or cover with nets all reserve pits to exclude T/E and state-sensitive species from the pits, in accordance with BIA and BLM requirements.
- Avoid disturbances to, wetlands, and riparian vegetation along rivers and streams and bordering ponds and lakes used by T/E species or state-sensitive species.
- Educate all project employees about applicable wildlife laws and penalties associated with unlawful "take" and harassment of threatened and endangered species.
- Reduce speed limits on Operator-controlled roads within the WRPA to minimize potential of vehicular collisions with threatened and endangered species.
- Where possible, retain all live trees and snags within the WRPA as hunting perches for bald eagles and other raptors.
- Avoid disturbances to habitats of unusually high value for threatened or endangered species or other species protected by state or federal law.
- No surface disturbance will occur within two miles of an active or known greater sage-grouse lek between March 1 and June 30. Potential lek habitat will also be identified and disturbance to these areas will be avoided, as much as possible.
- Mountain plover habitat (short-grass prairie) disturbed by construction and drilling activities will be restored by using seed mixes and application rates for reclamation that produce stands of sparse, low-growing vegetation suitable for plover nesting.
- Sagebrush vegetation, in known sage grouse habitat, that has been disturbed by construction activities will be restored by using seed mixes to produce sagebrush vegetative communities suitable for sage grouse nesting and brood rearing.
- Maintain, where possible, areas of low sagebrush canopy cover and high herbaceous composition adjacent to greater sage-grouse nesting habitat and retain linkages of sagebrush habitats to allow the sage-grouse to move between late brood-rearing and winter habitats.

Recreation

- Expedite development and re-vegetation, and consolidate facilities in areas frequently used by game species in order to avoid disruption of use by game.
- Protect water resources that support sport fisheries to ensure that water pollution is minimized where sport fisheries are at risk.

- Limit conflicts between project vehicles and equipment and recreation traffic by posting appropriate warning signs on Operator-controlled roads, implementing Operator safety training, and requiring project vehicles to adhere to low speed limits.
- Limit ground disturbances that would potentially affect the habitat of game and wildlife that may be hunted or viewed.
- Limit impacts to the landscape from wells and production facilities visible from recreation areas and public roads accessing them.
- Locate facilities away from existing recreational areas and their access routes, where possible, to maintain the recreational value of these areas.
- Avoid placing new facilities within WHMAs, where possible, and expedite construction and reclamation of facilities placed within WHMAs to minimize impacts to these areas.

Visual Resources

- Avoid placement of wells and production facilities, where possible, in locations that would be visible to large numbers of people, (i.e. along mesa edges, along WY 134 and Bass Lake Road, and in Boysen State Park, and Ocean Lake).
- Utilize existing topography to screen roads, pipeline corridors, drill rigs, well pads, and production facilities from view.
- Paint wells and facilities with flat colors that blend with the adjacent surrounding undisturbed terrain, except for structures that require safety coloration in accordance with Occupational Safety and Health Administration (OSHA) requirements. The color selected for the Wind River Gas Field Development Project is Mesa Brown.
- Roads that cut diagonally up the sides of mesas contrast with horizontal ridgelines. Berming and undulating the outer edge of the access roadways on mesa side slopes, where possible, will be utilized to partially disguise their appearance when viewed from the valley floor.
- In order to minimize surface disturbance that contrasts with the surrounding landscape, new drill sites will be accessed from existing roads, where possible.
- During well drilling, lights will be mounted at the lowest height possible in order to achieve the proper lighting for workers, while minimizing disturbance to visual resources for residents and others.
- Any non-essential well pad area will be reclaimed upon the completion of construction. Proper reclamation of well pads will be carried out soon after each well is removed from service or abandoned.

Cultural Resources

- On tribal surface, federal surface, or lands with tribal minerals, a cultural resources survey is required for all well pad sites, access roads, pipeline construction corridors, and other areas of potential surface disturbance. Results of a cultural resources survey will be submitted to the BIA and BLM prior to or concurrent with submittal of the APD or other development plan.
- Mitigation of adverse effects to cultural/historical properties that cannot be avoided will be accomplished by the preparation and execution of a cultural resources mitigation plan. For cultural/historical properties on tribal lands, preparation of the mitigation plan will include consultation with representatives of the Eastern Shoshone and Northern Arapaho Tribes. The mitigation plan will be approved by the BIA, prior to execution.
- If cultural resources are discovered at any time during construction on lands with tribal or federal surface ownership, all construction activities will cease and the BIA will be immediately notified. The BIA will conduct a site visit within 24 hours and issue a Notice to

Proceed, if construction is permitted to continue.

- If a site is considered eligible for, or is already on the National Register of Historic Places (NRHP), avoidance is the preferred method for mitigating adverse effects to that property.
- Rock art is a rare and fragile type of cultural resource, and nearly any site containing rock art is likely to be eligible for nomination to the NRHP. Mitigation of potential direct or indirect impacts to rock art sites will include a systematic survey and recording of rock art within and adjacent to the proposed well development areas, and fencing of well locations and other development areas to restrict workers from entering areas that contain rock art.
- Wells and other facilities will be sited away from the base of escarpments, or vertical rock faces, in order to avoid erosion or other damage to the escarpments and possible rock art and/or burials that could exist at those locations.

Socioeconomics

- Implement hiring policies that encourage the use of local and tribal workers who would not have to relocate in the vicinity of the WRPA.
- Coordinate project activities with agricultural operations to minimize conflicts involving agricultural operations. Project activities will be scheduled to minimize the potential disturbance during planting and harvesting of crops. Frequent communication with farmers during the construction and development phase will minimize potential impacts to farming.
- The Operators will conduct meetings with surface owners and other residents of the WRPA to describe upcoming drilling and development plans, discuss issues and receive landowner input. Meetings would be held annually or as dictated by changes in project activities.
- Haul fill dirt (or purchase from surface owner) for pad construction and remove the fill after drilling/completion.
- Reclaim the well pad to an approximately 8 foot x 8 foot disturbed area (Pavillion irrigated land only).
- In irrigated fields contain drill cuttings in metal containment and dispose of the cuttings offsite.
- Stockpile topsoil in accordance with landowner preferences.
- Locate tank batteries and other facilities on private property, in accordance with landowner preferences.
- Use existing flowline rights-of-way, when possible.
- Supply gated pipe to landowners to facilitate ongoing irrigation during surface disturbance, drilling and completion phases of development.
- Remove reserve pit spoils.
- Locate well pads away from hillsides.

Transportation

- Limit use of roads by trucks and heavy equipment during periods when roads are muddy, to the extent possible.
- A transportation planning committee will be formed within six months after signing the Record of Decision (ROD) to address natural gas access and road maintenance issues. The committee will include the Operators, the Shoshone and Arapaho Tribes, the BIA, Fremont County, the BOR and WYDOT. Prior to each year's drilling program, the Operators will meet with the committee and present their drilling and field development program. The members of the committee will identify road maintenance issues, road and bridge sufficiency and safety issues, and preferred access routes. The committee as a whole will identify measures to avoid or minimize impacts and assign responsibilities for addressing issues.

The committee will meet semi-annually or, more frequently, as necessary.

- The Transportation Committee will develop a formal Transportation Plan within one year of issuance of the ROD.
- The Operators will encourage all employees and contractors to comply with federal, state, county and WRIR traffic laws and regulations.
- The Operators will cooperate with the Fremont County Transportation Department to repair any extraordinary damage caused by employees or contractors.
- The Operators will instruct employees and contractors to minimize use of WY 133 and East Pavillion Road within the Town of Pavillion, and encourage the use of public transportation and car pools.
- The Operators, the BIA and the Tribes will coordinate with the Fremont County Transportation Department to identify and pursue federal and state funds to improve roads and bridges within the WRPA.
- The Operators will limit use of roads by trucks and heavy equipment during periods when roads are muddy, to the extent possible.
- Apply water to Operator-controlled access roads to control dust.
- Restore the reclaimed portions of the Operator-controlled access road and well pad by corrugating, drill seeding, installing watering flowlines, providing compaction equipment, repairing fences, cutting drain ditches, land leveling, and providing additional gated pipe.
- The Operators will coordinate with the Fremont County Transportation Department to develop measures to effectively control dust on all unpaved roads.

Health and Safety

- The Operators will comply with applicable OSHA, U.S. DOT, BIA, BLM, and tribal safety regulations to reduce the probability of occupational accidents and fatalities.
- To minimize undue exposure to hazardous situations, warning signs and fencing will be installed around facilities, as required by regulations, to prevent unauthorized access and alert the public to potential hazards in the area.
- Speed limits on Operator–constructed access roads will be reduced to minimize the risk of traffic accidents, dust generation, and noise levels.
- Unpaved access roads constructed by the Operators will be watered on a frequent basis or treated with dust suppressants to minimize the release of dust into the air.
- Pipeline markers will be posted at frequent intervals along gas pipelines, including road crossings and other areas likely to be disturbed by construction activities, to warn excavators and to reduce the risk of accidental rupture.
- The Operators will monitor the pipeline flows by either remote sensors or daily inspections of the flow meters. If pressure losses are detected, the wells will be shut in and the problem repaired to minimize risks of fire or explosion.
- During construction and upon commencement of production operations, the Operators will prepare a chemical or hazardous substance inventory for all such items. The Operators will institute a Hazard Communication Program for their employees and will require subcontractor programs in accordance with OSHA 29 CFR 1910.120.
- For every chemical or hazardous material that is brought on location, a Material Safety Data Sheet (MSDS) will accompany that material and will become part of the file kept at the field office, as required by 29 CFR 1910.120. All employees will receive the training in proper storage, handling, and disposal of hazardous substances.
- Any hazardous wastes, as defined by the Resource Conservation and Recovery Act (RCRA), will be transported and/or disposed of in accordance with all applicable federal, state, and local regulations.

- Chemical and hazardous materials will be inventoried and reported in accordance with the Superfund Amendments and Reauthorization Act (SARA) Title III (40 CFR Part 335), if quantities exceeding 10,000 pounds or the threshold planning quantity (TPQ) are produced or stored in association with the proposed development. The appropriate Section 311 and 312 forms will be submitted at the required time to the applicable government emergency management coordinators and the local fire departments.
- All employees and subcontractors will be trained in matters concerning potential emergencies and plans addressing them including fire prevention, reporting and response; employee injuries and first aid; general emergency response; and spill prevention and response for chemical spills and releases when they are hired. Refresher courses will be provided annually.
- To minimize the risks of fires and their severity, suppression equipment (fire extinguishers, fire water and hoses) will be available during construction and maintained on-site at various facilities. A “no smoking” policy, shut down devices on gas handling equipment, and adequate fire response training will also be incorporated into natural gas production operations to reduce the risk and severity of fires.

Noise

- Muffle and maintain all motorized equipment according to manufacturers’ specifications.
- Install and maintain mufflers on compressor engine exhaust. The muffler should be installed to direct the noise away from the closest residence.
- Facilities (e.g., compressors) will be placed a minimum of 350 feet from existing residence, in accordance with the requirements of the State of Wyoming.

APPENDIX C

AGENCY MITIGATION GUIDELINES

STANDARD PROTECTION REQUIREMENTS FOR SURFACE-DISTURBANCE ACTIVITIES (BLM 1987)

1.0 SURFACE DISTURBANCE MITIGATION GUIDELINES

Surface disturbance will be prohibited in any of the following areas or conditions. Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the AO.

- Slopes in excess of 25 percent.
- Within important scenic areas (Class I and II Visual Resource Management Areas).
- Within 500 feet of surface water and/or riparian areas.
- Within either one-quarter mile or the visual horizon (whichever is closer) of historic trails.
- Construction with frozen material or during periods when the soil material is saturated or when watershed damage is likely to occur.

GUIDANCE

The intent of the SURFACE DISTURBANCE MITIGATION GUIDELINE is to inform interested parties (potential lessees, permittees, or operators) that when one or more of the five (1a through 1e) conditions exist, surface-disturbing activities will be prohibited unless or until a permittee or his designated representative and the surface management agency (SMA) arrive at an acceptable plan for mitigation of anticipated impacts. This negotiation will occur prior to development. Specific criteria (e.g., 500 feet from water) have been established based upon the best information available. However, such items as geographical areas and seasons must be delineated at the field level. Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of proposals (e.g., activity plans, plans of development, plans of operation, and application for permit to drill) and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

2.0 WILDLIFE MITIGATION GUIDELINES

a. To protect important big game winter habitat, activities or surface use will not be allowed from November 15 to April 30 within certain areas encompassed by the authorization. The same criteria apply to defined big game birthing areas from May 1 to June 30.

Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operational or production aspects.

Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the AO.

b. To protect important raptor and/or sage and sharp-tailed grouse nesting habitat, activities or surface use will not be allowed from February 1 to July 31 within certain areas encompassed by the authorization. The same criteria apply to defined raptor and game bird winter concentration areas from November 15 to April 30.

Application of this limitation to operation and maintenance of a developed project must be based on environmental analysis of the operation or production aspects.

Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the AO.

c. No activities or surface use will be allowed on that portion of the authorization area identified within (*legal description*) for the purpose of protecting (e.g., sage/sharp-tailed grouse breeding grounds, and/or other species/activities) habitat.

Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the AO.

d. Portions of the authorized use area legally described as (*legal description*), are known or suspected to be essential habitat for (*name*) which is a threatened or endangered species. Prior to conducting any onsite activities, the lessee/permittee will be required to conduct inventories or studies in accordance with BLM and U.S. Fish and Wildlife Service guidelines to verify the presence or absence of this species. In the event that (*name*) occurrence is identified, the lessee/permittee will be required to modify operational plans to include the protection requirements of this species and its habitat (e.g., *seasonal use restrictions, occupancy limitations, facility design modifications that apply*).

GUIDANCE

The WILDLIFE MITIGATION GUIDELINE is intended to provide two basic types of protection: 1) seasonal restriction (2a and 2b), and 2) prohibition of activities or surface use (2c). Item 2d is specific to situations involving threatened or endangered species. Legal descriptions will ultimately be required and should be measurable and legally definable. There are no minimum subdivision requirements at this time. The area delineated can and should be defined as necessary, based upon current biological data, prior to the time of processing an application and issuing the use authorization. The legal description must eventually become a part of the condition for approval of the permit, plan of development, and/or other use authorization.

The seasonal restriction section identifies three example groups of species and delineates three similar time frame restrictions. The big game species including elk, moose, deer, antelope, and bighorn sheep, all require protection of crucial winter range between November 15 and April 30. Elk and bighorn sheep also require protection from disturbance from May 1 to June 30, when they typically occupy distinct calving and lambing areas. Raptors include eagles, accipiters, falcons, (peregrine, prairie, and merlin), kestrels, buteos (ferruginous and Swainson's hawks), osprey, burrowing owls, and short-eared owls. The raptors and sage and sharp-tailed grouse require nesting protection between February 1 and July 31. The same birds often require protection from disturbance from November 15 through April 30 while they occupy winter concentration areas.

Item 2c, the prohibition of activity or surface use, is intended for the protection of specific wildlife habitat areas or values within the use area that cannot be protected by using seasonal restrictions. These areas or values must be factors that limit life-cycle activities (e.g., *sage grouse strutting grounds, known threatened and endangered species habitat*).

Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of proposals (e.g., activity plans, plans of development, plans of operation, applications for permit to drill) and, if necessary, must allow for other mitigation to be

applied on a site-specific basis.

3.0 CULTURAL RESOURCE MITIGATION GUIDELINES

When a proposed discretionary land use has potential for affecting the characteristics, which qualify a cultural property for the National Register of Historic Places (National Register), mitigation will be considered. In accordance with Section 106 of the Historic Preservation Act, procedures specified in 36 CFR 800 will be used in consultation with the Wyoming State Historic Preservation Officer and the Advisory Council on Historic Preservation in arriving at determinations regarding the need and type of mitigation required.

GUIDANCE

The preferred strategy for treating potential adverse effects on cultural properties is "avoidance." If avoidance involves project relocation, the new project area may also require cultural resource inventory. If avoidance is imprudent or unfeasible, appropriate mitigation may include excavation (data recovery), stabilization, monitoring, protection barriers and signs, or other physical and administrative measures.

Reports documenting results of cultural resource inventory, evaluation, and the establishment of mitigation alternatives (if necessary) shall be written according to standards contained in BLM Manuals, the cultural resource permit stipulations, and in other policies issued by the BLM. These reports must provide sufficient information for Section 106 consultation. The appropriate BLM cultural resource specialist shall review reports for adequacy. If cultural properties on, or eligible for, the National Register are located within these areas of potential impact and cannot be avoided, the AO shall begin the Section 106 consultation process in accordance with the procedures contained in 36 CFR 800.

Mitigation measures shall be implemented according to the mitigation plan approved by the BLM AO. Such plans are usually prepared by the land use applicant according to BLM specifications. Mitigation plans will be reviewed as part of Section 106 consultation for National Register eligible or listed properties. The extent and nature of recommended mitigation shall be commensurate with the significance of the cultural resource involved and the anticipated extent of damage. Reasonable costs for mitigation will be borne by the land use applicant. Mitigation must be cost effective and realistic. It must consider project requirements and limitations, input from concerned parties, and be BLM-approved or BLM-formulated.

Mitigation of paleontological and natural history sites will be treated on a case-by-case basis. Factors such as site significance, economics, safety, and project urgency must be taken into account when making a decision to mitigate. Authority to protect (through mitigation) such values is provided for in Federal Land Policy Management Act (FLPMA) (1976), Section 102(a)(8). When avoidance is not possible, appropriate mitigation may include excavation (date recovery), stabilization, monitoring, protection barriers and signs, or other physical and administrative protection measures.

4.0 SPECIAL RESOURCE MITIGATION GUIDELINES

To protect (resource value), activities or surface use will not be allowed (i.e., within a specific distance of the resource value or between date to date) in (legal description).

Application of this limitation to operation and maintenance of a developed project must be based

on environmental analysis of the operational or production aspects.

Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the AO.

EXAMPLE RESOURCE CATIGORIES (Select or identify category and specific resource value):

a. Recreation areas.
b. Special natural history or paleontological features.
c. Special management areas.
d. Sections of major rivers.
e. Prior existing rights-of-way.
f. Occupied dwellings.
g. Other (specify).

GUIDANCE

The SPECIAL RESOURCE MITIGATION GUIDELINE is intended for use only in site-specific situations where one of the first three general mitigation guidelines will not adequately address the concern. The resource value, location, and specific restrictions must be clearly identified. A detailed plan addressing specific mitigation and special restrictions will be required prior to disturbance or development and will become a condition for approval of the permit, plan of development, or other use authorization.

Exception, waiver, or modification of requirements developed from this guideline must be based upon environmental analysis of proposals (e.g., activity plans, plans of development, plans of operation, applications for permit to drill) and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

5.0 NO SURFACE OCCUPANCY GUIDELINES

No Surface Occupancy (NSO) will be allowed on the following described lands (*legal description*) because of (*resource value*).

EXAMPLE RESOUCE CATAGORIES (Select or identify category and specific resource value):

a. Recreation areas (e.g., campgrounds, historic trails, national, monuments).
b. Major reservoirs/dams.
c. Special management areas (e.g., areas of critical environmental concern, known threatened or endangered species habitat, wild and scenic rivers).
d. Other (specify).

GUIDANCE

The NO SURFACE OCCUPANCY (NSO) MITIGATION GUIDELINE is intended for use only when other mitigation is determined insufficient to adequately protect the public interest and is the only alternative to "no development" or "no leasing." The legal description and resource value of concern must be identified and be tied to an NSO land use planning decision.

Waiver of, or exception(s) to, the NSO requirement will be subject to the same test used to initially justify its imposition. If, upon evaluation of a site-specific proposal, it is found that less restrictive mitigation would adequately protect the public interest or value of concern, then a

waiver or exception to the NSO requirement is possible. The record must show that because conditions or uses have changed, less restrictive requirements will protect the public interest. An environmental analysis must be conducted and documented (e.g., environmental assessment, environmental impact statement, etc., as necessary) in order to provide the basis for a waiver or exception to an NSO planning decision. Modification of the NSO requirement will pertain only to refinement or correction of the location(s) to which it applied. If the waiver, exception, or modification is found to be consistent with the intent of the planning decision, it may be granted. If found inconsistent with the intent of the planning decision, a plan amendment would be required before the waiver, exception, or modification could be granted.

When considering the "no development" or "no leasing" option, a rigorous test must be met and fully documented in the record. This test must be based upon stringent standards described in the land use-planning document. Since rejection of all development rights is more severe than the most restrictive mitigation requirement, the record must show that consideration was given to development subject to reasonable mitigation, including "no surface occupancy." The record must also show that other mitigation was determined to be insufficient to adequately protect the public interest, a "no development" or "no leasing" decision should not be made solely because it appears that conventional methods of development would be unfeasible, especially where an NSO restriction may be acceptable to a potential permittee. In such cases, the potential permittee should have the opportunity to decide whether or not to go ahead with the proposal (or accept the use authorization), recognizing that an NSO restriction is involved.

MEMO OF BIA MITGATION REQUIREMENTS FOR OIL AND GAS DEVELOPMENT(BIA 2004)

UNITED STATES GOVERNMENT

MEMORANDUM

DATE: 21-Jan-04

REPLY TO: Laura E. Austin, Realty Officer
ATTN.: BIA. Wind River Agency, Ft. Washakie, WY

SUBJECT: Tom Brown Inc.'s proposal to drill well Tribal Juniper # 28-11

TO: Area Manager, Bureau of Land Management, Lander Resource Area

We have reviewed Tom Brown's surface use plan to drill as well described Tribal Juniper #28-11 located in the NW¼NW¼ of section 28, Township 1 North, Range 1 West, WRM, Fremont County Wyoming.

Dr. Charles Reher, Archeologist and Director of WRCRPP, conducted a survey with no significant cultural resources located. Therefore, archeological clearance is grated for the project.

The U.S. Fish & Wildlife have conducted a T&E survey of the area with no major impacts to the threatened and endangered species therefore we recommend approval.

All disturbed areas shall be reseeded with the following seed mixture.

Crintana Thickspike Wheatgrass	3 lbs./acre
Rosanna Western Wheatgrass	3 lbs./acre
Green Needlegrass	3 lbs./acre
Indian Ricegrass	3 lbs./acre

Seed is to be planted to a depth not to exceed ½ inch using a seed drill. Where hand broadcast method be utilized, seed mixture shall be doubles and the area raked or chained to cover seed. Fall planting is recommended for September through November before the ground freezes and spring planting is after ground frost and prior to May 15th.

Any questions may be directed to Floyd Phillips of the Branch of Realty, Minerals section at (307) 332-5605.

U.S. FISH AND WILDLIFE SERVICE AVOIDANCE AND MINIMIZATION MEASURES FOR THREATENED AND ENDANGERED SPECIES (USFWS 2004)

Black-Footed Ferret

Black-footed ferret surveys are no longer recommended in black-tailed prairie dog towns statewide or in white-tailed prairie dog towns, except those noted in a letter by the USFWS February 2, 2004. However it is recommended that prairie dog towns are protected due to their value to the prairie ecosystem and the myriad of species that rely on them. he USFWS encourages that the potentially disturbed prairie dog towns be analyzed for their value to future black-footed ferret reintroduction.

If white-tailed prairie dog towns or complexes greater than 200 acres will be disturbed, surveys for ferrets may be recommended in order to determine if the action will result in adverse effects to the species. Surveys are recommended even if only a portion of the white-tailed prairie dog town or complex identified in the letter from the February 2, 2004 letter will be disturbed. According to the Black-Footed Ferret Survey Guidelines (USFWS 1989), a prairie dog complex consists of two or more neighboring prairie dog towns les than 7km (4.3 miles) from each other. If a field check indicates that prairie dog towns may be affected, the USFWS office should be contacted for guidance on ferret surveys.

Bald Eagle

The USFWS recommends annual raptor surveys within 1 mile of the proposed disturbance. All known active bald eagle nests should be protected by a 1 mile disturbance-free buffer until the chicks are fully fledged. Known winter roost sites should also be afforded a 1 mile protective buffer. Surveys for winter roosts in suitable habitats are recommended.

Grizzly Bear

For areas where there is a potential for grizzly bear–human interaction, the USFWS strongly encourages the enforcement of food storage and garbage disposal stipulations. In addition, all on-site personnel should be aware of the protected status of the grizzly bear and appropriate personal safety measures and behavior in grizzly bear habitats. The USFWS recommends that the actions of the Operator comply with the *Interagency Grizzly Bear Guidelines* (1986) and the *Final Conservation Strategy for the Grizzly Bear in the Yellowstone Ecosystem* (2003).

Gray Wolves

Wolves are dependant on movements of the big game populations and many occur in large ungulate migration, wintering or parturition areas. During project activities wolves may change their use of project areas based upon changes to big game population numbers and changes in movement of herd. Project planning should consider impacts to big game population, including migration, wintering, or parturition areas.

Migratory Birds

Federal agencies are obligated to protect the many species of migratory bird, including, eagles and other raptors protected under the Migratory Bird Treaty Act (MBTA), 16 U.S.C 703 and Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668. The USFWS recommends habitat surveys within the project area to identify important migratory bird areas. Avoidance of these areas during the breeding season may significantly increase nesting success. In order to promote the conservation of migratory bird populations and their habitats, the USFWS recommends that federally agencies implement those strategies outlined in the Memorandum of Understanding directed by the President of the U.S under Executive Order 13186, where possible.

Wetlands and Riparian areas

Wetlands perform significant ecological functions as well as possess aesthetic and recreational values. The USFWS recommends that measures be taken to avoid and minimize wetland losses in accordance with Section 304 of the Clean Water Act and Executive Order 11990 (wetland protection). If wetlands may be destroyed or degraded by the proposed project, those wetlands in the project area should be inventoried and fully described in terms of their functions and values. Acreage of wetlands, by type, should be disclosed and specific actions should be outlined to avoid, minimize, and mitigate for all unavoidable wetland impacts.

Plans for mitigating unavoidable impacts to wetlands and riparian areas should included mitigation goals and objectives, methodologies, time frames for implementation, success criteria and monitoring to determine if the mitigation is successful. The mitigation plan should also include a contingency plan to be implemented should the mitigation not be successful. In addition, wetland restoration, creation, enhancement, and/or preservation does not compensate for loss of stream habitat streams and wetlands have different functions and provide different habitat values for fish and wild life resources.

REFERENCES

Interagency Grizzly Bear Committee. 1986. Interagency Grizzly Bear Guidelines. Missoula, MT. 100 pp.

Interagency Conservation Strategy Team. 2003. Final Conservation Strategy for the Grizzly Bear in the Yellowstone Ecosystem. Missoula, MT. 86 pp.

U.S. Fish and Wildlife Service. 2004. Letter from Brian Kelly (USFWS) to George Gover (BIA) commenting on Draft EIS for the Proposed Wind River Natural Gas Field Development Project. August 30, 2004.

APPENDIX D

RECLAMATION PLAN

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RECLAMATION PLAN

1.0 INTRODUCTION

The following erosion control, revegetation, mitigation measures, and management measures are designed to attain successful rehabilitation of areas disturbed within the Wind River Project Area (WRPA) as a result of the Proposed Action or Alternatives A, B, and C. These measures are designed to establish the feasibility of reclaiming disturbances associated with this project. The extent of possible disturbed areas to be reclaimed includes drill sites, access roads and pipeline ROW's, staging areas, and other ancillary facilities. The following measures apply to the Proposed Action and Alternatives A, B, and C unless identified for a specific alternative.

The measures presented in this plan are designed to allow the project to be constructed without significant impacts to natural resources. Because of the large geographic area covered by the project and the lack of site-specific locations of project facilities, these measures are presented in a general manner. Final selection of the measures to be applied at any given location, and modifications of these measures, will be identified by the agencies involved in coordination the Operators.

This reclamation plan outlines measures that will be taken to effectively reclaim areas disturbed during construction within the WRPA. These measures will be followed unless exceptions are granted or actions are modified by agreement between involved agencies and the Operators. These measures describe how natural gas development activities would be managed to assure compliance with the resource management goals and objectives for the general area, applicable lease and unit area stipulations, and resource limitations identified during interdisciplinary (ID) team analyses. Initial monitoring for compliance and successful implementation of the mitigation measures will be under the direction of the Operators. Final approval and release will be under the direction of the agencies involved.

Reclamation measures covered in this plan fall into two general categories: temporary and final reclamation. Temporary reclamation refers to measures applied to stabilize disturbed areas and to control runoff and erosion during time periods when application of final reclamation measures is not feasible or practicable. Final reclamation refers to measures that would be applied concurrently with completion of drilling and pipeline installation.

Reclamation potential may be limited by salinity, alkalinity, steep slopes, shallow soils, depth to bedrock, low precipitation, stoniness, high wind and water erosion, periodic flooding, short growing season, seasonably high water tables, and strong winds. Special intensive land-use practices may be necessary to mitigate salt and sediment loading caused by surface-disturbing activities within the WRPA. Activity plans (e.g., applications for permit to drill [APD's]) would address site-specific problems, including monitoring for salt and sediment loading (USDI-BLM 1990).

In general, temporary reclamation measures would be applied to all areas not promptly reclaimed to final conditions within a specified time period whether due to adverse weather conditions, inability to secure needed materials, and/or seasonal constraints. Temporary reclamation measures would be applied only as needed. In most cases, final reclamation measures would be applied concurrently as sections of the project are completed. Temporary reclamation measures may be applied more rigorously to sensitive areas such as drainage channel crossings, steep slopes, and areas prone to high wind and water erosion. Temporary reclamation measures would include returning the disturbed area to near pre-disturbance

contour, re-spreading salvaged topsoil, mulching, and placing runoff and erosion control structures.

Final reclamation measures, in general, involve returning the disturbed area to near pre-disturbance contour, re-spreading salvaged topsoil, applying soil amendments (if necessary), applying a prescribed seed mixture, mulching, and placing runoff and erosion control structures such as water bars and silt fences (Figure D-1). The duration of the resulting impacts to the various vegetation community types depends in part on the success of implementation of the reclamation measures prescribed in this appendix and the time required for natural succession to return disturbed areas to pre-disturbance conditions.

Because wetlands are "waters of the U.S." and are protected under the Federal Clean Water Act (CWA), discharge of dredge or fill material into, and/or excavation of wetlands could require administrative coordination with the U.S. Army Corps of Engineers (COE) pursuant to the CWA and may require a Section 404 permit. The COE, based on the exact nature of the disturbance activity, would determine the type of permit (Individual, Regional, or Nationwide) required according to the regulations presented in the Federal Register (1986). Avoidance of waters of the U.S. and wetlands would be the highest priority. A suitable wetland mitigation plan would be developed for the areas of wetlands directly impacted due to project activities where avoidance is not practicable. Impact minimization would include reducing the area of disturbance in wetland areas as well as utilizing procedures specified by authorizing agencies to cross intermittent and ephemeral drainage channels and wetland areas.

Although intermittent and ephemeral drainage channels are not considered wetlands, the same requirements apply to the discharge of dredge and fill into them as for discharge into wetlands. Residual wetland impacts that could occur, after maximum avoidance and/or impact minimization has been demonstrated, would be mitigated according to the following order of priority: 1) avoidance; 2) impact minimization; 3) mitigation in-kind, on-site; 4) mitigation in-kind, off-site; 5) mitigation out-of-kind, on-site; and 6) mitigation out-of-kind, off-site. In addition, the following modes of mitigation could be implemented for wetland mitigation if avoidance and impact minimization were not feasible: 1) wetlands restoration; 2) wetlands creation; and 3) wetlands enhancement. The wetlands mitigation plan would be designed to replace the area of impact and functional values associated with the disturbed area.

2.0 OBJECTIVES

This plan is designed to meet the following objectives for reclamation of the access road/pipeline ROW's and the drill sites:

Short-Term (Temporary) Reclamation:

- Immediately stabilize the disturbed areas by mulching (if needed), providing runoff and erosion control, and establishing new vegetation (required for problem areas; may be optional for other areas depending on consultation with the BIA).
- Control and minimize surface runoff, erosion, and sedimentation through the use of diversion and water treatment structures.

Long-Term (Final) Reclamation:

- Immediately stabilize the disturbed soil surface by mulching (if needed and as directed by the agencies involved), runoff and erosion control, and through the establishment of new vegetation. Adequate surface roughness would exist to reduce runoff and to capture rainfall and snow melt.
- Control and minimize surface runoff, erosion, and sedimentation through the use of diversion and water treatment structures.
- Restore primary productivity of the site and establish vegetation that will provide for natural plant and community succession.
- Establish a vigorous stand of desirable plant species that will limit or preclude invasion of undesirable species, including noxious weeds.
- Revegetate the disturbed areas with plant species useful to wildlife and livestock.
- Enhance aesthetic values. In the long-term, reclaimed landscapes would have characteristics that approximate the visual quality of adjacent areas, including location, scale, shape, color, and orientation of major landscape undisturbed features.

3.0 PERFORMANCE STANDARDS

The following performance standards would be used to determine the attainment of successful revegetation:

All Years:

- Protective cover. With the exception of active work areas, all disturbed highly erosive or sensitive areas to be left bare, unprotected, or unreclaimed for more than one month will have at least a 50 percent cover of protective material in the form of mulch, matting, or vegetative growth. All disturbed areas would have at least a 50 percent cover of protective material within six months after reclamation.

Second Year (Final Reclamation):

- Seedling density. The density and abundance of desirable species is at least three to four seedlings per linear foot of drill row (if drilled) or transect (if broadcast). Vegetative transects will be established on a permanent basis so that transects can be measured annually through the five-year monitoring period.
- Percent cover. Total vegetative cover will be at least 50 percent of predisturbance vegetative cover as measured along the reference transect for establishing baseline conditions.

By the Fifth Year (Final Reclamation):

- Percent cover. Total vegetation cover will be at least 80 percent of predisturbance vegetation cover as measured along the reference transect for establishing baseline conditions.
- Dominant species. Ninety percent of the revegetation consists of species included in the seed mix and/or occurs in the surrounding natural vegetation, or as deemed desirable by the BIA as measured along the reference transect for establishing baseline conditions.
- Erosion condition/soil surface factor. Erosion condition of the reclaimed areas is equal to or in better condition than that measured for the reference transect for establishing baseline conditions.

4.0 METHODS

4.1 DRILL SITE, ACCESS ROAD, AND PIPELINE RIGHT-OF-WAY CLEARING AND TOPSOIL REMOVAL AND STORAGE

Topsoil would be handled separately from subsoil materials. At all construction sites, topsoil would be stripped to provide for sufficient quantities to be respread to a depth of at least four to six inches over the disturbed areas to be reclaimed. In areas where deep soils exist (such as floodplains and drainage channel terraces), at least 12 inches of topsoil would be salvaged. Where soils are shallow or where subsoil is stony, as much topsoil would be salvaged as possible. Topsoil would be stockpiled separately from subsoil materials. Topsoil salvaged from drill sites and stored for more than one year would be bladed to a specified location at these areas, seeded with a prescribed seed mixture, and covered with mulch for protection from wind and water erosion and to discourage the invasion of weeds. Topsoil stockpiles would not exceed a depth of 2 feet. Topsoil would be stockpiled separately from other soil materials to preclude contamination or mixing and would be marked with signs and identified on construction and design plans. Runoff would be diverted around topsoil stockpiles to minimize erosion of topsoil materials. In most cases, disturbances will be reclaimed within one year. Therefore, it is unlikely that topsoil stockpiling for more than one year will be required. Salvaged topsoil from roads and drill sites will be respread over cut-and-fill surfaces not actively used during the production phase. Upon final reclamation at the end of the project life, topsoil spread on these surfaces will be used for the overall reclamation effort.

Operators are finding out that it is not always necessary to remove all vegetation and strip all topsoil within a pipeline ROW. In many areas, such as with deep soils on relatively flat smooth slopes with low gradients, it is possible to crush in-place rather than clear vegetation and leave topsoil in-place rather than blade and stockpile. This technique would reduce the magnitude and severity of disturbance impacts and hasten successful reclamation.

In federal jurisdictional wetland areas, vegetation would be cut off only to the ground level, leaving existing root systems intact. Cut vegetation would be removed from wetland areas for disposal. Grading activities would be limited to directly over pipeline trenches and access roads. At least 12 inches of topsoil would be salvaged and replaced except in areas with standing water or saturated soils. Use of construction equipment in wetland areas would be limited. Dirt, rock fill, or brush riprap would not be used to stabilize pipeline ROW's. If standing water or saturated soils are present, wide-track or balloon-tire construction equipment would be used or normal construction equipment would be operated on equipment pads or geotextile fabric overlain with gravel fill. Equipment pads would be removed immediately upon completion of construction activities. Trench spoil would be placed at least 10 feet away from drainage channel banks for all minor and major drainage channel crossings.

4.2 DRILL SITE, ACCESS ROAD, AND PIPELINE RIGHT-OF-WAY CONSTRUCTION

4.2.1 Upland Areas

Uplands include all areas away from wetlands and alluvial bottomlands or other areas that have excess soil moisture for prolonged periods or have shallow water tables. Construction would be accomplished following site-specific construction and design plans and applicable agency specifications. At drill sites, and along the areas of access road or pipeline ROW traversing

steep slopes, slope angles would be minimized to enhance retention of topsoil, and reduce erosion as well as facilitate revegetation, and subsequent reclamation success. Slope-stabilizing revetment structures may be necessary in areas where the subsurface materials are unconsolidated and loose and cannot be stabilized with revegetation and mulch.

Surface runoff would be controlled at all well sites through the use of interception ditches and berms. A berm approximately 18 inches high would be constructed around fill portions of these well sites to control and contain all surface runoff generated or fuel or petroleum product spills on the pad surface. Water contained on the drill pads would be treated in a retention pond prior to discharge into undisturbed areas in the same manner as discussed previously. This system would also serve to capture fuel and chemical spills, should they occur.

Erosion and sedimentation control measures and structures would be installed on all disturbed areas. Soil erosion control would be accomplished on sites in highly erosive soils and steep areas with mulching, netting, tackifiers, hydromulch, matting, and excelsior. The type of control measure would depend on slope gradients and the susceptibility of soil to wind and water erosion. Silt fences would be placed at the base of all steep fill slopes and sensitive disturbed areas. All runoff and erosion control structures would be inspected periodically, cleaned out, and maintained in functional condition throughout the duration of construction and drilling. Water bars would be constructed on cut-and-fill slopes exceeding 25 feet long and 10 percent gradient using the water bar spacing guidelines and procedures specified for access road and pipeline ROW runoff and erosion control (BLM Manual Section 9113).

Runoff and erosion control along access road/pipeline ROW'S would be accomplished by implementing standard cross drain, culvert, road ditch, and turnout design as well as timely mulching and revegetation of exposed cut, fill, and road shoulders. All culverts would be constructed with riprapped entrances and exits and with energy dissipaters or other scour-reducing techniques where appropriate. Water discharged from culverts, cross drains, road ditches, and turnouts would be directed into undisturbed vegetation away from all natural drainages. Erosion and sedimentation control measures and structures would be installed across all cut-and-fill slopes within 100 feet of drainage channels. All runoff and erosion control structures would be inspected after major runoff events and at a regular schedule. If found to be sub-standard, these structures would be cleaned out and maintained in functional condition throughout the life of the project.

4.2.2 Drainage Channel Crossings

Construction of drainage channel crossings would minimize the disturbance to drainage channels and wetlands to the extent practicable and would occur during the low runoff period (June 15 through March 1). Staging areas would be limited in size to the minimum necessary and would be located at least 50 feet from drainage channel bottoms, where topographic conditions permit. Hazardous materials would not be stored and equipment would not be refueled within 100 feet of drainage channels. Drainage channel crossings would be constructed as perpendicular to the axis of the drainage channel and at the narrowest positions as engineering and routing conditions permit. Clean gravel would be used for the upper one foot of fill over the backfilled pipeline trenches within drainage channel crossings.

4.2.3 Wetlands

Access roads and pipelines would be rerouted, and drill sites located, to avoid wetland areas to the maximum practical extent. The size of staging areas would be limited to the minimum necessary and all staging areas would be located at least 50 feet from the edge of federally delineated wetland areas, where topographic conditions permit. The width of the access road and pipeline construction ROW would be limited to no more than 50 feet. Hazardous materials would not be stored and equipment would not be refueled within 100 feet of wetland boundaries.

Appropriate permits would be secured from the COE prior to any construction activities in federal jurisdictional wetland areas.

4.3 SURFACE RUNOFF AND EROSION CONTROL

4.3.1 Drill Site, Access Road, and Pipeline Right-of-Way

Temporary Reclamation

Temporary erosion control measures may include application of mulch and netting of biodegradable erosion control blankets stapled firmly to the soil surface, respreading scalped vegetation, or construction of water bars. Reclamation measures are further discussed in Chapter 4, Soils with specific information pertaining to mulching. The actual distance of a pipeline/road ROW requiring stabilization on each side of a drainage channel would be determined on a site-specific basis. To minimize sedimentation of drainage channels and wetlands during the interim period between construction activity and final reclamation, temporary erosion and sediment control measures would be applied. Silt fences or other sediment filtering devices, such as weed-free straw bales, would be installed along drainage channel banks where sedimentation is excessive and at the base of all slopes adjacent to wetlands. Figure D-1 presents schematics of water bar and silt fence construction. Sediment filtering devices would be cleaned out and maintained in functional condition throughout the life of the project. To avoid the possibility of mulching materials entering waterways, loose mulch (i.e., mulch not crimped into the soil surface, tackified, or incorporated into erosion control blankets) would not be applied to drainage channel banks.

If construction is completed more than 30 days prior to the specified seeding season for perennial vegetation, areas adjacent to the larger drainage channels would be covered with jute matting for a minimum of 50 feet on either side of the drainage channel. In addition, to protect soil from raindrop impact and subsequent erosion, 2.0 tons/acre of weed-free straw mulch would be applied to all slopes greater than 10 percent. Temporary erosion control measures may include leaving the ROW in a roughened condition, respreading scalped vegetation, or applying mulch. As indicated by several operators and the BLM, weed-free straw mulch is difficult to obtain in quantities and at costs suitable for all reclamation applications. Although this circumstance could reduce the application of the measure, the effectiveness of mulch in protecting the exposed soil from raindrop impact, erosion, and off-site sedimentation would not be ignored. In addition to its effectiveness in erosion control, mulching also benefits the soil as a plant growth medium in many cases. Therefore, effective mulching is fundamental to reducing soil erosion to acceptable, non-significant levels.

Trench breakers would be used for pipeline construction in certain areas to prevent the flow of water in a trench that has been backfilled or temporarily left open. Trench breakers are particularly important in wetland areas to minimize subsurface drainage. Trench breakers would

be constructed such that the bottom of one breaker is at the same elevation as the top of the next breaker down slope, or every 50 feet, whichever is greater. Factors that control the application of trench breakers include: the proximity to drainage channels and wetland areas, slope gradient, proximity of areas to shallow groundwater, and surface runoff source areas that can discharge water into the trench. Topsoil would not be used to construct trench breakers.

If a pipeline crosses roads at the base of slopes, vegetative strips would be maintained. If vegetation is disturbed within these limits, temporary sediment barriers, such as silt fences and/or staked weed-free straw bales, would be installed at the base of the slope adjacent to the road crossing. Temporary sediment barriers would remain in-place until permanent revegetation measures have been judged successful.

Final Reclamation

Upland Areas

Control of runoff and erosion along all ROW'S would be accomplished by constructing sediment trapping devices (e.g., silt fences and straw bales) and water bars, as well as by timely mulching and revegetation of exposed disturbed areas. Runoff discharged from water bars would be directed into undisturbed vegetation away from all natural drainages. Erosion and sedimentation control measures and structures would be installed across all cut-and-fill slopes. All runoff and erosion control structures would be inspected after major runoff events and on a regular schedule. If found to be substandard or ineffective, these structures would be cleaned out and maintained in functional condition until successful revegetation and soil stability is attained.

Water bars would be constructed across sideslopes at appropriate intervals, according to slope gradient, immediately following recontouring of the disturbed areas. The spacing would depend on whether mulching is applied in conjunction with placement of water bars. Water bars would be maintained in functional condition throughout the life of the project. If the integrity of the water bar system is disrupted during seeding, water bars would be repaired and broadcast seeded with the seed raked into the soil. Water bars would be constructed according to hillslope topography at the slope gradient intervals as shown in Table D-1.

Water bars would be constructed 12 to 18 inches deep by digging a small trench and casting the soil material to the downhill side in a row. Each water bar would initiate in undisturbed vegetation upslope, traverse the disturbed area perpendicular to the ROW at a gradient between one and two percent, and discharge water into undisturbed vegetation on the lower side of the disturbed area.

Table D-1. Water Bar Intervals According to Slope Gradient.

With Mulching		Without Mulching	
Slope Gradient (percent)	**Interval (feet)**	**Slope Gradient (percent)**	**Interval (feet)**
10	150	10	100
15	100	15	75
20	50	20	45
30	40	30	40
40	35	40	35
50	30	50	30
>50	30	>50	30

Source: Based on Grah (1989).

Wetlands and Drainage Channel Crossings

Disturbance to the ephemeral and intermittent drainage channels would be avoided and/or minimized. All channel crossings not maintained for access roads would be restored to near predisturbance conditions. Drainage channel bank slope gradients would be regraded to conform with adjacent slope gradients. Channel crossings would be designed to minimize changes in channel geometry and subsequent changes in flow hydraulics. Culverts would be installed for ephemeral and intermittent drainage channel crossings. All drainage channel-crossing structures would be designed to carry the 25- to 50-year discharge event as directed by the BLM. Silt fences would be constructed at the base of slopes at all drainage channel crossings. Minor routing variations would be implemented during access road, pipeline, and drill site layout to avoid washes. The area of disturbance in the vicinity of washes would be minimized. A 500-foot-wide buffer strip of natural vegetation would be maintained between all construction activities and drainage channels.

Trench plugs would be employed at non-flumed drainage crossings to prevent diversion of drainage channel flows into upland portions of pipeline trenches during construction. Application of riprap would be limited to areas where flow conditions prevent vegetative stabilization; riprap activities must comply with COE permit requirements. Pipeline trenches would be dewatered in such a manner that no silt-laden water flows into active drainage channels (i.e., prior to discharge the water would be filtered through a silt fence, weed-free straw bales, or allowed to settle in a sediment detention pond).

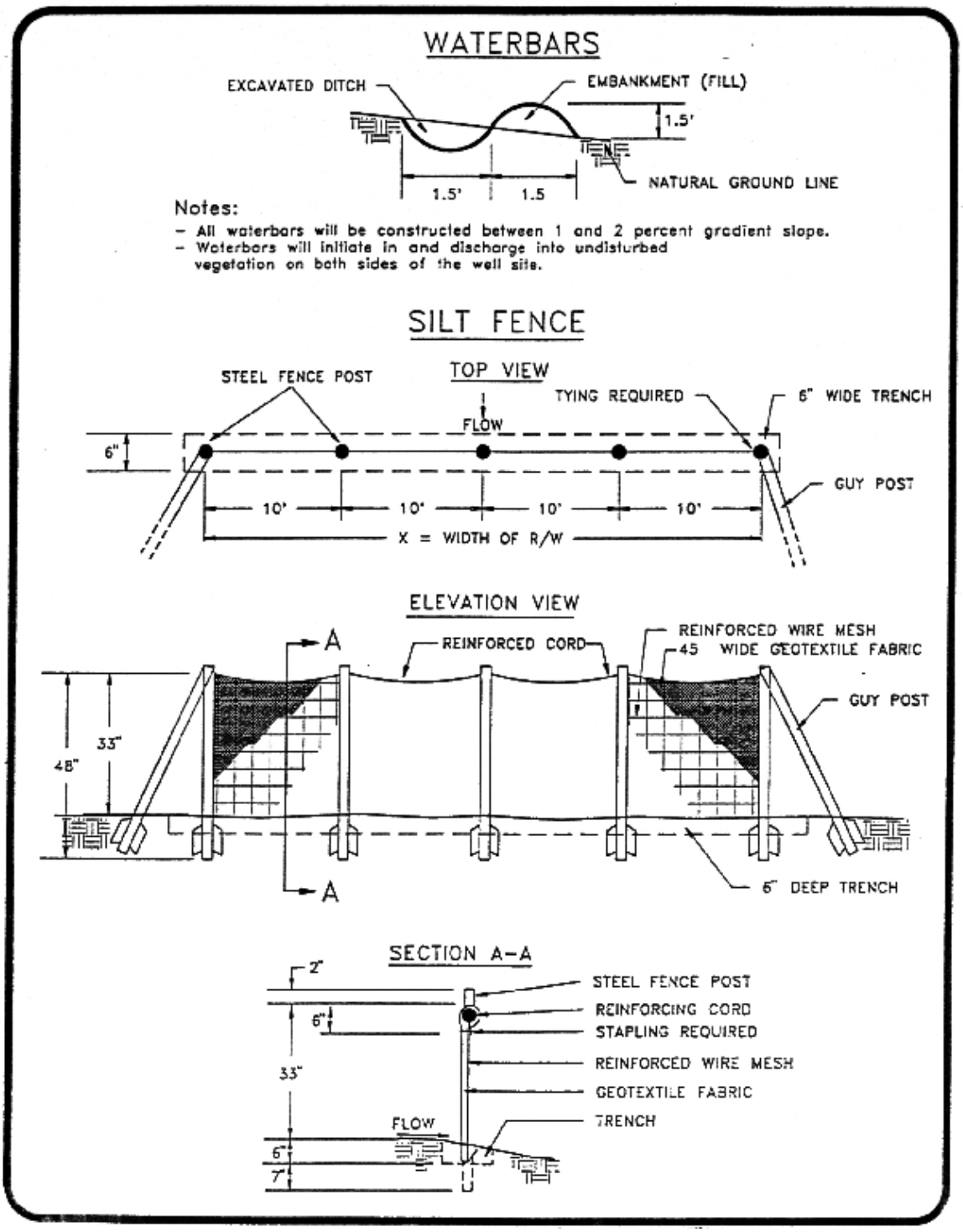

Figure D-1. Water Bar Construction and Silt Fence Construction.

4.4 FINAL RECLAMATION

4.4.1 Topsoil Re-spreading and Seedbed Preparation

In preparation for seeding, topsoil that was initially removed would be evenly spread over the pipeline ROW, staging areas, cut-and-fill surfaces, and all areas of other sites not required for production purposes.

Soil compaction could result from heavy equipment working on disturbed soils prior to revegetation. Therefore, compaction is likely to occur under most situations. Soil compaction can inhibit adequate revegetation of disturbance areas. Therefore, all disturbances to be revegetated will be ripped to reduce the adverse effect of compaction. All disturbed areas would be ripped on 18- to 26-inch spacing and 12 to 16 inches deep. A spring tooth harrow equipped with utility or seedbed teeth, or ripper-teeth equipment mounted behind a large crawler tractor or patrol would be used to loosen the subsoil. The subsoil surface would be left rough. After topsoil has been respread and if it is loose, it would be compacted with a cultipacker or similar implement to provide a firm seedbed. On steep slopes (greater than 40 percent and highly erosive), it may be difficult or impossible to replace topsoil and adequately prepare the seedbed. The disturbed areas on steep slopes would be ripped as described above. These areas would then be mulched with a hydromulch/seed/tackifier mix. Erosion control blankets with seed incorporated into the matting would be installed per manufacturer's specifications to enhance soil stabilization.

4.4.2 Seed Application

Upon completion of final grading, soil surfaces would either be seeded, or erosion control measures would be used until the site is seeded. Late fall is typically a good time of year to seed, however timing of seeding would be adjusted depending upon weather, soil moisture conditions, and the plant species being used. The seedbed would be prepared to a depth of three to four inches where possible to provide a firm seedbed. If hydroseeding or broadcast seeding is employed, the seedbed would be scarified to ensure good seed-soil contact. The seed mixtures presented in Tables D-2 through D-5, or a similar mix, would be applied according to the pure live seed (PLS) rates and drilling depths specified, to areas along the road and pipeline ROW, staging areas, and unused areas of drill sites that have been retopsoiled.

Seed would be used within 12 months of viability testing. Legume species purchased commercially must have been properly inoculated with nitrogen-fixing bacteria. Seed would be planted in the fall (after September 31) or no later than late fall (mid-November) prior to snow accumulation to avoid seed germination and breaking of dormancy and to prevent seedling frost damage; or in early spring (prior to May 15). Seed would preferably be planted with drill-type equipment such as a rangeland drill or brillion seeder. Where the microtopography of the disturbed areas does not allow drill-type equipment, seed would be broadcast applied at twice the application rate of drilled seed. A spike-toothed harrow or similar equipment would be used where ripping has been insufficient to provide cover for the broadcast seed.

Any soil disturbance that occurs outside the recommended permanent seeding season, or any bare soil left unstabilized by revegetation, would be treated as a winter-construction problem and mulching would be considered.

The seed mixtures presented in Tables D-2 through D-5, or similar mixtures, would be applied according to specific areas identified to be homogeneous in terms of overall ecosystem

similarities such as precipitation zones, elevational zones, dominant species herbaceous cover, soil types, and inherent limitations in reclamation success potential. Specifically, Seed Mixture #1 (Table D-2) would be applied to disturbances in the sagebrush-dominated mixed desert shrub and juniper woodland community types. Seed Mixture #2 (Table D-3) would be applied to disturbances in the more moist alkaline mixed desert shrub community types. Seed Mixture #3 (Table D-4) would be applied to greasewood-dominated mixed desert shrub communities in alkaline valley bottoms and bluffs. Seed Mixture #4 (Table D-5) would be applied to disturbances in wet meadow community types. These seed mixes were developed based on the following criteria: 1) site-specific conditions of the analysis area; 2) usefulness of species in rapid site stabilization; 3) species' success in revegetation efforts; and 4) current seed costs and availability. Native plant species would be used, and final seed mixes applied in the revegetation effort would be designed in coordination with the agencies involved.

Final determination of the appropriate seed mixture would be developed on a site-specific basis at the time of field review of the facility. Seeding rates may be varied to enhance the probability for maintaining the natural balance of species. Watershed protection must be emphasized when reclaiming disturbed areas. The composition of rare and native species, if encountered, would be taken into consideration at the time of seeding. However, appropriate measures must be taken to ensure that an adequate protection of the soil surface is maintained. Areas not exhibiting successful revegetation throughout the area disturbed by the project would be re-seeded until an adequate cover of vegetation is established. Private and agricultural lands would be seeded with similar seed mixes unless the landowner requests different mixes.

4.4.3 Mulching

In sensitive sites where significant erosion (e.g., large areas of disturbance or areas with high erosion rates) is most likely to occur, the seeded access road/pipeline ROW, staging areas, and the portion of the drill pads not needed for production purposes would be mulched following seeding to protect the soil from wind and water erosion, raindrop impact, surface runoff, noxious weed invasion, and to hold the seed in place. The exposed surface of disturbed areas, including topsoil stockpiles, may be protected by placing crimped straw mulch, hydromulch, biodegradable plastic netting and matting, or biodegradable erosion control blankets.

Table D-2. Seed Mixture[1] #1 - Mixed Desert Shrub, Badlands, and Juniper Woodland Community Types.

Species	Cultivar or Variety	Seed Application Drilled Rate (pls[2] lbs/ac)	Planting Depth (if drilled) (inches)
Grasses			
Western wheatgrass (*Agropyron smithii*)	Rosanna	2.0	0.5
Bluebunch wheatgrass (*Agropyron spicatum*)	Secar	2.0	0.5
Bottlebrush squirreltail (*Sitanion hystrix*)	-	2.0	0.5
Indian ricegrass (*Oryzopsis hymenoides*)	Nezpar	2.0	0.5
Needle-and-Thread (*Stipa comata*)	-	2.0	0.5
Forbs			
Gooseberryleaf globemallow (*Sphaeralcea grossulariaefolia*)	-	1.0	0.5
Cicer milkvetch (*Astragalus cicer*)	Monarch	1.0	0.5
Shrubs			
Wyoming big sagebrush (*Artemisia tridentata*)	-	0.5	0.25
Antelope bitterbrush (*Purshia tridentata*)	-	1.0	0.5
Fourwing saltbush *(Atriplex canescens*)	-	1.0	0.5
TOTAL		**14.5**	

[1] Seed mix based on adaptation to the site conditions of the project, usefulness of species for rapid site stabilization, species success in revegetation efforts, and current seed availability and cost.

[2] PLS = pure live seed.

Table D-3. Seed Mixture[1] #2 - Moist Alkaline Areas in the Mixed Desert Shrub Community Type.

Species	Cultivar or Variety	Seed Application Drilled Rate (pls[2] lbs/ac)	Planting Depth (if drilled) (inches)
Grasses			
Spike Muhly (*Muhlenbergia wrightii*)	El Vado	2.0	0.5
Alkaligrass (*Pucinellia distans*)	Fults	5.0	0.5
Alkali sacaton (*Sporobolus airoides*)	Salado	3.0	0.5
Forbs			
Strawberry clover (*Trifolium fragiferum*)	O'Connors, Salina	2.0	0.5
Shrubs			
Fourwing saltbush (*Atriplex canescens*)	-	1.0	0.5
Shadscale (*Atriplex confertifolia*)	-	1.0	0.5
TOTAL		**14.0**	

[1] Seed mix based on adaptation to the site conditions of the project, usefulness of species for rapid site stabilization, species success in revegetation efforts, and current seed availability and cost.

[2] PLS = pure live seed.

Table D-4. Seed Mixture[1] #3 - Greasewood-Dominated Valley Bottoms and Bluffs.

Species	Cultivar or Variety	Seed Application Drilled Rate (pls[2] lbs/ac)	Planting Depth (if drilled) (inches)
Grasses			
Western wheatgrass (*Agropyron smithii*)	Rosanna	3.0	0.5
Pubescent wheatgrass (*Agropyron tricophorum*)	Luna	2.0	0.5
Alkali sacaton (*Sporobolus airoides*)	-	2.0	0.25
Russian wildrye (*Elymus junceus*)	Vinall	2.0	0.25
Forbs			
Cicer milkvetch (*Astragalus cicer*)	Monarch	3.0	0.5
Shrubs			
Fourwing saltbush (*Atriplex canescens*)	-	1.0	0.5
Gardner saltbush (*Atriplex gardneri*)	-	1.0	0.5
Winterfat (*Ceratoides lanata*)	-	1.0	0.5
TOTAL		**15.0**	

[1] Seed mix based on adaptation to the site conditions of the project, usefulness of species for rapid site stabilization, species success in revegetation efforts, and current seed availability and cost.

[2] PLS = pure live seed.

Table D-5. Seed Mixture[1] #4 - Wet Meadow Community Types.

Species	Cultivar or Variety	Seed Application Drilled Rate (pls[2] lbs/ac)	Planting Depth (if drilled) (inches)
Grasses			
Spike muhly (*Muhlenbergia wrightii*)	El Vado	2.0	0.5
Redtop (*Agrostis stolonifera*)	-	1.0	0.5
Tufted hairgrass (*Deschampsia cespitosa*)	-	4.0	0.25
Forbs			
Red clover (*Trifolium pratense*)	Kenland	2.0	0.5
Strawberry clover *(Trifolium fragiferum*)	O'Connors, Salina	2.0	0.5
TOTAL		**13.0**	

[1] Seed mix based on adaptation to the site conditions of the project, usefulness of species for rapid site stabilization, species success in revegetation efforts, and current seed availability and cost.
[2] PLS = pure live seed.

All sensitive disturbed areas would be mulched immediately following seeding with 1.5 to 2.0 tons/acre of weed-free straw mulch. Mulching materials would be free of noxious and undesirable plant species, as defined by state or county lists. Hay mulch may be used, but it would be applied only if cost-competitive and if crimped into the soil. Straw mulch is more desirable than hay mulch because it is generally less palatable to wild horses, wildlife, and livestock. Additionally, there tends to be a higher risk of introducing undesirable species and noxious weeds with a hay mulch such as smooth brome, timothy, orchardgrass, and other minor species. The lessee would maintain all disturbances relatively weed-free for the life of the project through implementation of a noxious weed monitoring and eradication program.

Wherever utilized, mulch would be spread uniformly so that at least 75 percent of the soil surface is covered. If a mulch blower is used, the straw strands would not be shredded less than eight inches in length to allow effective anchoring. On slopes less than 30 percent, straw mulch would be applied by a mechanical mulch blower at a rate of 2.0 tons/acre after seeding. The mulch would be crimped into the soil surface using a serrated disc crimper. Where broadcast straw mulch is applied on windswept slopes, a biodegradable plastic netting would be staked firmly to the soil surface over the mulch following the manufacturer's specifications. On slopes in excess of 40 percent or on slopes exceeding the operating capabilities of machinery, hydromulch or biodegradable erosion control blankets with seed incorporated into the netting would be applied and staked firmly to the soil surface.

Where utilized, hydromulch and tackifier would be applied at a rate of 1,500 lbs/acre. In general, erosion control and soil stabilization are directly related to the amount of mulch applied. Under certain conditions where degradation processes are slow (e.g., in extremely hot or cold dry climates), a trade-off between the degree of effectiveness of mulch and long-term degradation would be considered. In extremely dry areas where mulch degradation may be

slow, mulching rates would be reduced to 1.0 to 1.5 tons/acre. Special measures may need to be implemented in areas with sandy soils.

On steeper slopes with highly erodible, shallow, rocky soils, and/or on windswept areas with loose, unconsolidated materials, the above recommended measures may not be sufficient to reduce erosion to non-significant levels. Incorporating a custom blend of seed into erosion control blankets would be used for stabilizing these areas. This method has proven cost-effective in many cases, with 98 percent of the cost being the blanket itself. The additional cost of incorporating seed into the blanket will average $1.00 to $1.50 per blanket, depending upon current seed costs. In most cases, this additional cost would offset the repeated efforts of broadcast seeding, manual raking of seeds into the soil, and mobilizing a labor force. The final measure(s) to be implemented in such areas would be determined by agreement between the agencies involved and the Operators.

4.4.4 Livestock Control

Livestock grazing would be monitored on and along all drill sites, access roads, and pipeline ROWs. If grazing negatively impacts revegetation success, measures would be taken to immediately remove livestock from the newly reclaimed areas. Depending upon site-specific evaluations, it may be necessary to temporarily fence off certain riparian areas and wetlands to prevent excessive livestock grazing and trampling to enhance drainage channel bank stabilization and overall revegetation success. Existing livestock control structures, such as fences and cattle guards, would be maintained in functional condition during all phases of the project. Where access requires the disruption of an existing fence, a cattle guard would be installed at the junction.

4.4.5 Off-Road Vehicle Control

Off-road vehicle control measures would be installed and maintained following the completion of seeding. Examples of practicable measures include a locking, heavy steel gate with fencing extending a reasonable distance to prevent bypassing the gate, with appropriate signs posted; a slash and timber barrier; a pipe barrier; a line of boulders; or signs posted at all points of access at intervals not to exceed 2,000 feet indicating "This Area Seeded for Wildlife Benefits and Erosion Control."

4.4.6 Fugitive Dust Control

If fugitive dust is generated during construction of the drill sites, access road/pipeline ROWs, or staging areas become a problem, dust abatement measures would be implemented. Such procedures could include applying water or water with additives (e.g., magnesium chloride) to the construction area at regular intervals.

4.5 MONITORING AND MAINTENANCE

4.5.1 General

A designated official or responsible party would annually inspect and review the condition of all drill sites, access road/pipeline ROWs, and any other disturbed areas associated with the project. This official would assess the success of and prognosis for all runoff and erosion control and revegetation efforts, evaluate fugitive dust control needs, and recommend remediation measures, if necessary. In addition, monitoring would take place following each major runoff event. Photographs would be taken at drill sites and along access roads at specific areas each year to document the progress of the reclamation program at established photomonitoring points.

The following specific items would be monitored during inspections:

- Revegetation success
- Sheet and rill erosion, gullies, slumping, and subsidence
- Soundness and effectiveness of erosion control measures
- Sediment filtering devices along all active ephemeral and intermittent drainage channels
- Water quality and quantity
- Noxious weed invasion
- Degree of rodent damage on seed and seedlings
- Locations of unauthorized off-highway vehicle (OHV) access
- Soundness and effectiveness of OHV control structures
- Evidence of livestock or wildlife grazing
- Overgrazing/trampling of riparian and wetland areas

4.5.2 Reclamation Success Monitoring

Reclamation success would be based upon the objectives specified in this plan. Therefore, monitoring would be tied to these objectives. The actual monitoring procedures for quantitative and qualitative evaluations of reclamation success would be implemented as specified by the authorizing agencies.

Reclamation success would be monitored in the short-term (temporary reclamation) and in the long-term (final reclamation). Monitoring of temporary reclamation measures would include visual observations of soil stability, condition, and effectiveness of mulching and runoff and erosion control measures, and a quantitative and qualitative evaluation of revegetation success, where appropriate. Long-term reclamation monitoring would include visual observations of soil stability, condition of the effectiveness of mulching and runoff and erosion control measures, and a quantitative and qualitative evaluation of revegetation success.

Revegetation success would be determined through monitoring and evaluation of percent ground cover to include a measure of vegetation cover (by species), litter/mulch, rock/gravel, and bare ground. Ground cover would be documented at each 1-foot interval along a 100-foot line intercept transect. Seedling density and relative abundance would be determined by selection of plots at the 20-, 40-, 60-, and 80-foot marks on the transect. Grazing impacts would be assessed as an ocular estimate of the percent utilization along the transect.

Soil stability would be measured using an erosion condition class/soil surface factor rating

method to numerically rate soil movement, surface litter, surface rock, pedestalling, flow patterns, and rill-gully formation. Information obtained through this rating system represents an expression of current erosion activity and can be used to reflect revegetation success as a function of soil stability.

The access road boundaries, pipelines, and unused portions of the drill sites would be monitored until attainment of 80 percent of predisturbance vegetative cover within five years of seeding. This standard would include 90 percent of the vegetative cover being comprised of desirable species and the erosion condition of the reclaimed area being equal to or in better condition than predisturbance conditions as described in Section 3.1.

4.5.3 Wetland and Drainage Channel Crossings

Wetland areas and natural drainage channel crossings would be monitored for a minimum of three years for noxious weed invasion and establishment of undesirable species. Noxious weeds and undesirable species would not be allowed to establish at any time. Noxious weeds would be removed if they were found in a reclaimed wetland or drainage channel crossing. At the third year of monitoring, presence of undesirable species would be negligible. The lessee would maintain wetland areas and drainage channel crossings according to this standard throughout the development of a noxious weed and undesirable species monitoring and eradication program.

4.5.3 Photomonitoring

Permanent photomonitoring points would be established at appropriate vantage locations that provide adequate visual access to drill sites, along pipeline and access road ROWs, and to ancillary facilities. Each photomonitoring point would be permanently marked with re-bar and identified on a topographic map of the area. The location of each point would be described in detail to assist in relocation from year to year. Photos would be taken at each photomonitoring point prior to initiation of construction. Photos, framing the same scene as previously taken, would be taken each year until reclamation standards have been met.

APPENDIX E

HAZARDOUS MATERIALS MANAGEMENT PLAN

1.0 INTRODUCTION

The Wind River Project Area (WRPA) producing operators, including mainly Tom Brown, Inc., but also include Samson Resources Co. and Saba Energy of Texas (hereafter referred to as "the Operators"), propose to explore and develop oil and natural gas reserves in the Wind River Project Area of Fremont County, Wyoming. The Bureau of Indian Affairs (BIA) has prepared an Environmental Impact Statement (EIS) for the proposed project, and this Hazardous Material Management Summary (HMMS), which is included as an appendix to the EIS, provides further specific information regarding the types and quantities of hazardous and extremely hazardous materials that are expected to be produced or used for the proposed project. Detailed descriptions of the Proposed Action and alternatives, the potential environmental consequences, and proposed mitigation and monitoring measures are provided in the EIS.

This HMMS is provided pursuant to BLM Instruction Memoranda Numbers WO-93-344 and WY-94-059, which require that all National Environmental Policy Act (NEPA) documents list and describe any hazardous and/or extremely hazardous materials that would be produced, used, stored, transported, or disposed of as a result of a proposed project. Hazardous materials, as defined herein, are those substances listed in the Environmental Protection Agency's (EPA's) *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986*, and extremely hazardous materials are those identified in the EPA's *List of Extremely Hazardous Substances* (40 Code of Federal Regulations [CFR] 355). Materials identified on either of these lists that are expected to be used or produced by the proposed project are discussed herein.

A list of hazardous and extremely hazardous materials that are expected to be produced, used, stored, transported, or disposed of as a result of the Wind River Gas Field Development Project was obtained from WRPA operators, along with Material Safety Data Sheets (MSDS) for all chemicals, compounds, and/or substances which may be used during the construction, drilling, completion, and production operations of the proposed project. The Operators have reviewed the aforementioned EPA lists, as amended, and all materials included on either of these two lists that would be used or produced by the proposed project were identified.

Some potentially hazardous materials that may be used in small, unquantifiable amounts have been excluded from this HMMS. These materials may include: wastes, as defined by the Solid Waste Disposal Act; wood products' manufactured items and articles which do not release or otherwise result in exposure to a hazardous material under normal conditions of use (i.e., steel structures, automobiles, tires, etc.); food, drugs, tobacco products, and other miscellaneous substances (i.e., WD-40, gasket sealants, glues, etc.). No unauthorized use or disposal of these materials by project personnel would occur during project implementation, and all project personnel would be directed to properly dispose of these materials in an appropriate manner. Solid wastes generated at well locations would be collected in approved waste facilities (e.g., dumpsters), and each well location would be provided with one or more such facilities during drilling and completion operations. Solid wastes would be regularly removed from well locations and transported off the WRPA to approved disposal facilities.

2.0 HAZARDOUS MATERIALS

A listing of all relevant known hazardous and extremely hazardous materials that are expected to be used, produced, stored, transported, or disposed of during project implementation is provided herein. Where possible, the quantities of these materials have been estimated on a per-well basis and their use, storage, transport, and disposal methods described.

2.1 PRODUCTION PRODUCTS

The purpose of the proposed project is to extract natural gas from the Fort Union, Lance, Meeteetse, Mesaverde and Wind River Formations and other formations underlying the WRPA. Water would also be produced as a by-product of gas and oil extraction operations. Table E-1 lists and quantifies, where possible, the hazardous and extremely hazardous materials that may be found in these production products.

2.1.1 Natural Gas

Natural gas, primarily containing methane, ethane, and carbon dioxide, would be produced from ***approximately 250*** wells at rates averaging ***0.4 million*** cubic feet per day (mmcfd) per well. No extremely hazardous materials are anticipated to be produced with the gas stream; however, the hazardous material hexane (CAS Number 110-54-3) would be present in the gas stream at volumes ranging from approximately ***4 to 24 thousand*** cubic feet per day (mcfd) per well (Table E-1). In addition, the gas would also likely contain small amounts of potentially hazardous polycyclic organic matter and polynuclear aromatic hydrocarbons. No other hazardous materials are known to occur within the natural gas stream.

The majority of gas produced from WRPA wells would be transported from each location through newly constructed pipelines linking well locations to existing or newly constructed gas processing facilities. The natural gas would eventually be delivered to consumers for combustion. Small quantities of natural gas may be vented or flared at certain well locations during well testing operations. During testing, produced gas would be vented or flared into a flare pit pursuant to BLM/BIA/Wyoming Oil and Gas Conservation Commission (WOGCC) rules and regulations (Notice to Lessees [NTL]-4A). BLM or WOGCC approval would be obtained prior to flaring or venting operations. No natural gas storage is anticipated under the proposed project.

Industry standard pipeline equipment, materials, techniques, and procedures in conformance with all applicable regulatory requirements would be employed during construction, testing, operation, and maintenance of the project to ensure pipeline safety and efficiency. All necessary authorizing actions for natural gas pipelines would be addressed prior to installation. These actions include:

- Fremont County special use permits,
- BIA rights-of-way (ROWs) applications,
- BOR (Bureau of Reclamation) special use permits,
- Conformance with U.S. Department of Transportation (DOT) pipeline regulations (49 CFR 191-192), and
- Wyoming Public Service Commission Certificates to act as common carrier for natural gas.

Table E-1. Hazardous and Extremely Hazardous Materials Potentially Produced by the WRPA Natural Gas Project, Fremont County, Wyoming, 2003.

PRODUCTION PRODUCT	Hazardous Constituents[1]	Extremely Hazardous Constituents[2]	Approximate Qauntity Produced per Well[3]
Natural Gas	-- Hexane PAHs[4] POM[5]	None	0.4 mmcfd 4-24 mcfd
Condensates	-- PAHs POM	None	252 gpd
Produced Water	-- Lead Cadmium Chromium Radium 226 Uranium	None	168 gpd

1 The hazardous constituents listed are, to the best of our present knowledge, those that are or may be present in the production products and are listed under the EPA's *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986*, as amended.

2 Extremely hazardous materials are those defined in 40 CFR 355.

3 mmcfd = million cubic feet per day.
mcfd = thousand cubic feet per day.
gpd = gallons per day.

4 PAHs = polynuclear aromatic hydrocarbons.

5 POM = polycyclic organic matter.

2.1.2 Condensate

Condensate would be produced with the gas stream at most of the proposed wells. Condensates primarily consist of long chain hydrocarbon liquids (e.g., octanes), but may also contain variable quantities of the following hazardous materials: polycyclic organic matter and polynuclear aromatic hydrocarbons. No other hazardous or extremely hazardous materials are known to be present in the condensates. The volume of condensate produced from Wind River Area wells is anticipated to be approximately ***252*** gallons per day (gpd) from most wells (Table E-1).

Condensate would be stored in tanks at well locations and centralized facilities, and all tanks would be bermed to contain the entire storage capacity of the largest tank plus 10% as mandated by the EPA. Condensate would be periodically removed from storage tanks and transported by truck, in adherence to DOT rules and regulations, off the WRPA. All necessary authorizing actions for the production, storage, and transport of condensates, including the Oil Pollution Act of 1990 (storage of >1,000,000 gal) as necessary, would be addressed prior to the initiation of condensate production activities.

2.1.3 Produced Water

Produced water from The WRPA wells is anticipated to range in volume from ***0 to 630*** gpd, and would average approximately ***168*** gpd for most wells (Table E-1). Produced water quality from wells within the WRPA is variable and would be monitored periodically. Based on water quality analyses of produced water samples from several WRPA wells, no hazardous or extremely hazardous materials are known to occur.

Produced water would be stored in tanks at well locations and centralized facilities and would periodically be removed and transported by truck to the existing EPA permitted Class II Tribal disposal well. Where applicable, National Pollutant Discharge Elimination System (NPDES) permits would be obtained from the EPA, and produced water that meets applicable standards would be discharged to the surface at appropriate locations. All necessary authorizing actions would be met prior to the disposal of produced water including:

- BLM/BIA approval of disposal methodologies,
- RCRA compliance as necessary,
- EPA Water Quality Division approval of wastewater disposal,

2.2 CONSTRUCTION, DRILLING, PRODUCTION, AND RECLAMATION

Known hazardous and extremely hazardous materials planned for use during typical construction, drilling, production, and reclamation operations for the proposed project are listed in Table E-2 and are described in detail below. Hazardous and extremely hazardous materials planned for use during project implementation fall into the following categories:

- Fuels,
- Lubricants,
- Coolant/antifreeze and heat transfer agents,
- Drilling fluids,
- Fracturing fluids,
- Cement and additives, and
- Miscellaneous materials.

2.2.1 Fuels

Gasoline (CAS 8006-61-9), diesel fuel (CAS 68476-30-2), and natural gas are the fuels proposed for use on the project, and all contain materials classified as hazardous. Gasoline would be used to power vehicles providing transportation to and from Riverton; diesel fuel would be used to power transport vehicles, drilling rigs, and construction equipment, and as a component of fracturing fluids (see Section 2.2.5); and natural gas would be used to power pipeline compressor stations.

Table E-2. Hazardous and Extremely Hazardous Materials Potentially Utilized During Construction, Drilling, Production, and Reclamation Operations by the Wind River Project Area, Fremont County, Wyoming.

Source	Hazardous Constituents[1]	Extremely Hazardous Constituents[2]	Approximate Quantity Used Per Well[3]
Fuel			
Gasoline	Benzene Toluene Ethyl benzene p-xylene m-xylene PAHs POM Tetraethyl lead		24,940 gal
Diesel Fuel	Benzene Toluene Ethylbenzene p-xylene m-xylene o-xylene Naphthalene PAHs POM	None	27,400 gal
Natural Gas	Hexane PAHs POM	None	
Lubricants	PAHs POM Lead Cadmium Manganese Barium Zinc Lithium	None	8 gal
Coolant/Antifreeze and Heat Transfer Agents	Ehylene glycol Triethylene glycol	None	180 gal 330 gal
Drilling Fluid Additives			
Caustic Soda	Sodium hydroxide	None	650 lbs
Lime	Fine mineral fibers	None	3,500 lbs
Mica	Fine mineral fibers	None	600 lbs
Uni-Drill	Acrylamide	None	50 gal

Uni-Gel	Fine mineral fibers	None	43,500 lbs
Unibar	Barium compounds	None	8,200 lbs
Fracturing Fluid Additives			
LGC-VI w/diesel fuel	Benzene Toluene Ethylbenzene p-xylene m-xylene o-xylene Naphthalene PAHs POM	None	953 gal
OPTI-FLO III	Glycol ether	None	144 lbs
SSO-21	Methanol Glycol Ether	None	15 gal
CL-29	Formic acid Ammonium chloride Zirconium nitrate Zirconium sulfate	None	59 gal
BA-20	Acetic acid	None	38 gal
Sand	Fine mineral fibers	None	2,994 lbs
Cement and Additives	Fine mineral fibers PAHs POM	None	>10,000 lbs
Miscellaneous Materials	Methanol Corrosion inhibitors	None	3,000 gal

[1] The hazardous constituents listed are, to the best of our present knowledge, those that are or may be present in the production products and are listed under the EPA's *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986*, as amended.

[2] Extremely hazardous materials are those defined in 40 CFR 355.

[3] lb = pounds
gal = gallons.

[4] PAHs = polynuclear aromatic hydrocarbons.

[5] POM = polycyclic organic matter.

2.2.1.1 Gasoline

Gasoline would be used to power vehicles traveling to and from the WRPA. The hazardous and extremely hazardous materials likely to be found in gasoline are listed in Table E-2. The hazardous materials present in gasoline include: benzene (CAS 71-43-2), toluene (CAS 108-88-3), ethylbenzene (CAS 100-41-4), p-xylene (CAS 106-42-3), m-xylene (CAS 108-38-3), o-xylene (CAS 95-47-6), (CAS 1634-04-4), polynuclear aromatic hydrocarbons, and polycyclic organic matter. Leaded gasoline contains tetraethyllead (CAS 78-00-2), which is listed as an extremely hazardous material (Table E-2).

2.2.1.2 Diesel Fuel

Diesel fuel would be used to power transport vehicles, drilling rigs, and construction equipment. The hazardous and extremely hazardous materials likely to be found in diesel fuel are listed in Table E-2. The hazardous materials present in diesel fuel include: benzene (CAS 71-43-2), toluene (CAS 108-88-3), ethylbenzene (CAS 100-41-4), p-xylene (CAS 106-42-3), m-xylene (CAS 108-38-3), o-xylene (CAS 95-47-6), (CAS 1634-04-4), naphthalene (CAS 91-20-3), polynuclear aromatic hydrocarbons, and polycyclic organic matter.

2.2.1.3 Natural Gas

An unknown volume of natural gas would be burned to provide power for the natural gas compressor stations required for efficient pipeline function. The natural gas used to power compressor stations would be produced by the proposed project, and hazardous materials contained in this natural gas are identified in Table E-2. Further detail on the transportation of natural gas as a result of the proposed project, and relevant authorizing actions for natural gas transportation, is provided in Section 2.1.1.

2.2.2 Lubricants

Various lubricants, including: motor oils, hydraulic oils, transmission oils, compressor lube oils (8 gal/well), and greases, would be utilized for project-required vehicles, rigs, compressors, and other machinery. Some of these lubricants would likely contain polynuclear aromatic hydrocarbons and polycyclic organic matter, and some may additionally contain compounds of lead, cadmium, nickel, copper, manganese, barium, zinc, and/or lithium. No extremely hazardous materials are known to be present in the lubricants required for the proposed project.

The quantity of each lubricant used, stored, transported, and disposed of is unknown; however, all lubricants would be used, stored, transported, and disposed of following manufacturer's guidelines. Disposal of rags contaminated with lubricants would be in accordance with local, State, and federal requirements. No unauthorized disposal of lubricants (e.g., disposal of used motor oil) would occur in the WRPA.

2.2.3 Coolant/Antifreeze and Heat Transfer Agents

Ethylene glycol (CAS 107-21-1) and triethylene glycol (CAS 112-27-6) would be utilized as coolant/antifreeze and heat transfer agents in association with this project (Table E-2). Ethylene glycol would be used as an engine coolant/antifreeze in automobiles, construction equipment, gas dehydrators, and drilling and workover rigs. An unspecified volume of this hazardous material would be stored and transported in engine radiators. In addition, both ethylene glycol and triethylene glycol would be used as heat transfer fluids during well completion and maintenance

operations. The estimated quantity of ethylene glycol required per well for completion and maintenance operations is approximately 180 gallons for the life of the project. The quantity of triethylene glycol required would range from approximately 290 to 370 gallons/well. While the total volume of ethylene glycol to be used, stored, transported, and disposed of for the proposed project is unknown, any disposal of ethylene glycol and/or triethylene glycol would be conducted in accordance with all relevant federal and state rules and regulations.

2.2.4 Drilling Fluids

Water-based muds (drilling fluids) would be used for drilling each well. Drilling fluids consist of clays and other additives that are used in standard industry procedures. Drilling fluid additives to be utilized for the proposed project include: caustic soda (650 lbs/well), cedar fibers (200 lbs/well), lime (3,500 lbs/well), mica (600 lbs/well), Uni-Drill (50 gal/well), Uni-Gel (43,500 lbs/well), UNIBAR (8,200 lbs/well), and paper (400 lbs/well) (Table E-2). All drilling operations would be conducted in compliance with applicable BLM/BIA, WOGCC, and WDEQ rules and regulations.

All known hazardous materials present in the proposed drilling fluids and additives are listed in Table E-2. These materials are: sodium hydroxide (CAS 1310-73-2), present in caustic soda; acrylamide (CAS 79-06-1), present in Uni-Drill (partially hydrolyzed polyacrylamide); barium compounds, present in UNIBAR (barium sulfate); and fine mineral fibers, present in lime, mica, and Uni-Gel (sodium montmorillonite or barite). No hazardous materials are known to occur in sawdust or paper, and no extremely hazardous materials are known to be present in any of the drilling fluids and additives.

Drilling fluid additives would be transported to well locations during drilling operations in appropriate sacks and containers in compliance with DOT regulations. Drilling fluids, cuttings, and water would be stored in reserve pits, and pits would be fenced to protect wildlife from exposure. Netting (1 inch mesh), to protect waterfowl, other birds and bats, and pit liners, to protect shallow groundwater aquifers, would be used on all reserve pits as deemed appropriate by the BLM.

When the reserve pit is no longer required, its contents would be evaporated or solidified in place, and the pit backfilled, as approved by the BLM. All reserve pit solidification procedures using flyash or other BLM/BIA approved materials would be approved by the BLM or WOGCC and/or WDEQ prior to implementation. If the pH of pit residue is very high following solidification, off-site disposal may be required. In this event, or if other unanticipated contamination circumstances arise, reserve pit contents would be removed and disposed of at an appropriate facility in a manner commensurate with all relevant state and federal regulations.

2.2.5 Fracturing Fluids

Hydraulic fracturing is expected to be performed at some Wind River wells to augment gas flow rates. Approximately 78,700 gallons of fracturing fluids, consisting primarily of fresh water, would be required per well for the proposed project. Fracturing fluid additives and their approximate volumes include: LGV-VI with diesel fuel (953 gal/well), GEL-STA (150 lbs/well), OPTI-FLO III (144 lbs/well), CLAYFIX II (157 lbs/well), SSO-21 (15 gal/well), CL-29 (59 gal/well), BA-20 (38 gal/well), SP BREAKER (27 lbs/well), GBW-30 (9 lbs/well), BE-5 microbiocide (36 lbs/well), and sand (299,400 lbs/well) (Table E-2).

The hazardous materials present in fracturing fluid components are listed in Table E-2 and include: benzene, toluene, ethylbenzene, p-xylene, m-xylene, o-xylene, naphthalene, polynuclear aromatic hydrocarbons, and polycyclic organic matter contained in LGC-VI with diesel fuel (hydrocarbon gel

concentrate); glycol ether present in OPTI-FLO III and SSO-21; methanol (CAS 67-56-1) present in SSO-21; formic acid (CAS 64-18-6), ammonium chloride (CAS 12125-02-9), zirconium nitrate (CAS 13746-89-9), and zirconium sulfate (CAS 14644-61-2) present in CL-29; acetic acid (CAS 64-19-7) present in BA-20; and fine mineral fibers present in sand. No hazardous materials are known to be present in GEL-STA (sodium salt), CLAYFIX II (alkylated quaternary chloride), SP BREAKER (sodium persulfate), GBW-30 (cellulase enzyme carbohydrate), and BE-5 (5-chloro-2-methyl-4-isothiazolin-3-one, 2-methyl-4-isothiazolin-3-one, a microbiocide). No extremely hazardous materials are known to be present in any of the fracturing fluid additives.

Fracturing fluids and additives would be transported to well locations in bulk (e.g., LGC-VI with diesel fuel, sand) or in appropriately designed and labeled containers (e.g., OPTI-FLO III in 50 lb fiber drums; SSO-21, CL-29, and BA-20 in 55 gal drums). All transportation of fracturing fluids and additives would be in adherence with DOT rules and regulations.

During fracturing, fluids are pumped under pressure down the well bore and out through perforations in the casing into the formation. The pressurized fluid enters the formation and induces hydraulic fractures. When the pressure is released at the surface, a portion of the fracturing fluids would be forced to the well bore and up into a tank. The fracturing fluids would then be transferred to lined reserve pits and evaporated, or hauled away from the location and reused or disposed of at an authorized facility. Decisions regarding the appropriate disposal of fracturing fluids would be made by the BLM on a case-by-case basis.

2.2.6 Cement and Additives

Well completion and abandonment operations would entail cementing and plugging various segments of the well bore to protect freshwater aquifers and other down-hole resources. Materials potentially used for cementing operations include: cement, calcium hydroxide, calcium chloride, pozzlans, sodium bicarbonate, potassium chloride, and insulating oil. An unknown quantity of cement and additives, which may contain the hazardous material classes of fine mineral fibers, polycyclic organic matter, and polynuclear aromatic hydrocarbons, would be transported in bulk to each well site by a qualified cement supply company. Small quantities may be transported and stored on-site in 50-pound sacks. Wells would be cased and cemented as directed and approved by the BLM (for federal minerals) and WOGCC (for state and patented minerals). No extremely hazardous materials are known to be present in the cement and additives proposed for use in this project.

2.2.7 Miscellaneous Materials

Miscellaneous materials, potentially containing hazardous and/or extremely hazardous materials, that may be used for the proposed project include: methanol and corrosion inhibitors. The material would be transported to the site by qualified service and supply companies and would be used and disposed of following manufacturer's guidelines.

An unknown quantity of methanol would be used to de-ice well bores and as a hydrate deterrent during completion and natural gas transport operations. Methanol is a listed hazardous chemical and would be stored, transported, used, and disposed of in adherence with all applicable federal and state rules, regulations, and guidelines.

2.3 COMBUSTION EMISSIONS

Combustion emissions from gasoline and diesel engines, as well as flaring natural gas, will occur as a result of this project. The complete oxidation of hydrocarbon fuels yields only carbon dioxide and water as combustion products; however, complete combustion is seldom achieved. Unburned hydrocarbons, particulate matter (e.g., carbon, metallic ash), carbon monoxide, nitrogen oxides, and possibly sulfur oxides would be expected as direct exhaust contaminants. Secondary contaminants would likely include the formation of ozone from the photolysis of nitrogen oxides. A listing of the hazardous and extremely hazardous materials potentially present in combustion emissions is provided in Table E-3.

Unburned hydrocarbons may contain potentially hazardous polynuclear aromatic hydrocarbons, and particulate matter may contain metal-based particulates from lead anti-knock compounds in the fuel, metallic lubricating oil additives, and engine wear particulates (Table E-3). Hazardous materials in the particulate matter may therefore include compounds of lead, cadmium, nickel, copper, manganese, barium, zinc, and /or lithium.

Nitrogen dioxide (CAS 10102-44-0), sulfur dioxide (CAS 7446-09-5), sulfur trioxide (CAS 7446-11-9), and ozone (CAS 10028-15-6) are probable combustion emissions, all classified as extremely hazardous materials. These materials would be either directly released in minor quantities from internal combustion engines, or would be formed through photolysis (i.e. ozone). No releases of these or other materials would occur in excess of those allowed for Prevention of Significant Deterioration Class II areas, WDEQ-Air Quality Division Implementation Plan; nor would releases occur that jeopardize National Ambient Air Quality Standards for Wind River. Particulate matter emissions and larger unburned hydrocarbons would eventually settle out on the ground surface, whereas gaseous emissions would react with other air constituents as components of the nitrogen, sulfur, and carbon cycles.

Table E-3. Hazardous and Extremely Hazardous Materials Potentially Present in Combustion Emissions of the Wind River Project Area, Fremont County, Wyoming, 2003.

Emission	Hazardous Constituents[1]	Extremely Hazardous Constituents[2]
Hydrocarbons	PAHs	None
Particulate Matter	Lead Cadmium Nickel Copper Manganese Barium Zinc Lithium	None
Gases	Nitrogen dioxide Sulfur dioxide Sulfur trioxide Ozone	Nitrogen dioxide Sulfur dioxide Sulfur trioxide Ozone

[1] The hazardous constituents listed are, to the best of our present knowledge, those that are or may be present in the production products and are listed under the EPA's *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986*, as amended.

[2] Extremely hazardous materials are those defined in 40 CFR 355.

[3] PAHs = plynuclear aromatic hydrocarbons.

3.0 MANAGEMENT POLICY AND PROCEDURE

WRPA Operators and their contractors would ensure that all production, use, storage, transport, and disposal of hazardous and extremely hazardous materials as a result of the proposed project would be in strict accordance with all applicable existing, or hereafter promulgated federal, state, and local government rules, regulations, and guidelines. All project-related activities involving the production, use, and/or disposal of hazardous or extremely hazardous materials would be conducted in such a manner as to minimize potential environmental impacts.

WRPA Operators would comply with emergency reporting requirements for releases of hazardous materials. Any release of hazardous or extremely hazardous substances in excess of the reportable quantity, as established in 40 CFR 117, would be reported as required by the *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980,* as amended. The materials for which such notification must be given are the extremely hazardous substances listed under the *Emergency Planning and Community Right to Know* Section 302 and the hazardous substances designated under Section 102 of CERCLA, as amended. If a reportable quantity of a hazardous or extremely hazardous substance is released, prompt notice of the release would be given to the BLM's Authorized Officer and all other appropriate federal and state agencies. Additionally, notice of any spill or leakage (i.e. undesirable event), as defined in BLM NTL-3A, would be given by DFPA Operators to the Authorized Officer and other such federal and state officials as required by law.

WRPA Operators have evaluated field operations in the WRPA and have or would prepare and implement multiple plans and/or policies to ensure environmental protection from hazardous and extremely hazardous materials. These plans/policies would be available for review at the Tom Brown Inc., Riverton, Wyoming field office. These plans/policies include, where applicable:

- Spill prevention and control countermeasure plans;
- Oil/condensate spill response plans;
- Inventories of hazardous chemical categories pursuant to Section 312 of the SARA, as amended; and
- Emergency response plans.

Development operations in the Wind River Area would be in compliance with regulations promulgated under the Resource Conservation and Recovery Act (RCRA), Federal Water Pollution Control Act (Clean Water Act), Safe Drinking Water Act (SWDA), Toxic Substances Control Act (TSCA), Occupational Safety and Health Act (OSHA), and the Federal Clean Air Act (CAA). In addition, project operations would also comply with all attendant state rules and regulations relating to hazardous material reporting, transportation, management, and disposal. Table E-4 provides a generic list of hazardous chemical categories for the oil and gas exploration and production industry.

Table E-4. Generic List of Hazardous Chemical Categories for the Oil and Gas Exploration and Production Industry.

Hazardous Chemical Category (With Examples of Representative Chemicals	Physical and Health Hazards
Acetylene Gas (CAS#74-86-2)	Fire, sudden release of pressure
Acids Hydrochloric acid (<30%)(CAS#7647-01-0) Hydrofluoric acid (<12%)(CAS#7664-39-3) Sulfuric acid (CAS#7664-93-9)	Immediate (Acute)
Alkalinity and pH Control Materials Calcium hydroxide (CAS#1305-62-0) Potassium hydroxide (CAS#1310-58-3) Soda ash (CAS#497-19-8) Sodium bicarbonate (CAS#144-55-8) Sodium carbonate (CAS#497-19-8) Sodium hydroxide (CAS#1310-73-2)	Immediate (Acute)
Biocides Amines Glutaraldehyde (CAS#111-30-8) Isopropanol (CAS#67-63-0) Thiozolin	Immediate (Acute), Fire
Breakers Ammonium persulfate (CAS#7727-54-0) Benzoic acid (CAS#65-85-0) Enzyme Sodium acetate (CAS#127-09-3) Sodium persulfate (CAS#7772-27-1)	Immediate (Acute), Fire
Buffers Sodium acetate (CAS#127-09-3) Sodium bicarbonate (CAS#144-55-8) Sodium carbonate (CAS#497-119-8) Sodium deacetate	Immediate (Acute)
Cement Additives - Fluid Loss Cellulose polymer Latex	Immediate (Acute)
Cement Additives - Miscellaneous Cellulose flakes (CAS#9004-34-6) Coated aluminum Gilsonite (CAS#12002-43-6) Lime (CAS#1305-78-8) Long chain alcohols	Immediate (Acute)
Cement Additives - Retarders Cellulose polymer Lignosulfonates	Immediate (Acute)

Hazardous Chemical Category (With Examples of Representative Chemicals	Physical and Health Hazards
Cement Additves - Weight Modification Barite (CAS#7727-43-7) Bentonite Diatomaceous earth (CAS#68855-54-9) Fly ash Glass beads Hematite (CAS#1317-60-8) Ilmenite Pozzolans	Immediate (Acute)
Chloride Salts Calcium chloride Potassium chloride Sodium chloride (CAS#7647-14-5) Zinc chloride (CAS#7646-85-7)	Immediate (Acute)
Chlorine Gas (CAS#7782-50-5)	Immediate (Acute), Sudden release of pressure
Corrosion Inhibitors 4-4' Methylene dianiline (CAS#101-77-9) Acetylenic alcohols Amine formulations Ammonium bisulfite (CAS#10192-30-0) Basic zinc carbonate (CAS#3486-35-9) Gelatin Ironite sponge (CAS#1309-37-1) Sodium chromate (CAS#7775-11-3) Sodium dichromate (CAS#10588-01-9) Sodium polyacrylate Zinc lignosulfonate Zinc oxide (CAS#1314-13-2)	Immediate (Acute), Delayed (chronic), Fire
Crosslinkers Boron compounds Organo-metallic complexes	Immediate (Acute), Fire
Defoaming Agents Aluminum stearate Fatty acid salt formation Mixed alcohols Silicones	Immediate (Acute)

Hazardous Chemical Category (With Examples of Representative Chemicals	Physical and Health Hazards
Deflocculants Acrylic polymer Calcium lignosulfonate Chrome-free lignosulfonate Chromium lignosulfonate Iron lignosulfonate Quebracho Sodium acid pyrophosphate (SAPP) Sodium hexametaphosphate (CAS#10124-56-8) Sodium phosphate (oilfos) Sodium tetraphosphate Stryene, maleaic anhydride co-polymer salt Sulfo-methylated tannin	Immediate (Acute)
Detergents/Foamers Amphoteric surfactant formulation Ethoxylated phenol Detergents	Immediate (Acute), Fire
Explosives Charged well jet perforating gun, Class C explosives Detonators, Class A explosives Explosive power device, Class B	Sudden release of pressure
Filtration Control Agents Acrylamide AMPS copolymer Aniline formaldehyde copolymer hydrochlorite Causticized leonardite Sulfomethylated phenol formaldehyde Leonardite Partially hydrolyzed polyacrylamide Polyalkanolamine ester Polyamine acrylate Polyanionic cellulose Potassium lignite Preserved starch Sodium carboxymethyl cellulose (CAS#9004-32-4) Starch (CAS#9005-25-8) Vinylsulfonate copolymer	Immediate (Acute)
Flocculants Anionic polyacrylamide	Immediate (Acute)
Fluoride Generating Compounds Ammonium bifluoride (CAS#1341-49-7) Ammonium fluoride (CAS#12125-0108)	Immediate (Acute)
Friction Reducers Acrylamide methacrylate copolymers Sulfonates	Immediate (Acute)

Hazardous Chemical Category (With Examples of Representative Chemicals	Physical and Health Hazards
Fuels Diesel (CAS#68476-34-6) Fuel oil Gasoline (CAS#8006-61-9)	Immediate (Acute), Delayed (Chronic), Fire
Gelling Agents Cellulose and guar derivatives	Immediate (Acute)
Hydrogen Sulfide (CAS#7783-06-4)	Immediate (Acute), Fire
Inert Gases Carbon dioxide (CAS#124-38-9) Nitrogen (CAS#7727-37-9)	Immediate (Acute), Sudden release of pressure
Lost Circulation Materials Cane fibers Cedar fibers Cellophane fibers Corn cob Cottonseed hulls Mica (CAS#12001-26-2) Nut shells Paper Rock wool Sawdust	Immediate (Acute)
Lubricants, Drilling Mud Additives Graphite (CAS#7782-42-5) Mineral oil formulations Organo-fatty acid salts Vegetable oil formulations Walnut shells	Immediate (Acute)
Lubricants, Engine Motor oil Grease	Immediate (Acute)
Miscellaneous Drilling Additives Diatomaceous earth (CAS#68855-54-9) Oxalic acid (CAS#144-62-7) Potassium acetate (CAS#127-08-2) Zinc bromide (CAS#7699-45-8)	Immediate (Acute), Delayed (Chronic)
Odorants Mercaptans, aliphatic	Immediate (Acute)

Hazardous Chemical Category (With Examples of Representative Chemicals	Physical and Health Hazards
Oil Based Mud Additives Amide polymer formulations Amine treated lignite Asphalt Diesel (CAS#68476-34-6) Gilsonite (CAS#12002-43-6) Mineral oil Organophilic clay Organophilic hectorite Petroleum distillate (CAS#8030-30-6) Polymerized organic acides Sulfonate surfactant	Immediate (Acute), Delayed (Chronic), Fire
Organic Acids Acetic acid (CAS#64-19-7) Acetic anhydride (CAS#108-24-7) Benzoic acid (CAS#65-85-0) Citric acid (CAS#5949-29-1) Formic acid (CAS#64-18-6) Organic acid salts	Immediate (Acute), Fire
Preservatives Dithiocarbamates Paraformaldehyde (CAS#30525-89-4) Isothiazions	Immediate (Acute)
Produced Hydrocarbons Condensate Crude oil (CAS#8002-05-9) Natural Gas	Immediate (Acute), Delayed (Chronic), Fire, Sudden release of pressure
Proppants Bauxite (CAS#1318-16-7) Resin coated sand Zirconium proppant	Immediate (Acute)
Radioactive, Special Form Cesium 137 (encapsulated) logging tool	Delayed (Chronic)
Resin and Resin Solutions Melamine resins Phenolic resins Polyglycol resins	Immediate (Acute), Fire

Hazardous Chemical Category (With Examples of Representative Chemicals	Physical and Health Hazards
Salt Solutions Aluminum chloride (CAS#7446-70-0) Ammonium chloride (CAS#12125-02-9) Calcium bromide (CAS#17626-99-8) Calcium chloride (CAS#10035-04-8) Calcium sulfate (CAS#778-18-9) Ferrous sulfate (CAS#7782-63-0) Potassium chloride(CAS#7447-40-7) Sodium chloride (CAS#7647-14-5) Sodium sulfate (CAS#7757-82-6) Zinc bromide (CAS#7699-45-8) Zinc chloride (CAS#7646-85-7) Zinc sulfate	Immediate (Acute)
Scale Inhibitors Ethylenediaminetetraacetic acid (EDTA) (CAS#60-00-4) Inorganic phosphates Isopropanol (CAS#67-63-0) Nitrilotriacetic acid (NTA) (CAS#139-13-9) Organic phosphates Polyacrylate Polyphosphates	Immediate (Acute), Fire
Shale Control Additives Hydrolyzed polyacrylamide polymer Organo-aluminum complex Polyacrylate polymer Sulfonated asphaltic residuum	Immediate (Acute)
Silica	Immediate (Acute), Delayed (Chronic)
Solvents 1,1,1-Trichloroethane (CAS#71-55-6) Acetone (CAS#67-64-1) Aliphatic hydrocarbons Aromatic naphtha (CAS#8032-32-4) Carbon tetrachloride (CAS#56-23-5) Diacetone alcohol Ethylene glycol monobutyl ether (CAS#111-76-2) Kerosene (CAS#8008-20-6) Isopropanol (CAS#67-63-0) Methyl ethyl ketone (MEK) (CAS#78-93-3) Methyl isobutyl ketone (MIBK) (CAS#108-10-1) Methanol (CAS#67-56-1) t-Butyl alcolhol (CAS#75-65-0) Toluene (CAS#108-88-3) Turpentine (CAS#8006-64-2) Xylene (CAS#1330-20-7)	Immediate (Acute), Delayed (Chronic), Fire

Hazardous Chemical Category (With Examples of Representative Chemicals	Physical and Health Hazards
Spotting Fluids Nonoil base spotting fluid Oil base spotting fluid (diesel oil base) Oil base spotting fluid (mineral oil base) Sulfonated vegetable ester	Immediate (Acute), Fire
Surfactants - Corrosive Alcohol ether sulfates Amines Quarternary polyamine Sulfonic acids	Immediate (Acute)
Surfactants - Flamable Amines Ammonium salts Fatty alcohols Isopropanol (CAS#67-56-1) Oxylalkylated phenols Petroleum naphtha (CAS#8030-30-6) Sulfonates	Immediate (Acute), Fire
Surfactants - Miscellaneous Amine salts Glycols Phophonates	Immediate (Acute)
Temporary Blocking Agents Benzoic acid (CAS#65-85-0) Naphthalene (CAS#91-20-3) Petroleum wax polymers Sodium chloride (CAS#7647-14-5)	Immediate (Acute)
Viscosifiers Attapulgite Bentonite Guar gum (CAS#9000-30-0) Sepiolite Xantham gum	Immediate (Acute)
Weight Materials Barite (CAS#7727-43-7) Calcium carbonate (CAS#1317-65-3) Galena Hematite (CAS#1317-60-8) Siderite	Immediate (Acute)

APPENDIX F

WILDLIFE MONITORING/PROTECTION PLAN

WILDLIFE MONITORING/PROTECTION PLAN

Prepared for:
Bureau of Indian Affairs
Wind River Agency
Fort Washakie, Wyoming

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Littleton, Colorado

November 2004

APPENDIX F: WILDLIFE MONITORING/PROTECTION PLAN

WILDLIFE MONITORING/PROTECTION PLAN

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ABBREVIATIONS AND ACRONYMS

ANS	Artificial Nesting Structure
APD	Application for Permit to Drill
APLIC	Avian Power Line Interaction Committee
BA	Biological Assessment
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BO	Biological Opinion
CSU	Controlled Surface Use
EIS	Environmental Impact Statement
GIS	Geographic Information System
LOP	Life-of-Project
LFO	Lander Field Office
PMZ	Primary Management Zone
ROW	Right-of-Way
T&E	Threatened and Endangered Species
USFWS	U.S. Fish and Wildlife Service
WGFD	Wyoming Game and Fish Department
WRIR	Wind River Indian Reservation
WRPA	Wind River Project Area
WYNDD	Wyoming Natural Diversity Database

1. 0 WILDLIFE MONITORING/PROTECTION PLAN

1.1 INTRODUCTION

This Wildlife Monitoring/Protection Plan was prepared in conjunction with the Environmental Impact Statement (EIS) for the Wind River Natural Gas Field Development Project, Freemont County, Wyoming. The goal of the plan is to avoid or minimize adverse impacts to wildlife by monitoring and protecting wildlife populations and associated habitat in the Wind River Project Area (WRPA). Implementation of the plan will allow managers and project personnel opportunities to achieve and maintain desired levels of wildlife productivity and populations on the WRPA (e.g., at pre-project levels) by avoiding or minimizing potential adverse impacts to wildlife species. In addition, the implementation of this plan will facilitate the maintenance of a diverse assemblage of wildlife populations on the WRPA simultaneously with the development of natural gas reserves.

The Proposed Action for the Wind River Natural Gas Field Development Project involves the development of a maximum of 325 new wells at 325 well locations and associated facilities (roads, pipelines, compressor stations) in the WRPA over the next 20 years. The proposed life-of-project (LOP) is estimated to be from 20 to 40 years. Alternative development strategies also have been proposed (i.e., Alternative A, Alternative B, and Alternative C (No Action)). A complete description of the proposed project and alternatives is provided in Chapter 2of this EIS.

Proposed inventory, monitoring, and protection measures will be implemented under each potential development scenario, unless information revealed in the coordinated review of annual wildlife reports indicates these measures are unnecessary for wildlife protection. The wildlife monitoring/protection plan will not be implemented under the No Action Alternative.

Implementation of the plan will begin after the publication of the Record of Decision and continue for 10 years. However, the plan may be terminated at the end of any year when there is sufficient evidence that wildlife populations in the WRPA have been successfully protected. The plan will be reviewed for effectiveness every five years, or as determined by the Review Team.

2.1 IMPLEMENTATION PROTOCOL

This section provides a preliminary wildlife inventory, monitoring, and protection protocol for the WRPA. A summary of primary protocol components, including inventory and monitoring requirements are provided in Table F-1. Additional inventory, monitoring, and protection measures are provided in Table F-2, if needed, for areas with high levels of development. Standard protocol for Application for Permit to Drill (APD) and right-of-way (ROW) application field reviews are provided in Table F-3. Alternative protocols may be developed in the future in response to specific needs identified in annual wildlife reports. The wildlife species and/or categories for which specific inventory, monitoring, and protection procedures will be applied were developed based on concerns expressed by agencies and the public identified during the preparation of this EIS.

Considerable effort will be required by the agencies and Operators (i.e., Saba Energy of Texas, Samson Resources Company, Tom Brown Inc.) for plan implementation. The proposed data collection methods are consistent with current agency activities. Additionally, during annual planning and throughout project implementation, all efforts will be made to accommodate agency personnel schedules and responsibilities, and cost-sharing approaches will be considered such that public demands and statutory directives are achieved (BLM 2000).

2.1.1 Annual Reports and Meetings

During project development, the Operators will provide an updated description of project plans (i.e., locations, size, and associated work force) for the Wind River Project Area (WRPA) and will be submitted to the BIA by the Operators no later than October 15 of each year. This information will be coupled with wildlife inventory, monitoring, and protection data obtained from the previous year. Wildlife survey, monitoring, and protection data, collected by contractors or other agencies, will be requested by the BIA by October 15 of each year. Upon receipt of these data, annual reports will be prepared by the BIA and submitted to Operators, USFWS, WGFD, and other interested parties no later than December 15 of each year. A one-day meeting of the Review Team will be organized by the BIA and held in January/February of the following year to discuss and modify, as necessary, the proposed wildlife inventory, monitoring, and protection protocol for the subsequent field season.

A final report will be issued to all interested parties by February/March of each year. Annual reports will summarize wildlife inventory and monitoring results; note any trends across years (if available); identify and assess protection measures implemented during past years; specify monitoring and protection measures proposed for the upcoming year; and recommend modifications to the existing wildlife monitoring/protection plan based on the success and/or failures of past years (e.g., identification of additional species to monitor).

Where possible, the data presented in reports will be used to identify potential correlations between development and wildlife productivity and/or abundance. Addendum F-1 provides examples for the tabular presentation of data within annual reports; however, it should be noted that the final report format will be determined by the BIA. Raw data collected each year also will be provided to other management agencies (e.g., WGFD, USFWS, Wyoming Natural Diversity Database [WYNDD]), at the request of those agencies.

Additional reports may be prepared in any year, as necessary, to comply with other relevant laws and regulations (e.g., bald eagle wintering surveys). Additional meetings will be held, as necessary, in any given year by the BIA, Operators, WGFD, and USFWS, Lander to inform interested parties on the findings of the annual reports (BLM 2000).

APPENDIX F: WILDLIFE MONITORING/PROTECTION PLAN

Table F-1: Summary of Wildlife Inventory and Monitoring, Wind River Project Area, Fremont County, Wyoming

Action	*Timing*	*Responsible Entity[1,2]*
Raptor nest inventories (WRPA plus one mile buffer)	Every 5 years during April-May	USFWS/WGFD
Raptor productivity monitoring (in the WRPA plus a one-mile buffer).	Every 5 years during March to mid-July.	USFWS/WGFD
Aerial greater sage-grouse lek inventories (WRPA plus a two-mile buffer).	Every 5 years during March-April	USFWS/WGFD
Greater sage-grouse lek attendance monitoring on and within two-miles of the WRPA.	Annually during March to mid-May	USFWS/WGFD
Greater sage-grouse winter habitat inventory and monitoring within and adjacent to the WRPA	As required, during December-February	USFWS/WGFD
Big game crucial winter range use monitoring (within the WRPA plus a one-mile buffer, or as determined by the Review Team)	No crucial winter ranges present in WRPA	USFWS/WGFD
Gray wolf productivity monitoring (within the WRPA plus a two-mile buffer, or as determined by the Review Team)	Annually during March – May (Note: only rare incidental observations recorded to-date)	USFWS/WGFD
Gray wolf winter productivity monitoring (within the WRPA plus a two-mile buffer, or as determined by the Review Team)	Annually during December – February (Note: only rare incidental observations recorded to date)	USFWS/WGFD
Grizzly bear population monitoring (within the WRPA plus a two-mile buffer, or as determined by the Review Team)	Annually during April-June (Note: only rare incidental observations recorded to date)	USFWS/WGFD

[1] USFWS inventories wildlife on WRIR.
[2] WGFD inventories wildlife on BOR surface.

Table F-2: Additional Wildlife Inventory and Monitoring Measures in and Adjacent to Areas with High Levels of Development, Wind River Project Area, Fremont County, Wyoming

Action	*Timing*	*Responsible Entity*[1,2]
Raptor nest inventory/monitoring on areas with a large number of wells per section, plus a one-mile buffer and selected reference areas.	Annually during April and May	USFWS/WGFD
Raptor productivity monitoring on areas with a large number of wells per section, plus a one-mile buffer and selected undeveloped reference areas.	Annually during March-July	USFWS/WGFD
Selected sensitive species inventory/monitoring on suitable habitat in areas with a large number of wells per section plus a one-mile buffer and selected undeveloped reference areas.	Annually during spring and summer	USFWS/WGFD
Aerial greater sage-grouse lek inventory on areas with a large number of wells per section plus a two-mile buffer and selected undeveloped comparison areas.	Annually during March-April.	USFWS/WGFD
Greater sage-grouse lek attendance monitoring on areas with a large number of wells per section plus a two-mile buffer and selected undeveloped reference areas.	Annually during March to mid-May.	USFWS/WGFD
Greater sage-grouse winter habitat inventory and monitoring in areas with a large number of wells per section and undeveloped reference areas.	Available years.	USFWS/WGFD
Other studies on areas with a large number of wells per section and selected undeveloped reference areas.	Year-long and in any year as deemed necessary by BIA, BLM, USFWS, or WGFD.	USFWS/WGFD

[1] USFWS inventories wildlife on WRIR.
[2] WGFD inventories wildlife on BOR Land.

2.1.2 Annual Inventory and Monitoring

The inventory and monitoring protocol is identified below for each wildlife species. Additional wildlife species and associated surveys may be added or omitted in future years, pending the coordinated review of annual wildlife reports. Incidental wildlife observations may be recorded throughout the year by agency or Operator personnel in the WRPA.

The frequency of inventory and monitoring will be dependent upon the level of development in the WRPA (see Tables F-1 and F-2). In general, inventory and monitoring frequency will increase with higher levels of development. Inventory and monitoring results may identify the need for further surveys. The Review Team and/or BIA will identify the level of effort required by this wildlife plan, subject to the standards stated in the following paragraphs. Site- and species-specific surveys will continue to be conducted in association with APD and ROW application field reviews (see Table F-3).

Table F-3: Summary of General APD/ROW Application Stage Survey/Protection Measures, Wind River Project Area, Freemont County, Wyoming

Protection Measure	*Timing*	*Responsible Entity[1,2]*
APD-stage general raptor nest analysis within 0.5 to 1.0 mile of proposed disturbance.	Year-long	USFWS/WGFD
APD-stage seasonal raptor nest avoidance within 0.5 to 1.0 mile of active nests.	February 1-July 31 (depending on species and/or site-specific conditions)	USFWS/WGFD
APD-stage general raptor nest avoidance within 0.5 mile of active nests (1.0 mile for active bald eagle and ferruginous hawk nests).	Year-long (Controlled Surface Use [CSU]), generally excluding surface disturbance.	USFWS/WGFD
APD-stage sensitive species surveys (within 0.25 - 0.5 miles of proposed disturbance sites).	As necessary	USFWS
APD-stage T&E habitat avoidance.		
APD-stage white-tailed prairie dog colony mapping and burrow density determination.	As necessary	USFWS
Black-footed ferret habitat (i.e., prairie dog colony) avoidance.	As necessary	USFWS
APD-stage western burrowing owl surveys (within 0.5 mile of proposed disturbance sites).	As necessary, between June and August	USFWS/WGFD
Western burrowing owl nest avoidance.	As necessary	USFWS/WGFD
APD-stage greater sage-grouse lek surveys on suitable habitats within 2 miles of proposed disturbance sites.	March 1 - mid-May	USFWS/WGFD

Protection Measure	*Timing*	*Responsible Entity[1,2]*
APD-stage greater sage grouse lek avoidance on areas within 2 miles of a lek.	March 1 - June 30	USFWS/WGFD
APD-stage greater sage-grouse lek avoidance on areas within 0.25 mile of a lek.	Year-long	USFWS/WGFD
APD-stage greater sage-grouse nest avoidance.	As necessary	USFWS/WGFD
APD-stage greater sage-grouse winter habitat avoidance.	As necessary, December-February, if adequate snow cover.	USFWS/WGFD
APD-stage general wildlife avoidance/protection	As necessary	USFWS/WGFD
Big game crucial winter range avoidance.	November 15-April 30	USFWS/WGFD

[1] USFWS inventories wildlife on WRIR.
[2] WGFD inventories wildlife on BOR surface.

2.1.2.1 Raptors

Based on the intensity of development in the WRPA, a raptor mitigation and monitoring plan will be developed to protect raptor species in the Project Area. This plan will be reviewed and approved by the USFWS Lander Field Office and the state USFWS office. The plan will be reviewed for effectiveness every five years or as determined by the Review Team.

Raptor inventories of potentially affected areas were conducted for this EIS in early April 2003 and will continue to be conducted every five years for the LOP to determine the location of raptor nests/territories and their activity status (Table F-1). At this time, no raptor concentration areas are known to exist within the WRPA. Approximate raptor nest locations on and adjacent to the WRPA have been identified and are presented in the survey report entitled *Preliminary Wildlife Habitat Evaluation of Tom Brown, Inc.'s Wind River Natural Gas Field Development Project* (B&A 2003a). Future aerial or ground surveys may be implemented, as necessary. Data collected during surveys will be recorded on Raptor Observation Data Sheets, or similar data forms (see Addendum F-1).

Nest productivity monitoring will be conducted at all active nests that are located within the project area (WRPA plus one-mile buffer) every five years. Nest productivity monitoring will occur between March 1 and mid-July to determine nesting success (i.e., number of nestlings/fledglings). These surveys will be conducted from the ground, and all active nests and nest failures will be documented.

Additional raptor nest activity and productivity monitoring measures will be applied in areas with high levels of development (Table F-2). Inventory and monitoring efforts in these areas, as well as selected undeveloped comparison areas, will be conducted annually during April and May, followed by nest productivity monitoring. Site- and species -specific raptor nest analyses will be conducted in association with all APD and ROW application field reviews (Table F-3).

All raptor nest/productivity surveys will be conducted using procedures that minimize potential adverse effects to nesting raptors. Specific measures for reducing adverse effects are listed in Grier and Fyfe (1987) and Call (1978) and include the following:

- Nest visits will be delayed for as long as possible in the nesting season.
- Nests will be approached cautiously, and their status (i.e., number of nestlings/fledglings) will be determined from a distance with binoculars or a spotting scope.
- Nests will be approached tangentially and in an obvious manner to avoid startling adults.
- Nests will not be visited during adverse weather conditions (e.g., precipitation events, windy periods, hottest part of the day).
- Visits will be kept as brief as possible.
- All inventories will be coordinated by the BIA, WGFD, or USFWS
- The number of nest visits in any year will be kept to a minimum.
- All raptor nest location data will be considered confidential (BLM 2000).

2.1.2.2 Big Game Species

There are no crucial winter ranges of big game species within the WRPA. Yearlong habitat of the pronghorn antelope, white-tailed deer, and mule deer is present within the WRPA, as well as sporadic use of the northern portion of the WRPA by elk. The ranges of the big game species that have been observed in the WRPA are shown in Figures 3.8-1 to 3.8-5 of the DEIS.

2.1.2.3 Threatened and Endangered Species

The level of inventory and monitoring required for threatened and endangered species will be commensurate with established protocols for each potentially affected species. Methodologies and results of these surveys will be included in annual reports or provided in separate supplemental reports. A preliminary list of threatened and endangered species that may occur in the vicinity of the WRPA is shown in Table F-4. Appropriate modifications will be incorporated to this plan and specified in annual reports if changes in threatened and endangered species occur. Additional species of concern that may occur in the vicinity of the WRPA are shown in Tables F-5 and F-6 (BLM Wyoming State Sensitive Species List).

Data collected during surveys for threatened and endangered species will be considered confidential and will be provided only as necessary to those agencies requiring the data for management and/or project development needs. Site- and species-specific surveys will continue to be conducted, as necessary, in association with all APD and ROW application field reviews (see Table F-3). Data will be collected on appropriate General Wildlife Observation Data Sheets or similar forms (see Addendum F-1).

Table F-4: Threatened and Endangered Species Documented or Potentially Occurring within or near the Wind River Project Area

Species	*Scientific Name*	*Status*	*Distribution*
Black-footed Ferret	*Mustela nigripes*	Endangered	Potential resident in prairie dog colonies[1]
Bald Eagle	*Haliaeetus leucocephalus*	Threatened (proposed for de-listing)	Nesting, winter resident, migrant, statewide
Canada Lynx	*Lynx canadensis*	Threatened	Resident of forested areas, may travel through
Gray Wolf	*Canis lupus*	Threatened	Greater Yellowstone Area, including all of Wyoming
Grizzly Bear	*Ursus arctos horribilis*	Threatened	Wyoming portion of the Greater Yellowstone Ecosystem

[1]The WRPA is included in the USFWS "block clearance." Wild populations of black-footed ferrets are not expected to be present (USFWS 2004)

Black-footed Ferret

In February 2004, the USFWS in coordination with the WGFD, reviewed the current and historic status of prairie dog colonies and related black-footed ferret surveys throughout Wyoming. The goal of this review was to determine whether survey guidelines should continue to be applied across the entire state. Through this process, the Service has developed a list of blocks of habitat that are not likely to be inhabited by black-footed ferrets. In those areas, take of individual ferrets and effects to a wild population are not an issue and surveys for ferrets are no longer recommended (USFWS 2004).

According to the USFWS, the white-tailed prairie dog colonies within the WRPA would not require black-footed ferret surveys. This does not however mean that the area is free of all value to black-footed ferrets, nor does this clearance relieve responsibility to evaluate the potential effects of development actions on the survival and recovery of the species (USFWS 2004).

In order to monitor whether the Proposed Action or Alternatives could have an adverse effect upon the value of the WRPA prairie dog colonies as a potential black-footed ferret reintroduction site, the BIA or BLM will determine the presence/absence of prairie dog colonies at each proposed development site during APD and ROW application field revisions (see Table F-3). White-tailed prairie dog colonies (i.e., potential black-footed ferret habitat) in and adjacent to the WRPA were mapped in July 2003 and burrow densities were determined. The results of these surveys can be found in the 2003 survey report entitled *White-tailed Prairie Dog (Cynomys leucurus) Survey for Tom Brown, Inc.'s Wind River Natural Gas Field Development Project (*B&A 2003b) (see Appendix J in DEIS). White-tailed prairie dog colonies located on and adjacent to the WRPA are shown in Figure 3.9-1 in the DEIS.

Bald Eagle

The inventory and monitoring protocol for the observations of bald eagle nest and young will be conducted as described for raptor species (Section 2.1.2.1). Winter roosting surveys will be conducted between the months of November through February.

Grizzly Bear

Although their occurrence is rare, grizzly bears have been observed within the boundaries of the WRPA. According to the Wyoming Grizzly Bear Management Plan (WGFD 2002), effective population management can only be met if data are collected to determine the status of local and statewide grizzly bear populations. To maintain consistency in data collection and to compare grizzly bear population parameters inside and outside the grizzly bear Primary Management Zone (PMZ), monitoring protocols should be similar. These protocols include four possible monitoring techniques, including: documentation of all grizzly bear observations with emphasis on females and cubs-of-the-year, mark-resight sampling, DNA analysis, and radio tracking. Since grizzly bear presence within the WRPA is rare, observations of individuals will be reported to the USFWS, Lander.

Gray Wolf

According to the WGFD's *Wyoming Gray Wolf Management Plan* (2003), wolf populations in Wyoming will be monitored using any applicable technique, with primary emphasis on monitoring of radio-collared individuals and surveys during the winter and denning periods when wolves are most visible. The monitoring program will emphasize existing protocols and techniques that the USFWS and Yellowstone National Park (YNP) Service have employed, to assess whether gray wolf recovery criteria have been met. Survey techniques to track population trends over time could include both aerial and ground surveys to monitor pack numbers, distribution, breeding success, and mortality. Upon delisting, wolves with active radio collars will continue to be monitored (WGFD 2003). In addition to radio telemetry monitoring, emphasis will be placed on non-invasive techniques such as winter track counts, aerial surveys during denning periods, hair sampling, howling surveys, and observations by field personnel for basic survey and inventory data collection. During periods of snow cover, aerial and ground track counts may be used to document wolf presence or absence. Track counts may also be used to estimate pack size, but they must be conducted repeatedly to provide accurate information, as wolves will step in each other's tracks while traveling in groups (WGFD 2003). Since documented gray wolf sightings within the WRPA are rare, any gray wolf observations will be reported to the USFWS, Lander.

Canada Lynx

Since there is no habitat or prey species for the Canada lynx present within the WRPA, surveys will not be conducted for the Canada lynx. However, any observations of lynx will be reported to the USFWS, Lander.

2.1.2.4 Wyoming Sensitive Species

Population declines have occurred in many wildlife species in Wyoming in recent years. As a result of this decline, the State of Wyoming Game and Fish Department has developed seven categories of sensitive mammals and birds. Category 1 (NSS1), which includes species with the highest level of concern in Wyoming, is for species with significant habitat loss or substantial decline in population and possible extirpation from the state. Category 2 (NSS2) refers to species with restricted or vulnerable habitat, but with no recent or ongoing significant loss occurring. However, populations are restricted or declining in numbers and/or distribution. Tables F-5 and F-6 identify mammals and birds, respectively, that are state species of concern in categories NSS1, NSS2, and NSS3.

Surveys for Wyoming sensitive species will be conducted by USFWS on the Wind River Indian Reservation, and by WGFD on BOR surface and land managed by the State of Wyoming. Surveys for these species may be implemented in conjunction with surveys for other species or as components of the APD/ROW application.

In sections where a large number of wells are drilled, the entire section plus a one mile buffer will be surveyed. Surveys will also be conducted in undeveloped areas, so that comparisons can be made. Surveys will be conducted annually during spring and summer by the BIA and/or BLM for selected sensitive species (see Table F-2). If any sensitive species are observed, the observations will be noted on the appropriate data forms (see Addendum F-1). In addition, if sensitive species are observed, efforts will be made to determine their activities (e.g., breeding, nesting, foraging, hunting, etc.). If any management agency (e.g., BIA, USFWS) identifies a potential concern regarding any of these species, additional inventory and monitoring may be implemented, as specified in annual reports (BLM 2000).

Greater Sage-grouse

Baseline data for greater sage-grouse lek locations were collected from the WRPA and 2-mile buffer in April of 2003 (see Figure 3.9-3 in the DEIS). Leks within 2 miles of existing and proposed disturbance areas will be monitored annually by the BIA, in coordination with the WGFD between March 1 and May 15, to determine lek attendance (see Table F-1). Ground surveys are typically conducted between March and April by USFWS on WRIR and WGFD on BOR surface. In areas with large numbers of well locations per section, aerial inventories may be conducted annually on affected sections, a 2-mile buffer of disturbance areas, and selected undeveloped comparison areas (see Table F-2). Data collected during these surveys will be provided on Greater Sage-Grouse Lek Records or other suitable forms (see Addendum F-1) (BLM 2000). Figure 3.9-3 in Chapter 3 of the DEIS shows the greater sage-grouse leks that have been identified near the WRPA; these leks include both known active and inactive leks. No leks have been reported from the WRPA, to date.

Greater sage-grouse winter habitat surveys within the WRPA will be conducted when there is adequate snow cover to determine actual winter use areas. In years when this snow cover is not available, then surveys would not be conducted.

Table F-5: Native Species Status (NSS) of Mammalian Species of Concern in Wyoming

	A. On-going significant loss of habitat.	B. Habitat is restricted or vulnerable but no recent or on-going significant loss; species is sensitive to human disturbance.	C. Habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance.	D. Habitat is stable and not restricted.
1. Populations are greatly restricted or declining; extirpation within Wyoming appears possible.	**NSS1**	**NSS2** Black-footed Ferret Pygmy Shrew	**NSS3** Preble's Shrew	**NSS4**
2. Populations restricted or declining in numbers and/or distribution; extirpation in Wyoming is not imminent.	**NSS2** Spotted Bat Long-eared Myotis Northern Myotis Long-legged Myotis Townsend's Big-eared Bat Pallid Bat Fringed Myotis Lynx	**NSS3** Black-tailed Prairie Dog White-tailed Prairie Dog Dwarf Shrew Pygmy Rabbit Water Vole Cliff Chipmunk Pinyon Mouse Canyon Mouse Swift Fox Vagrant Shrew Idaho Pocket Gopher Great Basin Pocket Mouse Plains Pocket Mouse Silky Pocket Mouse Olive-backed Pocket Mouse Hispid Pocket Mouse Spotted Ground Squirrel Western Heather Vole Prairie Vole Least Weasel	**NSS4**	**NSS5**
3. Species is widely distributed; population status and trends within Wyoming are assumed stable.	**NSS3** Little Brown Myotis Big Brown Bat Western Small-footed Myotis Wolverine	**NSS4**	**NSS5**	**NSS6**
4. Populations are stable or increasing and not restricted in numbers and/or distribution[1]		**NSS5**	**NSS6**	**NSS7**

Source: Wyoming Game and Fish Department - Habitat Protection - 26 February 2002
[1]Note: Only the 35 mammalian species in categories NSS1 - NSS3 are shown.

Table F-6: Native Species Status (NSS) of Bird Species of Concern in Wyoming

	A. On-going significant loss of habitat	B. Habitat is restricted or vulnerable but no recent or on-going significant loss; species may be sensitive to human disturbance.	C. Habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance.	D. Habitat is stable and not restricted.
1. Populations are greatly restricted or declining-extirpation appears possible.	**NSS1** Common Loon	**NSS2**	**NSS3**	**NSS4**
2. Populations are declining or restricted in numbers and/or distribution-extirpation is not imminent.	**NSS2** Trumpeter Swan Bald Eagle Yellow-Billed Cuckoo	**NSS3** American White Pelican American Bittern Snowy Egret Black-crowned Night-Heron White-faced Ibis Caspian Tern Forster's Tern Black Tern Harlequin Duck Merlin Peregrine Falcon Long-billed Curlew Lewis' Woodpecker Ash-throated Flycatcher Western Scrub-Jay Juniper Titmouse Bushtit Scott's Oriole	**NSS4** Grasshopper Sparrow Baird's Sparrow McCown's Longspur Chestnut-collared Longspur Boblink	**NSS5**
3. Species is widely distributed; population status and trends are unknown but are suspected to be stable.	**NSS3** Ferruginous Hawk	**NSS4** Clark's Grebe Western Grebe Great Blue Heron Mountain Plover Upland Sandpiper Northern Goshawk Northern Pygmy-Owl Great Gray Owl Boreal Owl Burrowing Owl Black-backed Woodpecker Common Yellowthroat Veery American Redstart Orange-crowned Warbler Indigo Bunting Pygmy Nuthatch	**NSS5**	**NSS6**

	A. On-going significant loss of habitat	B. Habitat is restricted or vulnerable but no recent or on-going significant loss; species may be sensitive to human disturbance.	C. Habitat is not restricted, vulnerable but no loss; species is not sensitive to human disturbance.	D. Habitat is stable and not restricted.
4. Populations are stable or increasing and not restricted in numbers and/or distribution[1]	**NSS4**	**NSS5**	**NSS6**	**NSS7**

Source: Wyoming Game and Fish Department - Habitat Protection - 26 February 2002
[1]Note: Only the bird species in categories NSS1 - NSS3 are shown.

Ferruginous Hawk and Burrowing Owl

The inventory and monitoring protocol for these species is described in the raptor section (see Section 2.1.2.1).

Fish

Muddy and Fivemile Creeks will be sampled in the summer for identification of resident fish species. Fish will also be sampled from two upstream reference sites for comparison with the affected areas. Sampling methods used will depend of the amount of water in the stream.

2.1.2.5 Record Keeping Responsibilities

The BIA will ensure that records are maintained of wildlife species observed within the WRPA. The information collected will include observations of wildlife species, their numbers, location, activity, and other pertinent data as applicable.

2.2 PROTECTION MEASURES

The wildlife protection measures proposed are based on standard measures developed for oil and gas development in Wyoming (BLM 2000). Additional measures may be included and/or BIA or BLM may modify existing measures in any given year as deemed appropriate. These measures will be specified in annual reports. It is assumed that as the wildlife issues within the WRPA are further described and impacts identified, some protection measures may be removed, and others may be added. The Operators will implement protection measures with assistance from and/or in consultation with the BIA. In addition, the BIA may modify these measures on a site-specific basis, as deemed appropriate, after completion of APD and ROW application field reviews. The protection measures for most wildlife species will be avoidance of sensitive habitats (e.g. big game winter range, raptor nests, greater sage-grouse leks, etc.). However, numerous species- and project-specific measures may be implemented. Additionally, general wildlife protection measures (see Table F-3) will likely benefit the majority of wildlife species found on and adjacent to the WRPA.

2.2.1 Raptors

The primary protection measure for raptor species on the WRPA will be avoidance of active/inactive nest locations during the breeding season. Active nests are defined as any raptor nest that has been used within the last three years. Depending on the timing of proposed construction and drilling activities, all surface-disturbing activities will be restricted from February 1 through July 31 within a 0.5 to 1.0 mile radius (depending upon species and site-specific conditions) of active, or occupied, as well as inactive, raptor nests and/or nesting territories (i.e., seasonal nest avoidance).

Exceptions to the timing stipulation may be made, based on field investigations of the nest at the time the exception was requested. In addition, well locations, roads, ancillary facilities, and other surface structures requiring repeated human presence will not be constructed within 0.5 miles of active raptor nests, except bald eagle and ferruginous hawk, where the restriction will be 1.0 miles. The seasonal buffer distance and exclusion dates may vary, depending on nest activity status, species, prey availability, natural topographic barriers, and line-of-sight distances. Actual nest buffers for each raptor nest will be specified in annual reports.

Operators will notify the BIA and USFWS on WRIR, and WGFD on BOR surface, immediately if raptors are found nesting on or within 1.0 miles of project facilities. In addition, the Operators will assist the BIA in erecting artificial nesting structures (ANS's), where necessary. The use of ANS's will be considered only if other protection methods are not adequate. If nest manipulation or a situation requiring a "taking" of a raptor nest becomes necessary, a special permit will be obtained from the Denver USFWS Office, Permit Section. Permit acquisition will be coordinated with the USFWS Office in Cheyenne, Wyoming and will be initiated with sufficient lead time to allow for development of mitigation measures. Required corresponding permits will be obtained from the state (i.e., WGFD) office in Cheyenne. Consultation and coordination with the USFWS and the WGFD will be conducted for all protection activities relating to raptors.

If the Review Team determines that project activities could potentially affect raptor nesting in or adjacent to the WRPA, ANS's may be constructed at a rate of two ANS's per one impacted nest. Existing degraded raptor nests may also be upgraded/reinforced to minimize potential impacts. The BIA, USFWS, or WGFD will determine the number of degraded nests, up to two per project, based on site-specific conditions and requirements. This focuses on the overall decline of raptor nesting success and will occur if the Review Team determines that projects may be the cause for this decline. The location, design, and other pertinent data regarding ANS's or nests proposed for upgrading will be identified in annual reports. ANS's will be located within the nesting territory of potentially affected raptor pairs and outside of the line-of-sight or nest buffer of actively nesting pairs, where possible. Annual ANS maintenance activities will be completed after August 1 and prior to October 15 each year, as necessary. ANS's will be placed within the nesting territories of potentially affected raptor pairs at sites sufficiently removed from development activities to minimize or avoid potential adverse effects.

In cases where existing project features (e.g., well pads) are located within the nest buffers of active raptor nests, no maintenance activities requiring a work-over rig will be allowed during critical periods (i.e., early March through mid-June) unless an exception has been approved. The exact dates of exclusion will be determined by the USFWS or WGFD and will likely vary from year to year, depending on the species present and variations in weather, nesting chronology, and other factors.

No aboveground power line construction is expected during the proposed development project. However, if any power lines are built, construction will follow recommendations of the Avian Power Line Interaction Committee (APLIC 1994, 1996) and Olendorff et al. (1981) to avoid collision and/or electrocution of raptors.

In the event that winter roost sites are identified, then construction, drilling, and other activities disruptive to wintering raptors are prohibited during the period of November 15 to April 30.

2.2.2 Big Game Species

There is no crucial winter range of big game species in the WRPA. Yearlong range is present within the WRPA for pronghorn antelope, white-tailed deer, and mule deer. There is also limited habitat for elk within the WRPA.

No road or pipeline ROW fencing is proposed for the project; however, if ROW fencing is required, it will be kept to a minimum, and the fences will meet BLM/WGFD standards for facilitating wildlife movement. Wildlife-proof fencing will be used only to enclose reclaimed areas where it is determined that wildlife species are impeding successful vegetation establishment. Snow-fences, if used, will be limited to segments of 0.25 mile or less. Project personnel will also be advised to minimize stopping and exiting their vehicles in big game winter habitat while there is snow on the ground. In addition, escape openings will be provided along roads in big game winter ranges as designated by the BIA or BLM to facilitate exit of big game animals from snow-plowed roads. Additional habitat protection/improvement measures may also be applied in any given year as directed by the BIA or BLM, in consultation with the Operators and other agencies, and specified in annual wildlife reports.

Increased human access within the WRPA may lead to increased poaching of big game animals. Potential increases in poaching may be reduced through employee and contractor awareness/education programs regarding wildlife laws. If violations are discovered on the WRPA, Operators will immediately notify the BIA.

2.2.3 Threatened and Endangered Species

USFWS consultation and coordination will be conducted for all activities that may impact threatened and endangered species and their habitats, as needed. Where possible, these actions will be specified in advance in the annual reports. The terms and conditions of the Biological Opinion (BO) prepared by the USFWS will be followed.

Black-footed Ferret

All white-tailed prairie dog colonies on the WRPA will be avoided, where practical. If black-footed ferrets are found on the WRPA, the USFWS and BIA will be notified immediately and consultation with the USFWS will be initiated to develop strategies that ensure no adverse effects to the species occur. All activities will be stopped, and authorization to proceed must be received from the BIA, in consultation with the USFWS, before ground-disturbing activities are reinitiated in black-footed ferret habitat, (BLM 2000).

Bald Eagle

No surface disturbing activities are permitted between February 1 and July 31 within one mile of bald eagle nests (see raptor protection measures in Section 2.2.1). Although no bald eagle nests have been identified within the WRPA and one-mile buffer, the timing restrictions apply to all raptor nests.

Grizzly Bear

Grizzly bear sightings in the vicinity of the WRPA are rare. The Wyoming Grizzly Bear Management Plan (2002) recommends monitoring of major grizzly bear food sources and continued consultation with land management agencies and private land owners on issues related to grizzly bear habitat protection, disturbance, and mitigation.

Radio telemetry studies have identified roads as a major factor in grizzly bear habitat deterioration and increased mortality of grizzly bears (WGFD 2002). The USFWS seeks to influence agencies to maintain average road densities of one mile or less per square mile of habitat. This goal has been demonstrated to meet the needs of a variety of wildlife, while maintaining reasonable public access. If a change in road management is warranted based on knowledge gained as grizzly bears reoccupy areas, it should be developed and implemented by land management agencies.

Gray Wolf

In the final rule on nonessential, experimental populations of the gray wolf (Federal Register 1994:60260), the USFWS encouraged states and Tribes to define unacceptable wolf impacts to ungulate populations. Upon approval of the draft Wyoming Wolf Management Plan by the USFWS, the state will have the option to translocate or kill wolves in areas where ungulates are negatively impacted. It is not anticipated that wolves will cause excessive predation on ungulates, in most circumstances. However, some wintering elk, deer, moose and bighorn sheep sub-populations in winter ranges or winter feed grounds or near cattle feed lines could be susceptible to wolf predation. Management action may then be necessary, under specific conditions.

Canada Lynx

Since there is no habitat or prey species of the Canada lynx in the WRPA, protective measures are not anticipated to be necessary.

2.2.4 Wyoming Sensitive Species

The sensitive mammal and bird species that have been identified by the State of Wyoming are listed in Tables F-5 and F-6. In order to protect these species, construction and drilling activities may be restricted during certain times in the breeding season, and for a specific distance from nesting areas of these species, as appropriate

Avoidance of sensitive habitats will be accomplished in consultation and coordination with the USFWS on the WRIR and the WGFD on BOR and state lands. Activities will be delayed until such time that no adverse effects will occur (e.g., after fledging). It is assumed that the protocol specified for general wildlife will likely benefit sensitive species as well. If any agency (i.e., BLM, WGFD, USFWS) identifies a potential for impacts to any sensitive species, additional measures may be implemented, as specified in annual reports.

Greater Sage-grouse

A NSO (no surface occupancy) restriction will apply within 0.25 miles of greater sage-grouse leks. In addition, powerlines will not be constructed within 0.6 miles of any lek, as necessary to protect leks from raptor predation. To protect nesting habitat of the greater sage-grouse, Operators will restrict construction activities between March 1 and June 30 within a two mile radius of an identified greater sage-grouse lek and associated nesting habitat. In addition, construction, drilling, and other activities potentially disruptive to wintering greater sage-grouse will be prohibited from November 15 to April 30 for the protection of winter concentration areas (BLM 2000).

Ferruginous Hawk, Peregrine Falcon, and Burrowing Owl

The protection protocol for the ferruginous hawk, peregrine falcon, and burrowing owl would be the same as described for other raptors (see Section 2.2.1). Additional measures will be applied on a species- or site-specific basis, as deemed appropriate by the USFWS and/or WGFD and specified in conditions of approval for individual APDs/ROWs. To protect nesting and brood-rearing burrowing owls, construction, drilling, and other activities will be restricted between February 1 and July 31, or until young are fully fledged.

2.2.5 General Wildlife

Unless otherwise indicated, the following protection measures will be applied for all wildlife species not specified above. Additional measures primarily designed to minimize impacts to other WRPA resources (e.g., vegetation and surface water resources, including wetlands, steep slopes, etc.) are identified in the EIS and these measures may provide additional protection for wildlife. These actions will be specified in annual reports. All roads on and adjacent to the WRPA that are required for the proposed project will be appropriately constructed, improved, maintained, and posted to minimize potential wildlife/vehicle collisions and facilitate wildlife (most notably big game) movement through the WRPA. Appropriate speed limits will be adhered to on all Operator-controlled roads within the WRPA, and Operators will advise employees and contractors regarding these speed limits.

To protect important habitat in areas with sagebrush greater than three feet tall, wells and facilities will avoid this habitat, where possible. Additional wildlife mitigation measures include the following:

- Reserve, work-over, and flare pits and other locations potentially hazardous to wildlife will be adequately protected by netting and/or fencing to prohibit wildlife access.
- No surface water or shallow ground water in connection with surface water will be utilized for the proposed project.
- If dead or injured raptors, big game, migratory birds, or other wildlife are observed on Operator-controlled roads within the WRPA, personnel will report the observations to the supervisor, who will contact the appropriate BIA, USFWS, or WGFD offices.
- Operators will implement policies designed to control poaching and littering and will notify all employees (contract and company) that a major violation of policy would result in disciplinary action. Contractors will be informed that any intentional game law violation or littering within the WRPA would result in dismissal.

2.3 COMBINATIONS OF WILDLIFE CONCERNS

Based on existing data sources, the primary wildlife resources known to be present within the WRPA were mapped (Figures 3.8-1 to 3.8-6 and 3-9.1 to 3.9-3 in the DEIS). These resources include: big game habitat, raptor nests, upland game bird habitat, mountain plover habitat, potential sage grouse habitat, and white-tailed prairie dog colonies. Figure 4.8-1 of the DEIS identifies the locations in the WRPA where habitats of several species overlap. The maximum number of potential wildlife species located within a single section is estimated to be five, which occurred in only seven sections (T4N:R2E, Sections 3, 4, 8, 9, 10, 16, and 17). Sections with the most wildlife species were generally located in the northwest portion of the WRPA. The southern and eastern portions of the WRPA tended to have fewer sensitive wildlife resources present. However, areas with a large number of a single species may provide equally important wildlife habitat. Awareness of the location of important wildlife habitats provides the Operators with useful information that can be utilized when determining the future placement of gas wells. Planned placement of disturbances may be used to avoid or minimize impacts to wildlife species of concern to the WGFD or USFWS.

3.0 REFERENCES

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ADDENDUM F-1

SAMPLE DATA SUMMARY TABLES AND FORMS

APPENDIX F: WILDLIFE MONITORING/PROTECTION PLAN

Wintering Bald Eagle Survey

Buys and Associates

Project _____ Time Start ____ End ____

Date _____ Observer _____ Temperature ____ ____

Morning or **Evening** Survey (Circle) Wind _____

General Location _____ % Cloud Cover _____

Legal Location _____

Station Comments

Time	# Of Eagles	Age Class	**Legal Location** or coordinates	Activity and Comments

	Other Raptors	Age Class	Legal Location or Coordinates	Activity and Comments

BUYS & ASSOCIATES, INC.
Black-footed Ferret Survey Field Data Form
Nocturnal Survey

Survey Mode _____ **Survey Night 1 2 3** (circle one) Date: _____
Wind Speed/Direction _____ Temperature Range _____
Weather Conditions (ground condition- bare/snow covered)_____
Method of Search (backpack spotlight, vehicle, walking)_____
Observer(s) _____
Legal Location Sec(s) _____ T _____ R _____

P. Dog Species _____ # Active Burrows _____ # Inactive Burrows _____
Signs of Ferret Activity _____
Approx. Size of Survey Area _____ ac # of Colonies w/in survey area_____
Dominant Vegetation _____ Photos Taken_____
Transects w/in Survey Area _____ Total Length of Survey Transects _____ mi

Transect #1
Start Time _____ End Time _____

Transect #2
Start Time _____ End Time _____

Transect #3
Start Time _____ End Time _____

Transect #4
Start Time _____ End Time _____

Transect #5
Start Time _____ End Time _____

Black-Footed Ferret Observations _____
Black-Footed Ferret Sign _____
Comments _____
Unidentified Green Eye-Shine _____
Comments _____

Potential Prairie Dog Predators	Number Observed	Sign

Opportunistic Wildlife Observations	Number Observed	Sign

Daylight Survey: Start Time _____ End Time _____
Evidence of ferret digging? _____

Prairie Dog Burrow Density Sampling Form

Prairie Dog Species_____

Date_____ Time_____ Temp (F°)_____ Page___ of ___

General Weather Description (clouds, wind, precip.)_____

_____

Observers: _____

Colony Name (GPS annotation)_____
UTM or Lat/Long Coordinates _____

Transect #	# of Active Burrows	# of Inactive Burrows	Prairie Dogs Observed	Additional Observations

APPENDIX F: WILDLIFE MONITORING/PROTECTION PLAN

ADDENDUM F-2

MOUNTAIN PLOVER SURVEY GUIDELINES

APPENDIX F: WILDLIFE MONITORING/PROTECTION PLAN

4/16/02

MOUNTAIN PLOVER SURVEY GUIDELINES
U.S. Fish and Wildlife Service
March 2002

The mountain plover (*Charadrius montanus*) is a small bird (17.5 cm, 7 in.) about the size of a killdeer (*C. vociferus*). It is light brown above with a lighter colored breast, but lacks the contrasting dark breast-belt common to many other plovers. During the breeding season it has a white forehead and a dark line between the beak and eye, which contrasts with the dark crown.

Mountain plover breeding habitat includes short-grass prairie and shrub-steppe landscapes; dryland, cultivated farms; and prairie dog towns. Plovers usually nest on sites where vegetation is sparse or absent, conditions that can be created by herbivores, including domestic livestock and prairie dogs. Vegetation in shortgrass prairie sites is typically less than 4 inches tall. Nest sites within the shrub-steppe landscape are also confined to areas of little to no vegetation, although surrounded by areas visually dominated by shrubs. Commonly, nest sites within shrub-steppe areas are on active prairie dog towns. Nests are commonly located near a manure pile or rock. In addition to disturbance by prairie dogs or livestock, nests have also been found on bare ground created by oil and gas development activities, and on dryland, cultivated agriculture in the southern part of their breeding range. Mountain plovers are rarely found near water. Positive indicators for mountain plovers therefore include level terrain, prairie dogs, bare ground, *Opuntia* pads, cattle, widely spaced plants, and horned larks. It would be unusual to find mountain plovers on sites characterized by irregular or rolling terrain; dense, matted vegetation; grass taller than 4 inches, wet soils, or the presence of killdeer.

These guidelines were developed by Service biologists and Dr. Fritz Knopf, USGS-BRD. Keep in mind these are guidelines - please call the local Fish and Wildlife Service, Ecological Services office, if you have any suggestions.

GENERAL GUIDELINES FOR SURVEYS

On February 16, 1999, the Service proposed the mountain plover for federal listing as threatened. Because listing of this species is proposed, the Service may recommend surveys for mountain plovers to better define nesting areas, and minimize potential negative impacts. The Service may recommend surveys for mountain plovers in all suitable habitat, as well as avoidance of nesting areas, to minimize impact to plovers in a site planned for development. While the Service believes that plover surveys, avoidance of nesting and brood rearing areas, and timing restrictions (avoidance of important areas during nesting) will lessen the chance of direct impacts to and mortality of individual mountain plovers in the area, these restrictions do nothing to mitigate indirect effects,

including changes in habitat suitability and habitat loss. Surveys are, however, a necessary starting point. The Service has developed the following 3 survey guidelines, depending on whether the intent is to determine the presence or absence of plovers at a site during the nesting season for permanent and short term projects, or to determine the density of nesting plovers at known nesting sites.

Survey Protocol

Surveys for mountain plovers are conducted during the period where the highest numbers of plovers are likely to be tending nests and territories, and therefore are most likely to be detected. Throughout their range, these dates are generally from May 01 through June 15. However, seasonal restrictions for ground disturbing activities in suitable mountain plover nesting habitats are usually longer than the survey dates. The longer seasonal restrictions allow for protection of early nesting birds, and very young chicks which tend to sit still to avoid detection during the first week post-hatch. Since specific nesting dates across the breeding range of the plover vary according to latitude and local weather, the project proponent or the land management agency should contact the local U.S. Fish and Wildlife Service Office to determine what seasonal restrictions apply for specific projects.

Two types of surveys may be conducted: 1) surveys to determine the presence/absence of breeding plovers (i.e., displaying males and foraging adults), or 2) surveys to determine nest density. The survey type chosen for a project and the extent of the survey area (i.e., beyond the edge of the construction or operational ROW) will depend on the type of project activity being analyzed (e.g., construction, operation) and the users intent. One methodology outlines a breeding survey that was used in northeastern Colorado to establish the density of occupied territories, based on displaying male plovers or foraging adults. The other was developed to only determine whether plovers occupy an area.

Techniques Common to Each Survey Method

- Conduct surveys during early courtship and territorial establishment. Throughout the breeding range, this period extends from approximately mid-April through early July. However, the specific breeding period, and therefore peak survey days, depends on latitude, elevation, and weather.

- Conduct surveys between local sunrise and 1000 and from 1730 to sunset (periods of horizontal light to facilitate spotting the white breast of the adult plovers).

- Drive transects within the project area to minimize early flushing. Flushing

distances for mountain plovers may be within 3 meters for vehicles, but plovers often flush at 50 to 100 meters when approached by humans on foot.

- Use of a 4-wheel drive vehicle is preferable where allowed. Use of ATVs has proven highly successful in observing and recording displaying males. Always seek guidance from land management agencies regarding use of vehicles on public lands, and always obtain permission of private landowners before entering their lands.

- Stay in or close to the vehicle when scanning. Use binoculars to scan and spotting scopes to confirm sightings. Do not use scopes to scan.

- Do not conduct surveys in poor weather (i.e., high wind, precipitation, etc.).

- Surveys conducted during the courtship period should focus on identifying displaying or calling males, which would signify breeding territories.

- For all breeding birds observed, conduct additional surveys immediately prior to construction activities to search for active nest sites.

- If an active nest is located, an appropriate buffer area should be established to prevent direct loss of the nest or indirect impacts from human-related disturbance. The appropriate buffer distance will vary, depending on topography, type of activity proposed, and duration of disturbance. For disturbances including pedestrian foot traffic and continual equipment operations, a 1/4 mile buffer is recommended.

SURVEY TO DETERMINE PRESENCE/ABSENCE

Large scale/long term projects

1. Conduct the survey between May 1 and June 15, throughout the breeding range.

2. Visual observation of the area should be made within 1/4 mile of the proposed action to detect the presence of plovers. All plovers located should be observed long enough to determine if a nest is present. These observations should be made from within a stationary vehicle, as plovers do not appear to be wary of vehicles. Because this survey is to determine presence/absence only, and not calculate statistical confidence, there is no recommended distance interval for stopping the vehicle to scan for birds. Obviously numerous stops will be required to conduct a thorough survey, but

number of stops should be determined on a project and site-specific basis.

3. If no visual observations are made from vehicles, the area should be surveyed on ATV's. Extreme care should be exercised in locating plovers due to their highly secretive and quiet nature. Surveys by foot are not recommended because plovers tend to flush at greater distances when approached using this method. Finding nests during foot surveys is more difficult because of the greater flushing distance.

4. A site must be surveyed 3 times during the survey window, with each survey separated by at least 14 days. The need for 3 surveys is to capture the entire nesting period, with the intent of reducing the risk of concluding the site is not nesting habitat by an absence of nesting birds during a single survey.

5. Initiation of the project should occur as near to completion of the survey as possible. For example, seismic exploration should begin within 2 days of survey completion. A 14 day period may be appropriate for other projects.

6. If an active nest is found in the survey area, the planned activity should be delayed 37 days, or seven days post-hatching. If a brood of flightless chicks is observed, activities should be delayed at least seven days.

Short-term, linear projects

The Service recognizes that many projects have minimal, if any impact on mountain plover nesting habitat, and that these projects may only be present in suitable habitat for a day or less. In order to address concerns from project proponents about delays associated with mountain plover surveys for these projects, the Service has developed the following guidelines. However, the Service encourages the project proponent to plan these projects so that all work occurs outside the plover nesting season.

Short-term linear projects are defined as projects which move through an area within the course of a day and result in no permanent habitat alteration (e.g., vegetative/topographic changes), and no permanent project-related above ground features. Short-term, linear projects may include activities such as pipelines (4 inch diameter or less), fiber optic cables, and seismic exploration. For these projects, all ROW surveying/staking activities should be completed before April 1 to avoid discouraging plovers from nesting in suitable habitat. If ROW surveying cannot be completed before April 1, surveyors will need to coordinate with the lead Federal agency before entering these areas, and a plover survey may be required prior to ROW demarcation. For these projects, the presence/absence guidelines above should adhere to the dates below.

1. **April 10 through July 10 -** a plover survey will need to be completed 1- 3

days prior to any construction activity, including initial brush clearing, to avoid direct take of mountain plovers. The survey should include the route and a 1/4 mile buffer on either of the project corridor. If there is a break in construction activity in these areas of more than 3 days (e.g., between pipe stringing, trenching, or welding), an additional plover survey is necessary before construction activity can resume after that break in activity. Generally, mountain plovers are either establishing territories and nests in April, and from late June to early July young chicks commonly freeze in place to avoid detection, increasing their vulnerability to direct take. After July 10, most mountain plover chicks are sufficiently mobile to reduce the risk of direct take.

2. If an active nest is found in the survey area, the planned activity should be delayed 37 days, or seven days post-hatching. If a brood of flightless chicks is observed, activities should be delayed at least seven days.

SURVEY TO DETERMINE DENSITY OF NESTING MOUNTAIN PLOVERS

We are assuming people will have received training on point counts in general before using this specialized point count technique adapted to mountain plovers.

Establishing Transects

1. Identify appropriate habitat and habitat of interest within geographic areas of interest.

2. Upon arriving in appropriate habitat, drive to a previously determined random starting point.

3. For subsequent points, drive a previously determined random distance of 0.3, 0.4 or 0.5 miles.

4. Each transect of point counts should contain a minimum of 20 points.

Conducting The Point Counts

1. Conduct counts between last week in June to July 4th at elevations equivalent to the eastern plains of Colorado (i.e., about 5,000 feet). Timing of counts at other elevations should be coordinated with the local FWS office.

2. Only 1 counter is used. Do not use a counter and recorder or other combinations of field help. Drivers are okay as long as they don't help spot

plovers.

3. If an adult mountain plover is observed, plot occupied territories on a minimum of 1:24,000 scale map and on a ROW diagram or site grid (see attached). The ROW diagram will be at a greater level of detail, depicting the location of breeding birds (and possible nest sites) relative to ROW centerline, construction boundary, and applicable access roads.

4. Estimate or measure distances (in meters) to all mountain plovers. Method used should be noted, e.g., estimates w/distance training, estimates w/o distance training, rangefinder or measured with tape measure, etc.

5. Record "fly-overs" as "FO" in the distance column of the data sheet.

6. If you disturb a mountain plover while approaching the point, estimate the distance from point-center to the spot from which the bird was flushed.

7. Conduct counts for 5 minutes with a 3 minute subsample to standardize with BBS.

8. Stay close to your vehicle while scanning.

Recording Data

Record the following information AT EVERY POINT, EVERY DAY.

- start time
- unique point code (don't duplicate within a field crew or across dates)
- number of mountain plovers and distance to each
- land use and/or habitat type (e.g., fallow wheat, plowed, shortgrass)
- temperature, Beaufort wind, and sky conditions (clear, partly cloudy, overcast)
- Information on the data sheet somewhere.
- your name and address
- date
- Record for each point at some point during the census.
- detailed location description of each point count including road number, distance to important intersections.
- record transect and point locations on USGS county maps.
- Universal Transverse Mercator from maps or GPS are useful.

GENERAL HABITAT INDICATORS

Positive habitat images

Stock tank (non-leaking, leaking tanks often attract killdeer)

Flat (level or "tilted") terrain

Burned field/prairie/pasture

Bare ground (minimum of 30 percent)

"Spaced" grass plants

Prairie dog colonies

Horned larks

Cattle

Heavily grazed pastures

Opuntia pads visible

Negative habitat images

Killdeer present (indicating less than optimal habitat)

Hillsides or steep slope

Prominent, obvious low ridge

Leaky stock tanks

Vegetation greater than 4 inches in height in short-grass prairie habitat

Increasing presence of tall shrubs

Matted grass (i.e., minimal bare ground)

Lark buntings

APPENDIX F: WILDLIFE MONITORING/PROTECTION PLAN

ADDENDUM F-3

BLM WYOMING SENSITIVE SPECIES LIST

APPENDIX F: WILDLIFE MONITORING/PROTECTION PLAN

BLM Wyoming
Sensitive Species Policy and List

September 20, 2002

Introduction

The USDI Bureau of Land Management (BLM) Wyoming has prepared this list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. Many species are not on this list due to the lack of status, distribution and habitat requirement information which prohibits any management attention.

The goals of this sensitive species policy are to:

- Maintain vulnerable species and habitat components in functional BLM ecosystems.
- Ensure sensitive species are considered in land management decisions.
- Prevent a need for species listing under the Endangered Species Act.
- Prioritize needed conservation work with an emphasis on habitat.

Authority

The authority for this policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A., General Program Delegation, Director, Bureau of Land Management.

Bureau of Land Management (BLM) Manual 6840 establishes Special Status Species (SSS) policy for plant and animal species and the habitat on which they depend. This SSS policy refers not only to species protected under the Endangered Species Act (ESA), but also to those designated by the State Director as Sensitive. The manual states " *Sec. 06D - Sensitive Species: State Directors, usually in cooperation with the State wildlife agency, may designate sensitive species. By definition the sensitive species designation includes species that could easily become endangered or extinct in the state. Therefore, if sensitive species are designated by the State Director,* ***the protection provided by the policy for candidate species shall be used as the minimum level of protection".***

Criteria set forth in the Glossary of Terms section of the 6840 Manual for designating sensitive species are:

1. under status review by the FWS/National Marine and Fisheries Service(NMFS); or
2. whose numbers are declining so rapidly that Federal listing may become necessary; or
3. with typically small or widely dispersed populations; or
4. those inhabiting ecological refugia or other specialized or unique habitats.

The intent of the sensitive species designation is to ensure actions on BLM administered lands consider the welfare of these species and do not contribute to the need to list any other Special Status Species under the provisions of the ESA. Management requirements that apply to the

species on the BLM Wyoming Sensitive Species List are to avoid or minimize adverse impacts and maximize potential benefits to species whose viability has been identified as a concern by reviewing programs and activities to determine their potential effect on sensitive species. Requesting technical assistance from the FWS, and any other qualified source, on actions that may affect a sensitive species is recommended. It is not the intent of this list to track species rangewide or even statewide as this is done by other entities (WYNDD, WGFD, FWS, GAP, etc.) rather our (BLM) obligation is to determine distribution and manage habitats. It is also the intent of this list to emphasize planning, management, and monitoring of these species.

Guidance

BLM Washington Office Instruction Memorandum IM 97-118 Guidance on Special Status Species Management (6840 Manual) was issued on April 30, 1997 in response to the February 28, 1996 Fish and Wildlife Service (FWS) "Notice of Review of Plant and Animal Taxa That Are Candidates For Listing as Endangered or Threatened" (61 FR 7595). It states: *"The new candidate list eliminated the separate categories of candidates (Category-1 and Category-2) and redefined candidates to include only species for which the FWS has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list, but for which issuance of the proposed rule is precluded by higher listing priorities. The December 5, 1996, notice made this decision to eliminate the Category-2 candidate (C2) list final. In a separate "Notice of Candidate Taxa Reclassification" (61 FR 7457), FWS reclassified 96 former Category-1 (C1) candidates to non-candidate status. Consequently, the list provided in 61 FR 7595 consists of a new candidate list which is an updated list of approximately one-half of the former C1 species, plus those species currently proposed for listing as threatened or endangered. It is, in effect, the list of proposed species and the backlog of listing proposals".*

IM 97-118 continues by reiterating BLM policy to ensure actions authorized, funded, or carried out by BLM do not contribute to the need for any species to become listed as a candidate, or for any candidate species to become listed as threatened or endangered. Early identification of BLM sensitive species is advised in efforts to prevent species endangerment, and state directors are encouraged to collect information on species of concern to determine if BLM sensitive species designation and special management are needed. It then urges evaluation of former C1 and C2 species to determine their vulnerability to ESA listing and therefore their designation by BLM as a sensitive species, and further urges states without a sensitive species list to institute one comprised of the former C1 and C2 species that meet the 6840 Manual criteria.

BLM WY Approach

In March 1990, an Umbrella Memorandum Of Understanding (MOU) between the Wyoming Game and Fish Department (WGFD) and USDI BLM Wyoming for Management of the Fish and Wildlife Resources on the Public Lands was signed. The purpose of the MOU was for the two agencies to work together to benefit all wildlife in Wyoming by cooperating in planning, and sharing data among other efforts. Six Appendices were planned for Specific Areas of Cooperation, one of which was titled Ecosystem Management and included the subtitle State Sensitive Species. This appendix has yet to be written although the WGFD has a Native Species Status (NSS) matrix (formerly called Species of special Concern) identifying sensitive species, and under BLM Manual 6840 the Bureau is charged with using other agency's lists when BLM does not have a designated sensitive species list of its own.

The current status of BLM Sensitive Species lists in some adjacent states, and lists from other Federal and State agencies in Wyoming, were reviewed for this effort. BLM in Idaho listed 100 species of animals and 169 species of plants on their Sensitive Species List in 1996. In addition, they list 31 species on a Watch List for species whose populations and range appear to be restricted, but information is lacking as to the cause or if the species is headed for extinction and in need of management action to remove or reduce threats. Colorado and Arizona used the criteria from 6840 to update their lists (1998 and 2000 respectively). Arizona issued a list of 109 species, including 10 invertebrate species, in an Instruction Memorandum (IM) and Colorado updated their list to a total of 112 species in an Information Bulletin (IB). The Montana State Office issued an IM in May, 1994, listing 34 Special Status Species and 61 "Candidates" that includes the C1, 2, and 3 and proposed species. Their list has not been updated since the FWS Federal Register Notices in 1996. They have however started collecting information for Habitat Accounts that cover life histories, specific habitat requirements and a literature review for each sensitive species. BLM Utah (1997) lists a total of 178 mammal, bird, fish, reptile and amphibian species with 108 species of plants. The mammal and plant species listed by BLM Oregon/Washington numbered over 1000 species in February 2000 in 3 categories of Bureau Status: Bureau Sensitive - using the 6840 criteria; Bureau Assessment - species may need protection and are included in NEPA analyses; and Bureau Tracking - species for which more information is needed to determine status.

The Wyoming Natural Diversity Database (WYNDD) maintains a list of Wyoming Plant and Animal Species of Special Concern. It provides information on global and state abundance, legal status and state distribution about rare species. Their Species of Special Concern criteria are: if species are vulnerable to extirpation at the global or state level due to inherent rarity; if there is a significant loss of habitat; or if the species is sensitive to human-caused mortality or habitat disturbances. This information can be found on the internet at:
http://uwadmnweb.uwyo.edu/wyndd/WYNDD/SpeciesofConcern.htm

The Wyoming Game and Fish Department's Species of Special Concern (SSC) list in the 1996 Nongame Bird and Mammal Plan ranks 47 species using a matrix of population variables and

habitat variables. The codes of SSC1, SSC2, and SSC3 refer to each species' level of sensitivity and all are considered "sensitive". In 1998 the name of the matrix was changed to Native Species Status. The mammal list was revised in spring 2000 to reflect the addition of 12 species for a total of 35 mammals. The Department is actively involved in the Partner's in Flight effort to prioritize bird species of concern and develop a bird conservation plan. In November, 1999, the Habitat Protection Program (WGFD Cheyenne Office) produced a Species Watch List using State, Federal and University of Wyoming Cooperative Fish and Wildlife Research Unit sources to develop a list of 150 species that may need management attention.

Two Forest Service (USFS) Regions cover Wyoming: Region 2 (Rocky Mountain Region) in the eastern part of the state (Bighorn, Black Hills, Medicine Bow, and Shoshone National Forests and Thunder Basin National Grassland) and Region 4 (Intermountain Region) in the western part of Wyoming (Ashley, Bridger-Teton, Caribou, Targhee, Wasatch-Cache National Forests and Flaming Gorge National Recreation Area). The original list of Vertebrate Sensitive Species for Region 4 , issued in August, 1990, listed 29 vertebrates. Their January, 1999, updated list includes 222 species of plants, mammals, birds, fish, amphibians and reptiles, the majority (200) of which are plants. Another update of the Region 4 list is planned for this fall. Region 2 is in the process of updating their 1994 list of 165 species of plants, mammals, birds, fish, amphibians and reptiles, and invertebrates. Thunder Basin National Grassland lists 8 plant and 33 vertebrate species on their Species of Concern list.

BLM resource specialists statewide were polled in March 2000 concerning development of the BLM Wyoming Sensitive Species list. Suggestions and concerns heard from the field were: the species on the sensitive species list should have declining populations throughout all or part of its range; that species are experiencing declining habitat conditions; that the species and their habitats had to be manageable; and that the list should have a limited number of species to meet the objective of focusing management attention. The population and habitat criteria expressed largely correspond with the 6840 criteria. The manageability of the species, their habitats and the list size have guided the development of this list. Also requested were management guidelines, which are not included at this time, but are seen as likely extension of this effort. General habitat requirements are provided in the table as well as statewide distribution by Field Office.

Evaluation/Monitoring/Review Process

The BLM Sensitive Species List is meant to be dynamic. The State Office wildlife and botany staff will annually review the list and solicit recommendations from BLM and non-BLM appropriate authorities for additions and deletions. If biological information shows that a species needs to be included, or removed, the appropriate Field Manager or the State Office can make a nomination for an addition or deletion with sufficient scientific justification and supporting data concerning the above-listed criteria. Under this scenario, if such a species occurs in more than one Field Office, consensus will be sought from the other Field Offices before action is taken.

Any Federally de-listed threatened or endangered species will automatically be designated BLM

Wyoming Sensitive for the 5 year monitoring period required by the ESA. Species that were evaluated in a FWS 12 month finding but were found to be "not warranted", both petitioned species and species given candidate status after 1996, will initially be included on the BLM Wyoming Sensitive Species List.

The List

Using the criteria set forth in Manual 6840 (see page 1 above), BLM Wyoming is designating the following list of plants and animals to be Sensitive Species. While using these criteria, the process of including species on the list is still subjective. This list does not include those species already formally designated by the FWS as Federally endangered, threatened, proposed, and/or candidate.

Many species are not included on the list because their status is largely unknown and basic inventory is needed. It is the BLM Wyoming's intent that the WYNDD's and WGFD's lists should be regularly consulted by field personnel to develop inventory projects designed to gather information on population size, trend, and distribution for these poorly known species. They should also be the target for budgetary funding for inventory purposes.

BLM WYOMING STATE DIRECTOR'S SENSITIVE SPECIES LIST

(ANIMALS AND PLANTS)

September 2002

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: WY Natural Heritage Program; Forest Service (FS) Regions 2 and 4;Wyoming Game and Fish	Occurrence by BLM Field Office[2]									
				WFO	CYFO	RFO	RSFO	LFO	CFO	BFO	NFO	KFO	PFO
MAMMALS													
Myotis, Long-eared	*Myotis evotis*	Conifer and deciduous forests, caves and mines	G5/S1B, S1?N, NSS2, CA, NV, ID, OR/WA, AZ	X	X	X	X	X	X	X	X	X	X
Myotis, Fringed	*Myotis thysanodes*	Conifer forests, woodland-chaparral, caves and mine	G5/S1B, S1N, FSR2, TBNG, NSS2, CO, NV, ID, UT, MT, WA, AZ			X	X		X	X	X		
Bat, Spotted	*Euderma maculatum*	Cliffs over perennial water, basin-prairie shrub	G4/S1B, SZ?N FSR2, FSR4, NSS2,ID, CO, UT, MT, OR/WA, AZ, CA	X	X		X	X	X	X			
Bat, Townsend's Big-eared	*Corynorhinus townsendii*	Forests, basin-prairie shrub, caves and mines	G4/S1B, S2N, FSR2, TBNG, FSR4,NSS2, ID, CO, UT, MT, OR/WA	X	X	X	X	X	X	X			
Rabbit, Pygmy	*Brachylagus idahoensis*	Basin-prairie and riparian shrub	G4/S2, NSS3, ID, MT, OR/WA, IUCN LR(nt)				X					X	X
Prairie Dog, White-tailed	*Cynomys leucurus*	Basin-prairie shrub, grasslands	G4/S2S3, NSS3, MT (Petitioned 7/11/02)	X	X	X	X	X	X			X	X
Pocket Gopher, Wyoming	*Thomomys clusius*	Meadows with loose soil	G2/S1S2, NSS4, FSR2			X	X						
Pocket Gopher, Idaho	*Thomomys idahoensis*	Shallow stony soils	G4/S2?, NSS3, IUCN- LR(nt)				X					X	X
Fox, Swift	*Vulpes velox*	Grasslands	G3/S2A3, FSR2, MT (Removed from Federal Candidate list 01/08/01)	X	X	X	X	X	X	X	X		
BIRDS													
Ibis, White-faced	*Plegadis chihi*	Marshes, wet meadows	G5/S1B, SZN, FSR2, TBNG, NSS3, UT, MT, CO, AZ	X	X	X	X	X	X	X	X	X	X
Swan, Trumpeter	*Cygnus buccinator*	Lakes, ponds, rivers	G4/S1B, S2N, FSR2, TBNG, FSR4,NSS2, ID, MT	X	X	X	X	X	X	X	X	X	X

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: WY Natural Heritage Program; Forest Service (FS) Regions 2 and 4;Wyoming Game and Fish	Occurrence by BLM Field Office[2]									
				WFO	CYFO	RFO	RSFO	LFO	CFO	BFO	NFO	KFO	PFO
BIRDS (Continued)													
Goshawk, Northern	*Accipter gentilis*	Conifer and deciduous forests	G5/S23B, S4N, FSR2, TBNG, FSR4, NSS4, ID, CO, UT, MT, OR	X	X	X	X	X	X	X	X	X	X
Hawk, Ferruginous	*Buteo regalis*	Basin-prairie shrub, grassland, rock outcrops	G4/S3B, S3N, FSR2, TBNG, NSS3,ID, CO, MT, CA, OR	X	X	X	X	X	X	X	X	X	X
Falcon, Peregrine	*Falco peregrinus*	Tall cliffs	G4/T3/S1B, S2N, FSR2, TBNG, NSS3, UT, ID (Removed from Federal Endangered list 8/25/1999)	X	X	X	X	X	X	X		X	X
Sage-grouse, Greater	*Centrocercus urophasianus*	Basin-prairie shrub, mountain-foothill shrub	G5/S3, TBNG, ID, CO, UT, CA, NV, MT (Petitioned 6/8/2002)	X	X	X	X	X	X	X	X	X	X
Grouse, Columbian Sharp-tailed	*Tympanuchus phasianellus columbianus*	Grasslands	G4/T3/S1, FSR2, FSR4, ID, CO, UT, MT (Removed from federal petitioned list 10/11/2000)			X							
Curlew, Long-billed	*Numenius americanus*	Grasslands, plains, foothills, wet meadows	G5/S3B, SZN FSR2, TBNG, NSS3, ID, CO, UT, MT	X	X	X	X	X	X	X	X	X	X
Cuckoo, Yellow-billed	*Coccyzus americanus*	Open woodlands, streamside willow and alder groves	G5/S2B, SZN, FSR2, TBNG, NNS2, UT, ID, (Petitioned 7/25/2001)	X	X	X	X	X	X	X	X	X	X
Owl, Burrowing	*Athene cunicularia*	Grasslands, basin-prairie shrub	G4/S3B, SZN, FSR2, TBNG, NSS4, ID, MT, AZ, CA, OR	X	X	X	X	X	X	X	X	X	X
Thrasher, Sage	*Oreoscoptes montanus*	Basin-prairie shrub, mountain foothill shrub	G5/S3B,SZN, PIF Priority	X	X	X	X	X	X	X	X	X	X
Shrike, Loggerhead	*Lanius ludovicianus*	Basin-prairie shrub, mountain-foothill shrub	G5/S4B,SZN, FSR2, TBNG, ID, MT, AZ (Removed from candidate list 2/28/1996)	X	X	X	X	X	X	X	X	X	X
Sparrow, Brewer's	*Spizella breweri*	Basin-prairie shrub	G5/S3B,SZN, TBNG, PIF Priority, ID	X	X	X	X	X	X	X	X	X	X
Sparrow, Sage	*Amphispiza belli*	Basin-prairie shrub, mountain-foothill shrub	G5/S3B,SZN, PIF Priority, ID, MT, OR	X	X	X	X	X	X	X	X	X	X

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: WY Natural Heritage Program; Forest Service (FS) Regions 2 and 4;Wyoming Game and Fish	Occurrence by BLM Field Office[2]									
				WFO	CYFO	RFO	RSFO	LFO	CFO	BFO	NFO	KFO	PFO
Sparrow, Baird's	*Ammodramus Bairdii*	Grasslands, weedy fields	G4/S1B, SZN, FSR2, TBNG, MT	X	X	X		X	X	X	X		
FISH													
Chub, Roundtail	*Gila robusta*	CO River drainage, mostly large rivers, also streams and lakes	G2G3/S2?, NSS1, CO, UT			X	X					X	X
Chub, Leatherside	*Gila copei*	Bear, Snake and Green drainages, clear, cool streams and pools	G3G4/S2, NSS1, ID, UT				X					X	X
Sucker, Bluehead	*Catostomus discobolus*	Bear, Snake and Green drainages, all waters	G4/S2S3, NSS1, CO, UT			X	X					X	X
Sucker, Flannelmouth	*Catostomus latipinnis*	CO River drainage, large rivers, streams and lakes	G3G4/S3, NSS1, CO, UT			X	X					X	X
Trout, Yellowstone Cutthroat	*Oncorhynchus clarki bouvieri*	Yellowstone drainage, small mountain streams and large rivers	G4T2/S2, FSR2, NSS3, ID, MT (Removed from petitioned list 2/23/2001)	X	X			X		X			X
Trout, Colorado River Cutthroat	*Oncorhynchus clarki pleuriticus*	CO River drainage, clear mountain streams	G4T2T3/S2, FSR2, FSR4, NSS2, CO, UT, (Petitioned 12/19/1999)			X	X					X	X
Trout, Bonneville Cutthroat	*Oncorhynchus clarki utah*	Bear R. drainage, clear mountain streams	G4T2/S1S2, NSS2, FSR4, ID, UT, (Removed from petitioned list 10/9//2001)									X	
Trout, Fine-spotted Snake River Cutthroat	*Oncorhynchus clarki spp*	Snake R. drainage, clear, fast water	G4T1T2Q/S1, NSS4, FSR4, Petitioned									X	X
REPTILES													
Rattlesnake, Midget Faded	*Crotalus viridis concolor*	Mountain foothills shrub, rock outcrop	G5T3/S1S2, CO				X						
AMPHIBIANS													

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: WY Natural Heritage Program; Forest Service (FS) Regions 2 and 4;Wyoming Game and Fish	Occurrence by BLM Field Office[2]									
				WFO	CYFO	RFO	RSFO	LFO	CFO	BFO	NFO	KFO	PFO
Frog, Northern Leopard	*Rana pipiens*	Beaver ponds, permanent water in plains and foothills	G5/S3, FSR2, TBNG, NSS4, CO, ID, MT	X	X	X	X	X	X	X	X	X	X
AMPHIBIANS (continued)													
Spadefoot, Great Basin	*Spea intermontana*	Spring seeps, permanent and temporary waters	G5/S4, NSS4, CO			X	X	X				X	
Toad, Boreal (Northern Rocky Mountain population)	*Bufo boreas boreas*	Pond margins, wet meadows, riparian areas	G4T4/S2,NSS2, FSR2, FSR4, UT, ID		X	X	X	X				X	X
Frog, Spotted	*Ranus pretiosa (lutieventris)*	Ponds, sloughs, small streams	G4/S2S3, FSR2, FSR4, NSS4, ID, UT, MT		X		X	X		X		X	X
PLANTS													
Meadow Pussytoes	*Antennaria arcuata*	Moist, hummocky meadows, seeps or springs surrounded by sage/grasslands 4,950-7,900'	G2/S2, FSR4				X	X					X
Laramie Columbine	*Aquilegia laramiensis*	Crevices of granite boulders & cliffs 6,400-8,000'	G2/S2, FSR2			X			?				
Small Rock Cress	*Arabis pusilla*	Cracks/Crevices in sparsely vegetated granite/pegmatite outcrops w/in sage/grasslands 8,000-8,100'	G1/S1(Removed from Federal Candidate list 10/25/99)				X						
Mystery Wormwood	*Artemisia biennis var. diffusa*	Clay flats & playas 6,500'	G5T1/S1				P						

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: WY Natural Heritage Program; Forest Service (FS) Regions 2 and 4;Wyoming Game and Fish	Occurrence by BLM Field Office[2]									
				WFO	CYFO	RFO	RSFO	LFO	CFO	BFO	NFO	KFO	PFO
Porter's Sagebrush	*Artemisia porteri*	Sparsely vegetated badlands of ashy or tufaceous mudstone & clay slopes5,300-6,500'	G2/S2					X	X	X			
Dubois Milkvetch	*Astragalus gilviflorus var. purpureus*	Barren shale, badlands, limestone, &redbed slopes & ridges 6,900-8,800'	G5T2/S2					X					
PLANTS (Continued)													
Hyattville Milkvetch	*Astragalus jejunus var. articulatus*	Sparsely vegetated stony ridges & barren red clay slopes 4,900-5,900'	G3T1/S1	X									
Nelson's Milkvetch	*Astragalus nelsonianus -or- Astragalus pectinatus var. platyphyllus*	Alkaline clay flats, shale bluffs and gullies, pebbly slopes, and volcanic cinders in sparsely vegetated sagebrush, juniper, & cushion plant communities at 5200-7600'	G2/S2, CO			X	X	X	X				
Precocious Milkvetch	*Astragalus proimanthus*	Cushion plant communities on rocky, clay soils mixed with shale on summits & slopes of white shale hills 6,800-7,200'	G1/S1				X						
Trelease 's Milkvetch	*Astragalus racemosus var. treleasei*	Sparsely vegetated sagebrush communities on shale or limestone outcrops & barren clay slopes at 6500-8200'	G5T2/S1									X	X
Cedar Rim Thistle	*Cirsium aridum*	Barren, chalky hills, gravelly slopes, & fine textured, sandy-shaley draws 6,700-7,200'	G2Q/S2			X	X	X					X

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: WY Natural Heritage Program; Forest Service (FS) Regions 2 and 4;Wyoming Game and Fish	Occurrence by BLM Field Office[2]									
				WFO	CYFO	RFO	RSFO	LFO	CFO	BFO	NFO	KFO	PFO
Ownbey's Thistle	*Cirsium ownbeyi*	Sparsely vegetated shaley slopes in sage & juniper communities 6,440 8,400'	G3/S2, CO				X						
Many-stemmed Spider-flower	*Cleome multicaulis*	Semi-moist, open saline banks of shallow ponds & lakes with baltic rush & bulrush 5,900'	G2G3/S1, CO						X				
PLANTS (Continued)													
Owl Creek Miner's Candle	*Cryptantha subcapitata*	Sandy-gravelly slopes & desert ridges on sandstones of the Winds River Formation 4,700-6,000'	G1/S1					X					
Evert's Wafer-Parsnip	*Cymopterus evertii*	Coarse volcanic soils or sandstone outcrops dominated by cushion plants or sparse shrublands in openings within Rcky Mtn juniper or Limber pine woodlands at 5,900-10,900'	G2G3/S2S3	?	X								
Williams' Wafer-Parsnip	*Cymopterus williamsii*	Open ridgetops & upper slopes with exposed limestone outcrops or rockslides 6,000-8,300'	G3/S3	X					X	X			
Wyoming Tansymustard	*Descurainia torulosa*	Sparsely vegetated sandy slopes at base of cliffs of volcanic breccia or sandstone 8,300-10,000'	FSR4, G1/S1				X						
Weber's Scarlet Gilia	*Ipomopsis aggregata ssp. weberi*	Openings in coniferous forests & scrub oak woodlands 8,500-9,600'	G5T1T2Q/S1, FSR2			X							

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: WY Natural Heritage Program; Forest Service (FS) Regions 2 and 4;Wyoming Game and Fish	Occurrence by BLM Field Office[2]									
				WFO	CYFO	RFO	RSFO	LFO	CFO	BFO	NFO	KFO	PFO
Entire-Leaved Peppergrass	*Lepidium integrifolium var. integrifolium*	WY populations occur in sparsely vegetated and seasonally wet clay flats, greasewood communities on clay hummocks, and moist alkaline meadows at 6,200-6,770'	G2T1?/S1									X	
Sidesaddle Bladderpod	*Lesquerella arenosa var. agrillosa*	Dry, open rock outcrops of gravel, shale, or limestone & barren, often seleniferous, roadsides 4,200-4,300'	G5T3/S1								X		
Fremont Bladderpod	*Lesquerella fremontii*	Rocky limestone slopes & ridges 7,000-9,000'	G2/S2					X					
PLANTS (Continued)													
Large-fruited Bladderpod	*Lesquerella macrocarpa*	Gypsum-clay hills & benches, clay flats, & barren hills 7,200-7,700'	G2/S2				X					X	X
Western Bladderpod	*Lesquerella multiceps*	Dry, gravelly limestone ridges & slopes in sparse grasslands or cushion plant communities at 8,300-8,600'	G3/S1									?	
Prostrate Bladderpod	*Lesquerella prostrata*	Cushion plant or sparse sage grassland communities on slopes and rims of whitish to reddish or gray limey clays & soft sandstones with a surface layer of fine gravel at elevations of 7,200-7,700'	G3/S1									X	
Absaroka Beardtongue	*Penstemon absarokensis*	Sparsely vegetated openings on steep slopes of loose volcanic rubble or outcrops of dry andesitic volcanic rock at 5,920-10,000'	G2/S2		X								

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: WY Natural Heritage Program; Forest Service (FS) Regions 2 and 4;Wyoming Game and Fish	Occurrence by BLM Field Office[2]									
				WFO	CYFO	RFO	RSFO	LFO	CFO	BFO	NFO	KFO	PFO
Stemless Beardtongue	*Penstemon acaulis var. acaulis*	Cushion plant or Black sage grassland communities on semi-barren rocky ridges, knolls, & slopes at 5,900-8,200'	G3T2/S1				X						
Gibbens' Beardtongue	*Penstemon gibbensii*	Sparsely vegetated shale or sandy-clay slopes 5,500-7,700'	G1/S1, CO			X							
Beaver Rim Phlox	*Phlox pungens*	Sparsely vegetated slopes on sandstone, siltstone, or limestone substrates 6,000-7,400'	G2/S2				X	X				X	X
Tufted Twinpod	*Physaria condensata*	Sparsely vegetated shale slopes & ridges 6,500-7,000'	G2/S2				X					X	X
PLANTS (Continued)													
Dorn's Twinpod	*Physaria dornii*	Dry, calcareous-shaley soils on slopes & ridges w/mountain mahogany & rabbitbrush 6,500'-7,200'	G1/S1									X	
Rocky Mountain Twinpod	*Physaria saximontana var. saximontana*	Sparsely vegetated rocky slopes of limestone, sandstone or clay 5,600-8,300'	G3T2/S2	X				X					
Persistent Sepal Yellowcress	*Rorippa calycina*	Riverbanks & shorelines, usu on sandy soils near high-H^2O line	G3/S2S3	X	X	X		X					
Shoshonea	*Shoshonea pulvinata*	Shallow, stony calcareous soils of exposed limestone outcrops, ridgetops, & talus slopes 5,900-9,200'	G2G3/S2, MT		X			?					
Laramie False Sagebrush	*Sphaeromeria simplex*	Cushion plant communities on rocky limestone ridges & gentle slopes 7,500-8,600'	G2/S2			X			X				

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: WY Natural Heritage Program; Forest Service (FS) Regions 2 and 4;Wyoming Game and Fish	Occurrence by BLM Field Office[2]									
				WFO	CYFO	RFO	RSFO	LFO	CFO	BFO	NFO	KFO	PFO
Green River Greenthread	*Thelesperma caespitosum*	White shale slopes & ridges of Green River Formation 6,300'	G1/S1				X						
Uinta Greenthread	*Thelesperma pubescens*	Sparsely vegetated benches & ridges on coarse, cobbly soils of Bishop Conglomerate 8,200-8,900'	G1/S1, FSR4				X						
Cedar Mtn. Easter Daisy	*Townsendia microcephala*	Rocky slopes of Bishop Conglomerate 8,500'	G1/S1				X						
Barneby's Clover	*Trifolium barnebyi*	Ledges, crevices, & seams on reddish - cream Nugget Sandstone outcrops 5,600-6,700'	G1/S1					X					
TOTALS			**75 species statewide**	**26**	**27**	**35**	**47**	**35**	**27**	**24**	**18**	**36**	**33**

[1]Rankings
Heritage Program
WYNDD uses a standardized ranking system developed by The Nature Conservancy's Natural Heritage Network to assess the global and statewide conservation status of each plant and animal species, subspecies, and variety. Each taxon is ranked on a scale of 1-5, from highest conservation concern to lowest. Codes are as follows:

G	Global rank: Rank refers to the rangewide status of a species.
T	Trinomial rank: Rank refers to the rangewide status of a subspecies or variety.
S	State rank: Rank refers to the status of the taxon (species or subspecies) in Wyoming. State ranks differ from state to state.
1	Critically imperiled because of extreme rarity (often known from 5 or fewer extant occurrences or very few remaining individuals) or because some factor of a species' life history makes it vulnerable to extinction.
2	Imperiled because of rarity (often known from 6-20 occurrences) or because of factors demonstrably making a species vulnerable to extinction.
3	Rare or local throughout its range or found locally in a restricted range (usually known from 21-100 occurrences).
4	Apparently secure, although the species may be quite rare in parts of its range, especially at the periphery.
5	Demonstrably secure, although the species may be rare in parts of its range, especially at the periphery.
H	Known only from historical records. 1950 is the cutoff for plants; 1970 is the cutoff date for animals.
X	Believed to be extinct.
A	Accidental or vagrant: A taxon that is not known to regularly breed in the state or which appears very infrequently (typically refers to birds and bats).
B	Breeding rank: A state rank modifier indicating the status of a migratory species during the breeding season (used mostly for migratory birds and bats)
N	Nonbreeding rank: A state rank modifier indicating the status of a migratory species during the non-breeding season (used mostly for migratory birds and bats)
ZN or ZB	Taxa that are not of significant concern in Wyoming during breeding (ZB) or non-breeding (ZN) seasons. Such taxa often are not encountered in the same locations from year to year.
U	Possibly in peril, but status uncertain; more information is needed.
Q	Questions exist regarding the taxonomic validity of a species, subspecies, or variety.
?	Questions exist regarding the assigned G, T, or S rank of a taxon.

State Status
The Wyoming Game and Fish Department has developed a matrix of habitat and population variables to determine the conservation priority of all native, breeding bird and mammal species in the state. Six classes of Native Status Species (NSS) are recognized, of which classes 1, 2, and 3 are considered to be high priorities for conservation attention.
These classes can be defined as follows:
NSS1 Includes species with on-going significant loss of habitat and with populations that are greatly restricted or declining (extirpation appears possible).
NSS2 Species in which (1) habitat is restricted or vulnerable (but no recent or significant loss has occurred) and populations are greatly restricted or declining; or (2) species with on-going significant loss of habitat and populations that are declining or restricted in numbers and distribution (but extirpation is not imminent).
NSS3 Species in which (1) habitat is not restricted, but populations are greatly restricted or declining (extirpation appears possible); or (2) habitat is restricted or vulnerable (but no recent or significant loss has occurred) and populations are declining or restricted in numbers or distribution (but extirpation is not imminent); or (3) significant habitat loss is on-going but the species is widely distributed and population trends are thought to be stable.

Forest Service

Region 2	Rocky Mountain Region
Region 4	Intermountain Region
TBNG	Thunder Basin National Grassland

Other BLM states

AZ	Arizona
CO	Colorado
ID	Idaho
MT	Montana
OR/WA	Oregon/Washington
UT	Utah

IUCN - International Union for Conservation of Nature, Rodent Specialist Group. North American Red List. LOWER RISK (LR) - A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories:
1.Conservation Dependent (cd). Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.
2.Near Threatened (nt). Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.
3.Least Concern (lc). Taxa which do not qualify for Conservation Dependent or Near Threatened.
PIF - Partners in Flight, a coalition of federal, state and provincial agencies, private groups, corporations and individuals dedicated to neotropical migratory bird conservation

Petitioned- Species which has been petitioned for listing under the Endangered Species Act

[2] Occurrence by BLM Field Office

WFO	Worland
CFYO	Cody
RFO	Rawlins
RSFO	Rock Springs
LFO	Lander
CFO	Casper
BFO	Buffalo
NFO	Newcastle
KFO	Kemmerer
PFO	Pinedale

For Plants:

P - Indicates occurrence within BLM Field Office area on **P**rivate Land Ownership
S - Indicates occurrence within BLM Field Office area on **S**tate Land Ownership
F - Indicates occurrence within BLM Field Office area on other **F**ederal Land Ownership
? - Indicates likely occurrence within BLM Field Office area

APPENDIX F: WILDLIFE MONITORING/PROTECTION PLAN

APPENDIX G

RAPTOR MITIGATION AND MONITORING PLAN

Raptor Mitigation and Monitoring Plan

Wind River Natural Gas Field Development Project

Prepared by:

Buys & Associates, Inc.
Littleton, CO 80122

Prepared for:

Bureau of Indian Affairs
Wind River Agency
Ft. Washakie, WY

November 2004

APPENDIX G: RAPTOR MITIGATION AND MONITORING PLAN

APPENDIX D

RAPTOR MITIGATION AND MONITORING PLAN

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Raptor Mitigation and Monitoring Plan

1.0 PURPOSE AND GOALS

This raptor mitigation and monitoring plan (RMMP) has been developed for application to the Wind River Natural Gas Field Development Project. The purpose of this plan is: (1) to provide the means to enable managers to avoid and minimize impacts to raptors, (2) to mitigate impacts that do occur through measures designed to maintain the long-term breeding raptor population in the region at a level comparable to that which would have occurred in the absence of the gas field development, and (3) to document the effectiveness of the mitigation and monitoring plan.

2.0 METHODS

2.1 AVOIDANCE AND MINIMIZATION OF IMPACTS

2.1.1 Instruction of Personnel

All project workers will be provided information on raptor species that occur on the Project Area, potential impacts to these species, and measures that can be taken to avoid or minimize impacts. They will also be advised of federal and state regulations and laws concerning harassment and illegal kill of raptor species.

2.1.2 Power Line Cross-arms

If above-ground power lines are installed, power pole cross arms will be configured by the owner of the power line according to specifications described in *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996 (*Avian Power Line Interaction Committee) so as to eliminate the potential for raptor electrocution.

2.1.3 Seasonal Restrictions

Seasonal restrictions of construction activities within ¼ mile of occupied raptor nests will be applied. An occupied nest is defined as one where eggs or young are being incubated or tended. Occupied nests will be protected during the nesting period until the young have safely fledged. Typically the exclusionary time window for nesting activities extends from February 1 through July 31 for golden eagles and from March 15 through July 31 for other raptor species. The Bureau of Indian Affairs (BIA), in coordination with the Bureau of Land Management (BLM), US Fish and Wildlife Service (USFWS) and Wyoming Game and Fish Department (WGFD), may modify these dates depending on the specific circumstances surrounding individual nests.

Seasonal restrictions will be applied as follows:

- Any construction, drilling or other activity initiated prior to February 1 may be completed. This means a well may be permitted, drilled and completed, without restrictions unless activities on the drill site cease for 3 weeks or longer between February 1 and June 1. In the event of such prolonged construction and drilling inactivity, a nest survey must be performed in ¼-mile radius surrounding the drill site to determine whether or not an occupied nest has been established during the period of inactivity. If an occupied nest is found, the operation must temporarily cease until the young have fledged.

- Any activity initiated between February 1 and June 1 will require a nest survey by the wildlife protection agencies (USFWS on the Wind River Indian Reservation (WRIR) and WGFD on Bureau of Reclamation (BOR) surface) or the Operator‘s consultants; if an occupied nest is present, activity would be restricted during the critical breeding period.

2.1.4 Casual Use

Casual uses within the WRPA include, but are not limited to, ground activities such as: (1) preliminary scouting of routes or sites, (2) land surveying and staking, and (3) cultural and wildlife surveys. Because casual use is generally not treated as a managed or permitted activity, there is a potential for causing impacts to nesting raptors. Measures that can be taken to minimize or avoid potential impacts are outlined below:

- Casual use activities away from existing roads and facilities that are scheduled to occur between March 1 and mid-June should be coordinated with the BIA and wildlife protection agencies in order to obtain current information about raptor nests in the area.
- If an adult raptor is flushed from a nest, particularly when eggs or nestlings are present, it is important to get away from the nest area immediately so that the adult may quickly return to the nest to incubate the eggs or to shelter the young birds. During the first few weeks after hatching, raptor chicks are unable to thermoregulate their body temperature and must have an adult on the nest in order to stay warm. The danger to exposed eggs or young is greater when temperatures are cold (less then 60 degrees F) or hot (greater than 90 degrees F), and when it is raining or snowing. Winds in excess of 10 mph, combined with cold temperatures or precipitation, increase the potential for losses from exposure.
- Operators must report to the BIA, USFWS or WGFD raptor nests that are discovered and must not approach them. Employees will be directed not to enter buffer zones, established by the BIA, USFWS or WGFD to reduce potential impacts to raptor adults or young and to prevent nest abandonment.
- The discovery of injured or dead raptors or nestlings which have fallen from nests must be reported to the Wyoming Game and Fish Department, Lander (307-332-2688), US FWS, Lander (307-332-2159) or the BIA, Ft. Washakie (307-332-3718). Under no circumstances should these birds be approached or handled.

Other general information and guidelines that are pertinent to the management of casual uses so as to minimize potential impacts to nesting raptors are provided below.

- Routine operations and maintenance on existing roads and facilities would cause little or no impacts.
- Early nesting golden eagles may be on eggs as early as the first week of March while late nesting birds may not commence incubation until the last week of May.
- Initiation of incubation by ferruginous hawks may commence as early as the first week of April, and as late as the second week of June. Red-tailed hawks and prairie falcons nest within the same approximate time frame as ferruginous hawks. Great horned owls nest earlier than golden eagles.

2.1.5 "Unusual Maintenance"

"Unusual maintenance" means extensive or significant operations, such as workover operations or other operations which include loud noise or night-time activity. If "unusual maintenance" is necessary within ¼-mile of an occupied nest between March 1 and June 15, the Operators must contact the BIA, USFWS, or WGFD for prior approval of operations or maintenance which would be "unusual." Emergency (safety) measures are not restricted. The seasonal restriction at any particular occupied nest would be about 60 days, which would protect the raptors from intense disturbance during the periods of egg-laying, incubation and the first two weeks of brooding.

Evaluation of specific requests for prior approval would be based upon the following criteria:

- Dates of proposed maintenance activities.
- Extent of proposed maintenance activities (length of time, number of vehicles and people, noise, daytime vs. "round-the-clock" operations).
- Stage of nesting (egg-laying, incubating, brooding).
- Distance and visual relationship between the nest and the proposed maintenance activities.

2.2 MITIGATION

2.2.1 Rationale and Overall Plan

As described in the Draft Environmental Impact Statement (DEIS), some nesting pairs of raptors may be displaced from the WRPA during the drilling and construction phase of the project. The BIA, USFWS or WGFD may determine that artificial nesting structures (ANSs) are the most appropriate measures for mitigating impacts to raptor nests. It was recommended by the USFWS that, if ANSs are used to mitigate for displacement of raptors from nests, they be constructed at a rate of two ANSs to one impacted raptor nest (USFWS 2004). A permit for active nest removal must be obtained from the USFWS's Migratory Bird Office (Cheyenne, Wyoming) prior to removal. The rationale for the choice of this procedure as a mitigation action is that any losses in raptor production on the WRPA would be offset or more than offset by the creation of nesting opportunities in areas where they did not previously exist or were poor.

2.2.2 Justification for ANS Use

The use of ANSs may be selected as a mitigation option due to the demonstrated success of this technique for increasing raptor production in other areas (Call 1994, Call and Tigner 1991, Gaines 1985, Houston and Scott 1992, Olendorff 1993, Schmutz et al. 1984, Schmutz 1989, Smith and Murphy 1978, Stalmaster 1988, Steenhof et al. 1993, Wittenhagen 1992).

Physical description

ANS design and installation would follow the plan developed by Dr. Mayo Call (Raptor Biologist) and described in (Call 1989). In general, a wooden nest platform would be mounted on top of a large diameter (6" to 8") pressure-treated wooden pole approximately 9 to 12 feet above ground. Structures intended for use by golden eagles would be mounted 12 feet above the ground and would follow the general specifications used by Howard Postovit (Raptor Biologist) in the Powder River Basin of Wyoming. Structures intended for use by ferruginous hawks would be mounted at 9 feet above the ground. Wire netting secured to the nest platform will serve as an anchor for nesting materials used in constructing a nest. Nest materials would consist of sticks

collected from decadent sagebrush plants.

Site Selection

Selection of sites for ANS placement would be based on consultation with the BIA, USFWS, and WGFD. Site screening and selection would be accomplished using maps, past studies, and an aerial survey. During the aerial survey, sites which have passed initial screening tests would be field- inspected for other criteria. Potential sites for ANS placement would include the following:

- Areas of "low potential" for oil and gas development would be selected based on analyses and mapping performed by BLM's Wyoming Reservoir Management Group.
- Sites within the areas classified as "low potential" for oil and gas development areas of currently unleased federal mineral and surface estate would be selected.
- Raptor habitats lacking good natural nest substrates (rock pinnacles, cliffs, trees) would be selected in areas at least 1 mile from known active nests. Raptor habitats where only predator-accessible nests exist are likely to benefit from ANSs. Nests accessible to ground predators include nests located on: (1) the ground, (2) low pillar of rock (less than 6 feet high), (3) stream banks or erosion cuts accessible from either above or below, and (4) higher rock pillars that have an "access ramp" of natural rock leading up to it.
- Specific ANS sites would be selected in areas removed (at least ½ mile) from existing physical facilities that require or undergo frequent visits or use. Such facilities include roads, oil and gas wells or production facilities, and mineral quarries. Where possible, ANSs would be placed no closer than 200 feet from two-track trails and fences.
- ANS sites should be accessible to personnel who install and monitor them with access routes preferably not crossing private surface. When or if it is necessary to cross private surface the landowner would be notified.
- Avoid the most sparsely vegetated sites which are the least likely to support prey base for raptors.
- Space ANSs so that they are at least 1 mile apart.
- ANS sites should be outside of known sage grouse nesting habitats (2-mile radius from active leks) and prime brood rearing habitats (draws with riparian habitat).
- Place ANSs outside of areas with high densities of prairie dogs to avoid potential conflict with black footed ferret. This issue would be addressed and resolved during the aerial reconnaissance.

Permits

In the event that a raptor nest requires removal (e.g., human health and safety issues), the BIA will contact the US FWS Migratory Bird Office in Denver, CO at 303-236-8171 to obtain a permit to remove the nest.

Maintenance of ANS Sites

- Each ANS would be maintained in a functional condition for 20 to 40 years or until such time as it can be determined that their maintenance is no longer required or beneficial.
- If an ANS is not used by raptors for 5 years after placement, or if the site is compromised by an unavoidable disturbance, it would be relocated.

- Management of the federal mineral and surface lands would be executed so as to avoid disturbances to raptors nesting on the ANSs. The development of site specific restrictions is based on: (1) ¼ to 1/2-mile No Surface Occupancy (NSO) recommendations from the USFWS (2) BLM's standard seasonal restrictions, and (3) information on the biological need and distances required for insulating nesting ferruginous hawks contained in the draft paper entitled *A Review of Literature Concerning the Use of Artificial Nesting Structures by Ferruginous Hawks and Other Raptors (Baldwin and Hayden-Wing 1997).* Restrictions are as follows:

    - A 1/4–mile NSO radius would be established around each ANS site.
    - In addition to the ¼-mile NSO radius, a seasonal raptor restriction buffer of up to an additional ¼-mile would be applied, depending upon line-of-sight distances. If line-of-sight extends ½ mile or more from the ANS, the seasonal restriction would extend ½ mile beyond the ¼-mile NSO buffer for a maximum total ½-mile buffer.
    - The size of the seasonal raptor restriction radius would be determined by the BIA, in consultation with the USFWS or WGFD, for individual sites at the time proposals for development are received by the BIA.
    - The BIA can modify or adjust these restrictions accordingly when new information becomes available.

ANSs are designed to require very little maintenance. If an ANS becomes unusable, it would be repaired after July 31, but prior to February 1 of the following year. Adherence to seasonal restriction for nesting raptors would be needed for maintenance activities.

2.3 MONITORING

Monitoring is used to evaluate the effectiveness of mitigation measures, which are intended to minimize the impacts of the Wind River Gas Field Development Project on raptor nesting. Monitoring also determines the extent to which development is occurring at the pace which was estimated and if the impacts to raptors are within the range which was predicted. If monitoring shows that mitigation is not effective, or needs to be changed, the mitigation measures may need to be adjusted.

Monitoring of the effectiveness of ANSs and of the population levels, as reflected by nesting densities and productivity of raptor species, are the two primary kinds of monitoring which would be conducted for the Wind River Natural Gas Field Development Project. The area in which ANS sites would be selected would be contiguous with the WRPA and support raptors of the same general regional populations as found on the WRPA. Monitoring population levels of raptor species will be done for the raptor mitigation area, which includes the WRPA, plus the ANSs outside the WRPA.

In addition to the raptor inventories conducted by the Operators in the Spring of 2003, the Operators have agreed to be responsible for the following raptor monitoring tasks:

- Raptor surveys will be conducted every five years for the life of the project (LOP) to determine the location of raptor nests/territories and their activity status.
- Annual surveys of bald eagle nesting and roosting areas for five consecutive years within the WRPA to determine use trends within the WRPA.
- Site-specific raptor surveys within 1-mile of proposed disturbance associated with each application for permit to drill (APD) and right-of-way application

- Implementation of 0.5 mile disturbance-free protection buffers (1-mile for bald eagles and ferruginous hawks) to protect existing nest sites.
- Review and possibly amend this Raptor Mitigation and Monitoring Plan after five years of data. If negative trends are documented sooner, the plan should be amended prior to five years.

If the BIA, USFWS, and WGFD believe that the use of ANSs is the appropriate mitigation measure, the following monitoring would be necessary in order to establish ANS placement:

- Survey raptor prey base (i.e., rodents) along previously established diurnal walking transects during mid July.
- Survey raptor prey base (i.e., rabbits) along previously established diurnal ground walking transects and nocturnal headlight transects during September.

2.4 REPORTING

An annual report on the results of the surveys (as described in Section 2.3 above) conducted during the year will be prepared by the Operators or their consultants. Such reports will contain only the data collected and will present the results of surveys and monitoring without analysis. These reports will be submitted no later than December 1 each year. Copies of the report will be sent to: BIA (Wind River Agency), , U.S. Fish and Wildlife Service (Lander and Cheyenne), and Wyoming Game and Fish Department (Lander).

3.0 SCHEDULE

The scheduling of raptor monitoring for the WRPA will be as described below. Scheduling for ANS construction, monitoring, and maintenance would be implemented once the BIA, USFWS, and WGFD determine that ANSs would be used. General times of the year are listed below as recommended timing for various surveys in the WRPA.

- Late May – mid-June – Aerial survey of occupied raptor nests on the Project Area, and the ANSs (if existing).
- Early July – Ground survey of ANSs (if established) to determine fledging/production.
- Mid July – Survey raptor prey base (rodents) along previously established transects on the WRPA.
- Mid-July – Establish and stake diurnal walking transects and survey raptor prey base (rodents) in the ANS areas (if established).
- September – Establish and stake diurnal walking transects and nocturnal headlight routes and survey raptor prey base (rabbits) in the ANS areas (if existing).
- September – Survey raptor prey base (rabbits) along previously established diurnal ground walking transects and nocturnal headlight transects on the Project Area.
- December 1 – Submit annual report (if not previously submitted).

4.0 EVALUATION

Following completion of the first year of surveys, the BIA, in coordination with the UFWS and the WGFD, will evaluate the effectiveness of the raptor mitigation measures and determine whether modifications are necessary. Such long-term results are likely to be of value to Operators, managers, and biologists in making future decisions regarding the mitigation of raptor impacts.

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BIOLOGICAL ASSESSMENT FOR THE

WIND RIVER NATURAL GAS FIELD DEVELOPMENT

PROJECT, FREMONT COUNTY, WYOMING

Prepared for:

U.S. Fish and Wildlife Service
Ecological Services
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September 2004

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1.0 INTRODUCTION

The Operators (Tom Brown, Inc., Samson Resources Company and Saba Energy of Texas) have notified the Wind River Agency of the Bureau of Indian Affairs (BIA) that they intend to drill 325 exploration and development wells in Fremont County, Wyoming in Townships 3 and 4 North and Ranges 2 through 5 East as shown in Figure 1. The topographic maps for this area include Pavillion Butte, Harris Bridge, Mexican Pass SW, Mexican Pass SE, Pavillion, and Ocean Lake. The Wind River Project Area (WRPA) presently contains three fields with producing wells, the Muddy Ridge, Pavillion, and Sand Mesa fields. The existing fields contain 178 producing wells, with accompanying production facilities, roads, compressors and pipelines.

1.1 ENDANGERED SPECIES ACT REQUIREMENTS

Section 7(c) of the Endangered Species Act (ESA) of 1973 requires that a Biological Assessment (BA) be prepared for any major Federal action to determine the effects of the proposed action on Federally listed species. If, based on the results of the biological assessment, it is determined that the proposed project "may affect, is likely to adversely affect" any listed species, formal consultation would be initiated with the USFWS. If it is concluded that the project "may affect, is not likely to adversely affect," an informal consultation will be requested with the USFWS to request the agency's concurrence with the determination.

The U.S. Fish and Wildlife Service (USFWS) has determined that six threatened or endangered species, or species proposed for listing under the ESA, may be present in the WRPA and need to be evaluated in this BA. Since the letter from the USFWS was written (2002), the mountain plover was removed from the list of "proposed" species (USFWS 2003b). Table 1 identifies these species and their federal status.

Table 1. Threatened, Endangered, and Proposed Species that may be Present in the WRPA (from USFWS 2002a).

COMMON NAME	LATIN NAME	STATUS	EXPECTED OCCURRENCE
Black-footed ferret	*Mustela nigripes*	Endangered (experimental, non-essential population)	Prairie dog colonies
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Found throughout the State
Grizzly bear	*Ursus arctos horribilis*	Threatened	Montane areas
Gray wolf	*Canis lupus*	Threatened (experimental, non-essential population)	Greater Yellowstone ecosystem
Canada lynx	*Lynx canadensis*	Threatened	Montane forests
Mountain plover	*Charadrius montanus*	Proposed[1]	Grasslands

[1]Removed from list of proposed species in September 2003 (68 FR 53083).

This Biological Assessment (BA) discusses the potential effects of the proposed development on species that are listed as threatened, endangered, and proposed for listing under the ESA. The BA also presents recommendations to ensure that the construction and subsequent operation of the proposed project will not jeopardize the continued existence of threatened and endangered species and species proposed for listing or result in the destruction or adverse modification of their critical habitat, if any has been designated. Analysis of the effects of the proposed Wind River Gas Field Development Project on these species complies with the provisions of the ESA.

1.2 CONSULTATION HISTORY

Previous Environmental Assessments and Biological Assessments have been conducted for oil and gas development by Tom Brown, Inc. for the following proposed projects.

- EA for Tom Brown, Inc., Pavillion North Oil/Gas Leasing Proposal Wind River Indian Reservation, Fremont County, Wyoming (BIA 1992)
- EA for Tom Brown, Inc., Haymaker Creek, Indian Butte, Little Dome and Owl Creek Oil/Gas Lease Option Proposals located within the Wind River Indian Reservation of Fremont County, Wyoming (BIA 1994)
- Tom Brown, Inc. and Brownlie, Wallace, Armstrong & Bander Exploration Wind River Oil and Gas Exploration License Agreement Environmental Assessment and Finding of No Significant Impact (BIA 1996)

2.0 PROJECT DESCRIPTION, HABITAT AND ALTERNATIVES

2.1 PROJECT DESCRIPTION

The Wind River Project Area (WRPA) natural gas producing operators, including Tom Brown, Inc., Samson Resources Company and Saba Energy of Texas, hereafter referred to as "the Operators", have notified the Wind River Agency of the Bureau of Indian Affairs (BIA) and the Lander Field Office of the Bureau of Land Management (BLM) that they intend to drill and develop 325 natural gas wells in the WRPA in central Wyoming. This is in addition to the existing 178 producing wells within the WRPA. The proposed exploration and development wells, access roads, pipelines, and other ancillary facilities are located on tribal, federal, and private surface, and tribal and private minerals. Facilities located on federal or tribal surface estate and Tribal minerals would be permitted by BIA and BLM. Facilities located on privately owned surface and privately owned minerals would be permitted with the Wyoming Oil and Gas Conservation Commission (WOGCC).

The WRPA is located in Townships 3 through 4 North and Ranges 2 through 5 East in Fremont County, Wyoming as shown in Figure 1. The WRPA is located approximately 21 miles northwest of Riverton, Wyoming and is bounded on the east by Boysen Reservoir. The WRPA consists of five development areas: Pavillion, Sand Mesa, Muddy Ridge, Sand Mesa South, and Coastal Extension (Figure 2). Main accesses to the various development areas within the WRPA are also shown in Figure 2. Access to the WRPA is from US Highway 26 and WY133 and 134 and other secondary roads (paved two-lane highways), light-duty roads (gravel surface roads that are maintained), and unimproved roads (dirt and gravel roads and tracks that are generally not maintained). Within the WRPA, there are a total of 45.6 miles of secondary roads, 104.2 miles of light-duty roads, and 185.1 miles of unimproved roads.

The Operators anticipate that future development in the WRPA would likely be concentrated within and near existing development areas rather than in outlying areas where development currently does not exist, with the exception of the exploratory and potential development wells proposed for the Sand Mesa, Coastal Extension, and Sand Mesa South.

2.2 DESCRIPTION OF HABITAT IN WRPA

The Wind River Project Area (WRPA) consists of a relatively level, gently sloping valley, with low lying, hilly terrain at elevations that range from 5,500 feet to approximately 4,750 feet within the lower elevations of cottonwood Creek, Muddy Creek and Fivemile Creek drainages. The majority of the land is currently used for agriculture, livestock grazing, and oil and gas development. Seven land cover types identified by the Wyoming Game and Fish Department's (WGFD) Land Cover Classification (GAP) system for the State of Wyoming have been identified in the WRPA. The seven primary vegetative cover types include Wyoming big sagebrush, desert shrub, cropland, mixed grass prairie, greasewood fans/flats, saltbush fans/flats and Shrub riparian and are described below.

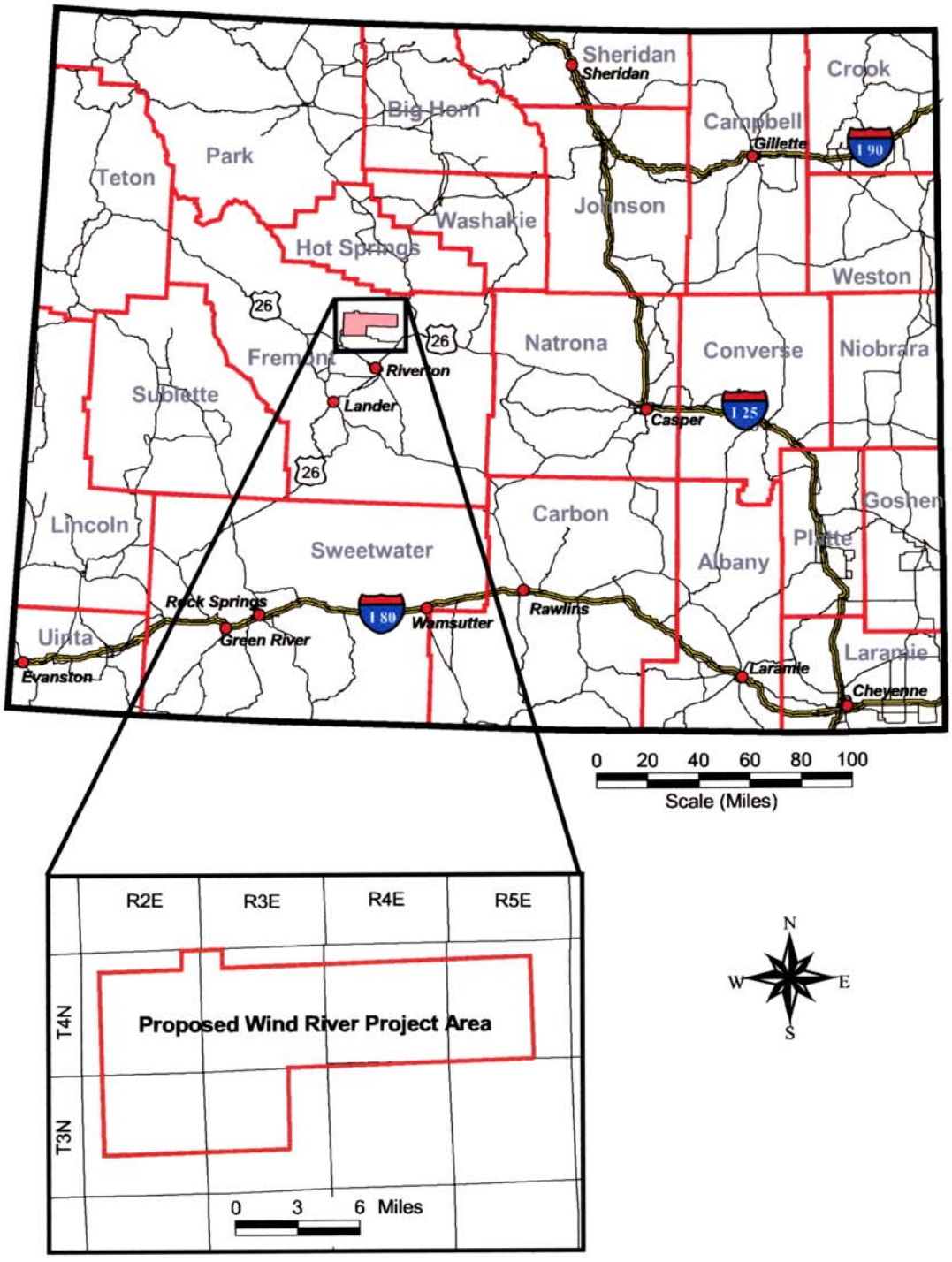

Figure 1. Location of Wind River Gas Development Project Area in Central Wyoming.

2.2.1 Wyoming Big Sagebrush

The sagebrush community covers 20,332 acres (approximately 22% of the WRPA). Wyoming big sagebrush (*Artemisia tridentate wyomingensis*) shrubland occupies relatively dry, low-elevation sites, whereas silver sagebrush (*Artemisia cana*) occupies the deep alluvial soils of drainage bottoms at low elevation. The vegetation included in this alliance is characterized by moderately sparse to moderately dense (20-70% cover) shrub layer that is dominated by Wyoming big sagebrush. The herbaceous layer is relatively sparse and often dominated by perennial graminoids (<20% cover) that occupy patches within the shrub matrix (WYNDD 2003); Reid et al 2002).

2.2.2 Desert Shrub

The desert shrub association covers 26,741 acres (approximately 29% of the WRPA, primarily in the north-central portion of the project area. The desert shrub association is composed of a mix of black greasewood (*Sarcobatus vermiculatus*), shadscale saltbush (*Atriplex confertifolia*), and Nuttall's or Gardner's saltbush (*Atriplex gardneri*), interspersed with a variety of grasses and forbs. The vegetation type consists of a mixture of dry, saline-adapted shrubs dominated by shadscale saltbush and often intermixed with greasewood, Gardner's saltbush, and several grasses and forbs. The shrub cover typically is greater than 25% and is usually located in flats and fans in Wyoming's central basins (WYNDD 2003; Reid et al 2002).

2.2.3 Greasewood Fans and Flats

Greasewood dominates this shrub cover type and represents more than 75% of the total shrub cover in places where total shrub cover is at least 25%. This association covers less than 843 acres (1%) of the WRPA. This shrub cover is found along riparian areas and often mixed with grasses. The distribution of this association is along streams at low to medium elevations, but it can be found on saline upland areas and basin fans/flats (WYNDD 2003); Reid et al 2002).

2.2.4 Irrigated Cropland

The most abundant cover type is irrigated crops, which represents 36,010 acres (39%) of the cover within the WRPA. The irrigated fields include row crops, irrigated pastureland, and hayfields associated with farm or ranching activities. Crops include corn, beans, potatoes, beets, sunflower, alfalfa, and hay, grown throughout the alluvial plains and riparian areas at elevations that range from 3,200 to 9,600 feet (WYNDD 2003).

2.2.5 Mixed Grass Prairie

Approximately 3,249 acres (4%) of the WRPA are characterized as mixed-grass prairie, and consists of short and tall grass prairie species that are often interspersed with *Artemisia* shrubs, typically silver sagebrush (*Artemisia cana*). This cover type is found at elevations from 3,200 to 10,300 feet. Common plant species include blue grama (*Bouteloua gracilis*), western wheatgrass (*Elymus smithii*), thickspike wheatgrass (*Elymus lanceolatus*), needle-and-thread (*Hesperostipa comata*), threadleaf sedge (*Carex filifolia*), and needle-leaf sedge (*Carex duriuscula*) (WYNDD 2003)

2.2.6 Saltbrush Fans and Flats

Gardner's saltbush is the dominant shrub that characterizes the saltbush fans and flats, which represents about 114 acres (<1%) of the WRPA. Generally these areas contain few or no other grass or shrub species on exposed soil in saline flats or fans at elevations of 6,200 to 7,200 feet within the Wind River Basin (WYNDD 2003).

2.2.7 Shrub Riparian

Riparian shrublands cover approximately 4,254 acres (5%) of the WRPA. Riparian shrublands typically contain more than 25% shrub cover with few or no trees. Shrub species include willow (*Salix* sp), greasewood, shrubby cinquefoil, alder, birch, and tamarisk interspersed with several *Artemisia* species (WYNDD 2003; Reid et al 2002). The riparian shrub lands are found throughout Wyoming.

2.3 DESCRIPTION OF ALTERNATIVES

Four alternatives have been developed for the proposed development project: Proposed Action (325 new wells), Alternative A (485 new wells), Alternative B (233 new wells), and Alternative C (No Action). The proposed project is in addition to 178 existing producing wells. Each of these alternatives is discussed below.

2.3.1 Proposed Action – 325 New Wells

The Operators are proposing to drill up to 325 new wells in the Wind River Project Area (WRPA). Economic conditions and the evaluation of the drilling results will determine the actual number of wells to be drilled. Some of the wells may be classified as exploration or delineation wells because natural gas production potential has not been fully defined due to geological uncertainties. Where production potential is better known, wells would be classified as in-fill or development wells. Drilling is expected to last for approximately 20 years, with the life of the project anticipated to be 20-40 years. The Proposed Action would require the construction of the following primary components on private, federal, and tribal lands within the WRPA:

- 325 new wells and associated lease roads (excluding 178 existing wells)
- 164 miles of new natural gas pipeline (excluding 101 existing miles), and
- 32,800hp of new compression (excluding 14,600 hp of existing compression).

The WRPA consists of approximately 91,520 acres. During the drilling and construction phase the proposed well pads, pipelines and roads would result in initial disturbance of approximately 1,982 acres or 2.15 percent of the total surface area in the WRPA. Following the completion of drilling operations, well pads would be reduced in size and pipeline right-of-ways (ROWs) would be restored. The residual disturbance would be 422.7 acres or 0.46 percent of the WRPA.

An existing road network developed to service existing drilling and production activities currently accesses the WRPA. The Operators anticipate that the drilling of additional wells within the WRPA would require the construction of additional roads. Existing pipelines and new pipelines, including new gathering lines, loop lines and tie-in lines to existing interstate pipelines, would transport the produced gas within and from the WRPA.

2.3.2 Alternative A – 485 New Wells

Alternative A would consist of an increased number and density of wells to 485 wells at 485 locations, assuming an overall success rate of 76 percent (i.e., 369 new wells). Assuming a success rate of 76 percent, the Operators anticipate that 369 of the 485 wells will be producing gas wells. During the construction phase, Alternative A would disturb up to 2,818.7 acres or 3.06 percent of the WRPA. With implementation of reclamation under Alternative A, disturbance would be reduced to 611.9 acres, or about 0.67 percent of the WRPA.

2.3.3 Alternative B – 233 New Wells

Alternative B would consist of a decreased number and density of new wells to 233 wells at 233 locations. Assuming a success rate of 78 percent, the Operators anticipate that 182 of the 233 wells will be producing gas wells. During the construction phase, Alternative B would result in surface disturbance of 1,609.6 acres or 1.75 percent of the WRPA. With implementation of reclamation under Alternative B, impacts would be reduced to 325.1 acres, or about 0.35 percent of the WRPA.

2.3.4 Alternative C – No Action

This alternative would allow Applications for Permit to Drill (APDs) and ROW applications to be granted by the Wyoming Oil and Gas Conservation Commission (WOGCC) on private minerals within the WRPA. Additional wells would be developed as needed to the prevent drainage of Tribal minerals. Under the No Action Alternative, approximately 100 new gas wells at 100 locations would be developed. Assuming a success rate of 100 percent, there would be 100 producing wells. With implementation of Alternative C, approximately 316.6 acres of surface disturbance would result, or 0.34 percent of the WRPA. After reclamation, total disturbance would be reduced to 79.3 acres or 0.09 percent of the WRPA.

Table 2. WRPA Disturbance Summary for Existing Production, the Proposed Action, and Alternatives A, B, and C.

Disturbance Type	Existing	Proposed Action		Alternative A		Alternative B		Alternative C (No Action)	
		New	LOP[1]	New	LOP	New	LOP	New	LOP
Well Pads (acres)	207.5	1164.1	263.3	1813.3	382.8	880	206.7	200.9	36.5
Roads (acres)	180.1	183.8	122.5	278.3	175.4	137.9	95.4	41.9	23.1
Pipelines (acres)	0	597.2	0	673.6	0	568.7	0	54.1	0
Ancillary Facilities[2]	22.9	36.9	36.9	53.5	53.5	23	23	19.7	19.7
Total disturbance (acres)	410.5	1982	422.7	2818.7	611.9	1609.6	325.1	316.6	79.3
Percent of WRPA	0.45	2.15	0.46	3.06	0.67	1.75	0.35	0.34	0.09
Gas Compression, Gas Treatment, and Electrical Generation (hp)	14,600	32,800		46,000		22,700		3,200	

[1] Life of Project (LOP)
[2] Ancillary facilities include production facilities in Pavillion irrigated fields; Pavillion Booster Station; and compressor stations.

3.0 METHODS USED IN PREPARATION OF THIS BA

The assessment and recommendations contained in this Biological Assessment are based on information obtained from various sources identified below.

3.1 PERSONAL COMMUNICATIONS, PUBLISHED/ UNPUBLISHED DATA

In preparation for this BA, meetings were held with wildlife biologists from the US Fish and Wildlife Service in Cheyenne and Lander, WY; U.S. Forest Service; Wyoming Department of Game and Fish, Lander and Cheyenne; Wyoming Department of Environmental Quality, Lander; Wind River Fish and Game, Ft. Washakie; Wind River Environmental Quality Commission, Ft. Washakie; the Bureau of Land Management, Lander; and the Bureau of Reclamation, Casper.

Wildlife biologists at the state and federal agencies that provided information on threatened, endangered, proposed species, and species of concern include Kathleen Erwin (USFWS, Cheyenne), Charlie Dillahunty (Wind River Agency, BIA; Ft. Washakie), Greg Anderson (Wyoming Game and Fish Department, Lander), Bob Oakleaf (Wyoming Game and Fish Department, Lander), Pat Hnilicka (USFWS, Lander), Preston Smith (Wind River Agency, BIA, Ft. Washakie), Mark Hogan (USFWS, Lander), Scott Ross (Wyoming Game and Fish Department, Lander), Andrea Surrowsky (Wyoming Game and Fish Department, Cheyenne), Connie Breckenridge (Bureau of Land Management, Lander), Mike Jimenez (USFWS, Wolf Management Program), Tavis Eddy (Wyoming Department of Environmental Quality, Lander), Terry Root (USFWS, Cody), Kevin Johnson (Wyoming Game and Fish Department, Lander), and the staff of the Wind River Environmental Quality Commission.

Published and unpublished documents were obtained from the USFWS, Wyoming Game and Fish Department, Wind River Agency, and Bureau of Land Management. Information was also obtained from the Wyoming Natural Diversity Database (WYNDD) and from the Internet sites of the WYNND, USFWS endangered species, and other relevant sites.

3.2 AERIAL SURVEY OF WRPA

Aerial surveys were conducted on April 16 and 17, 2003 to identify suitable habitat of threatened/endangered species, species proposed for listing, State sensitive species and habitats in the WRPA (Buys & Associates 2003a). The surveys were conducted for the presence of sage grouse (*Centrocercus urophasianus*) leks, bald eagle and other raptor nests, white-tailed prairie dog (*Cynomys leucurus*), game species and other wildlife and wildlife habitat in and adjacent to WRPA. The survey protocol consisted of early morning, low-level flights (200-250 feet) to document sage grouse strutting grounds (leks); the status and locations of two previously documented golden eagle (*Aquila chrysaetos*) nests, as well as any new raptor nests within the WRPA; presence of mountain plover (*Charadrius montanus*) habitat; and locations and dimensions of white-tailed prairie dog colonies in the area to determine if black-footed ferret surveys would be necessary. While flying above the WRPA, presence of other wildlife was documented as well as the wildlife habitat in the area.

A large portion of the WRPA is currently being used for agriculture. There are several canals winding through the area, all of which appeared to be used for irrigating adjacent agricultural fields. The majority of the western portion of the WRPA consists of large irrigated crop circles

and large fields, which appeared to be arranged so they could be flooded using the nearby canals. The land north of these crop fields appears to consist of roughly 20 percent short grasses, and 80 percent bare ground. This land was not being used by prairie dogs and did not look like suitable sage grouse habitat. However, it did appear to be suitable habitat for the mountain plover. The creeks running though the WRPA, including Muddy Creek and Fivemile Creek and their associated wetlands, as well as Boysen Reservoir and its associated wetlands, did not appear to contain any obligate wetland species that could be identified from the air. The few trees observed in the WRPA primarily surrounded houses, and likely served as windbreaks (Buys & Associates 2003a).

Existing oil and gas wells are located within the WRPA. The majority of the wells are in the southwestern portion of the area, north of Ocean Lake. There are numerous gas wells, storage tanks, and access roads in this area. There are also a few oil well locations visible from the air.

4.0 STATUS OF THREATENED AND ENDANGERED SPECIES

The life history and range-wide distribution of the six threatened, endangered, or proposed species identified by the USFWS as potentially being present in the WRPA, are provided below.

4.1 BLACK-FOOTED FERRET AND WHITE-TAILED PRAIRIE DOG

The black-footed ferret is considered to be one of the most endangered mammals in North America (FWS 1988) and was listed as endangered on the List of Endangered Species issued by the Office of Endangered Species on March 11, 1967 (32 FR 4001 - USFWS 1967).

4.1.1 Life History

The black-footed ferret is one of five members of the genus *Mustela* in North America. The ferret has a slender yellowish-brown body ranging from 18 to 24 inches in length, with short legs, rounded ears and bright “button-like” eyes, and a distinct black facemask and black feet (BLM 2002; Wassink 1993). The black-footed ferret has strong front limbs, large front paws, sharp claws, and slender bodies that are well-adapted for excavating and burrowing (King 1990). Other members of the genus *Mustela* include the mink (*Mustela vison*), which is smaller and dark brown in color; and the long-tailed weasel (*Mustela frenata*), which is approximately half the size of the ferret and does not have the distinct black face mask and feet.

The black-footed ferret is an obligate associate of the prairie dog. The range of the ferret is essentially identical with that of three species of prairie dogs: black-tailed prairie dog, Gunnison prairie dog, and white-tailed prairie dog. The white-tailed prairie dog is the species that is present in the WRPA. The black-footed ferret depends almost exclusively on the prairie dog ecosystem for food and shelter. Ninety percent of the ferret’s diet consists of prairie dogs. Other prey include cottontail rabbits, ground squirrels, voles, mice, and birds (USFWS 1988, USFWS 1998; BLM 2002). The black-footed ferret utilizes abandoned prairie dog burrows or burrows of prairie dogs they have killed for shelter, nesting, and rearing of young. The species is primarily nocturnal, with peak activity occurring after sunset and again between 0400 and 0600 hours (USFWS 1988; BLM 2002).

Black-footed ferrets are solitary predators, except during the breeding season. Female ferrets reach sexual maturity at one year of age. Breeding activity generally occurs in March or April, and after a 41-45 day gestation period, a litter of three or four young (kits) are born. Male black-footed ferrets do not assist in raising the young and generally stay with the female only until

breeding occurs. Life expectancy of ferrets in the wild is generally less than five years.

The primary threats to ferret survival include accidents, starvation, injury, canine distemper, sylvatic plague, parasites, and predators (e.g., coyotes, great-horned owls, badgers).

4.1.2 Current Status and Range-wide Distribution

Black-footed ferrets were once found throughout the prairie ecosystem of the Great Plains from foothills of the Rocky Mountains eastward through the grasslands of Kansas, Nebraska, the Dakotas, Oklahoma, and Texas (USFWS 1988; USFWS 1998; BLM 2002). The ferret's range is closely associated with that of prairie dogs, which were once abundantly distributed through the North American prairie. When the plains were settled and large tracts of prairie were tilled for agriculture, prairie dog and ferret habitat were destroyed. Poisoning campaigns in the early 1900's further reduced prairie dog and ferret populations (BLM 2002, NGPC 1996). Merriam (1902) and the USFWS (1988) estimated that in the late 1800's, prairie dogs occupied from 250 to 700 million acres of the plains. Recent studies indicate that today, prairie dogs occupy only about 1.5 million acres (NGPC 1996). These present day colonies of prairie dogs are smaller and more isolated than those found in the 1800's (NGPC 1996). As a result, black-footed ferret habitats are also smaller and more isolated (USFWS 1988; Reading et. al. 1996).

In the 1950's, ferrets were thought to occur in low densities throughout most of their historic range, but populations continued to disappear as a result of poisoning campaigns and diseases, such as plague and canine distemper (Reading et al. 1996). The last known wild population of black-footed ferrets was discovered in 1981 on a ranch in Meeteetse, Wyoming. The Meeteetse colony was studied for several years until canine distemper reduced the population's numbers to 18 known individuals (Reading et al. 1996). By 1987, these 18 ferrets had been taken into captivity to begin propagation program at Sybille Wildlife Center in Wyoming. Current recovery efforts emphasize the reintroduction of ferrets back into the wild from captive bred stock (USFWS 1998).

Currently, captive-bred ferrets have been released into the wild at six release sites: the Shirley Basin of Wyoming; Charles M. Russell National Wildlife Refuge and Fort Belknap Indian Reservation in Montana; Badlands/Buffalo Gap, South Dakota; Aubrey Valley, Arizona; Coyote Basin Primary Management Zone in Uintah County, Utah; and the Wolf Creek and Coyote Basin Black-footed Ferret Management Areas in Moffat and Rio Blanco counties, Colorado. All of the released ferrets, including those found in the Shirley Basin in Wyoming, are considered parts of experimental, non-essential populations (USFWS 1998). Although the number of captive black-footed ferrets has increased and ferrets have been reintroduced into six sites within their former range, no wild population, apart from the experimental, non-essential populations, is known to exist (Reading et. al. 1996).

4.1.3 White-tailed Prairie Dog Survey

Buys & Associates (2003b) completed quantitative white-tailed prairie dog (*Cynomys leucurus*) colony surveys in and adjacent to the Wind River Natural Gas Development Project Area. Aerial surveys of the WRPA and a two-mile buffer zone were conducted on April 16 and17, 2003. These surveys identified the locations of the prairie dogs, and determined areas for ground surveys. Ground surveys, consisting of colony mapping and burrow density estimates, were conducted on July 10 and 11, 2003. These surveys were conducted at all prairie dog colonies meeting USFWS (1989) requirements located within 2 miles of the WRPA. These areas included the following Townships (T) and Ranges (R) in Fremont County, Wyoming: T3N

- R1E, T4N - R1E, T4N - R2E, and T5N - R2E.

The overall goal of these surveys was to determine if the prairie dog colonies could provide potential habitat for the endangered black-footed ferret (*Mustela nigripes*). According to Biggins et al. (1989), active burrow density is strongly correlated with potential prairie dog density. The U.S. Fish and Wildlife Service (USFWS) defines a prairie dog colony as a group of prairie dog burrows whose density meets or exceeds 8 burrows/acre (20 burrows/ha) (USFWS 1989). They suggest viewing a colony as a group of 5-ha (12.35- acre) parcels, each of which must contain at least 100 burrows to be considered as potential black-footed ferret habitat. This implies that colonies smaller than 5 ha (12.35 acres) would not support black footed ferrets, and can therefore be eliminated from the survey.

The USFWS defines a prairie dog complex as two or more neighboring prairie dog colonies which are less than 7 km (4.34 miles) from each other (USFWS 1989; K. Erwin, USFWS, pers. comm., Sept. 2002). White-tailed prairie dog towns or complexes that are greater than 200 acres and have a minimum density of 8 burrows/acre (20 burrows/ha) have the potential to support black-footed ferrets, and therefore, must be surveyed for ferrets prior to approval of any surface disturbance or other land use that could adversely affect the species (USFWS 1989; K. Erwin, USFWS, pers. comm., Sept. 2002).

Four prairie dog colonies consisting of 1,243 acres (503 ha) were surveyed on or adjacent to the WRPA. The approximate density of active prairie dog burrows in and adjacent to the WRPA is 10.3 burrows/acre (25.5 burrows/ha). This number was derived by dividing the total number of active burrows (566) by the total area surveyed using transects (54.85 acres). No statistical corrections have been applied to this value. The 54.85 acres (22.2 ha) of transects evaluated comprises approximately 4.4 percent of the total 1,243 acres (503 ha) of prairie dog colonies illustrated in Figure 2. The 4.4 percent of active burrows is a sufficient sample size, according to Biggens et al. (1989).

The resulting 10.3 burrows/acre (25.5 burrows/hectare) density in the WRPA exceeds the USFWS minimum threshold of 8 burrows/acre (20 burrows/hectare) (USFWS, 1989). Therefore, the prairie dog colonies within the WRPA are considered potential black-footed ferret habitat (Table 3). Biggens et al.'s (1989) quantitative model was used to estimate the number of ferret families (*R)* that could be supported by a complex. In this model, a complex with a rating of R<1.0 is not expected to support ferrets. The Wind River complex has a rating of R= 1.9 (Table 4).

Table 3. Wind River WRPA Prairie Dog Burrow Density Estimates

Town	Area (Acre)	Area (Ha)	# Transects	Transect Area (Acre)	Transect Area (Ha)	# Active Burrows
F	868.81	351.6	46	34.1	13.8	383
G	118.61	48.0	11	8.15	3.3	60
H	176.19	71.3	9	6.67	2.7	67
I	79.32	32.1	8	5.93	2.4	56
Total	**1242.93**	**503.00**	**74**	**54.85**	**22.2**	**566**

Active Burrow/Acre =10.3
Active Burrow/ha = 25.5

Table 4. Wind River WRPA Prairie Dog Complex Ferret Family Estimate

Colony	# Trans.	Size (ha)	Trans. Good Hab.	Good Hab.%	Ha Good Hab.	Burrows/Ha	P.Dogs/Ha	Total P.Dogs	R
F	46	351.6	24	0.5200	182.83	45	6.63	1213	1.56
G	11	48.0	4	0.3636	30.03	35	5.16	155	0
H	9	71.3	5	0.4285	13.75	50	7.37	101	0
I	8	32.1	3	0.5555	54.77	36	5.31	290	0.38
								Total	**1.94**

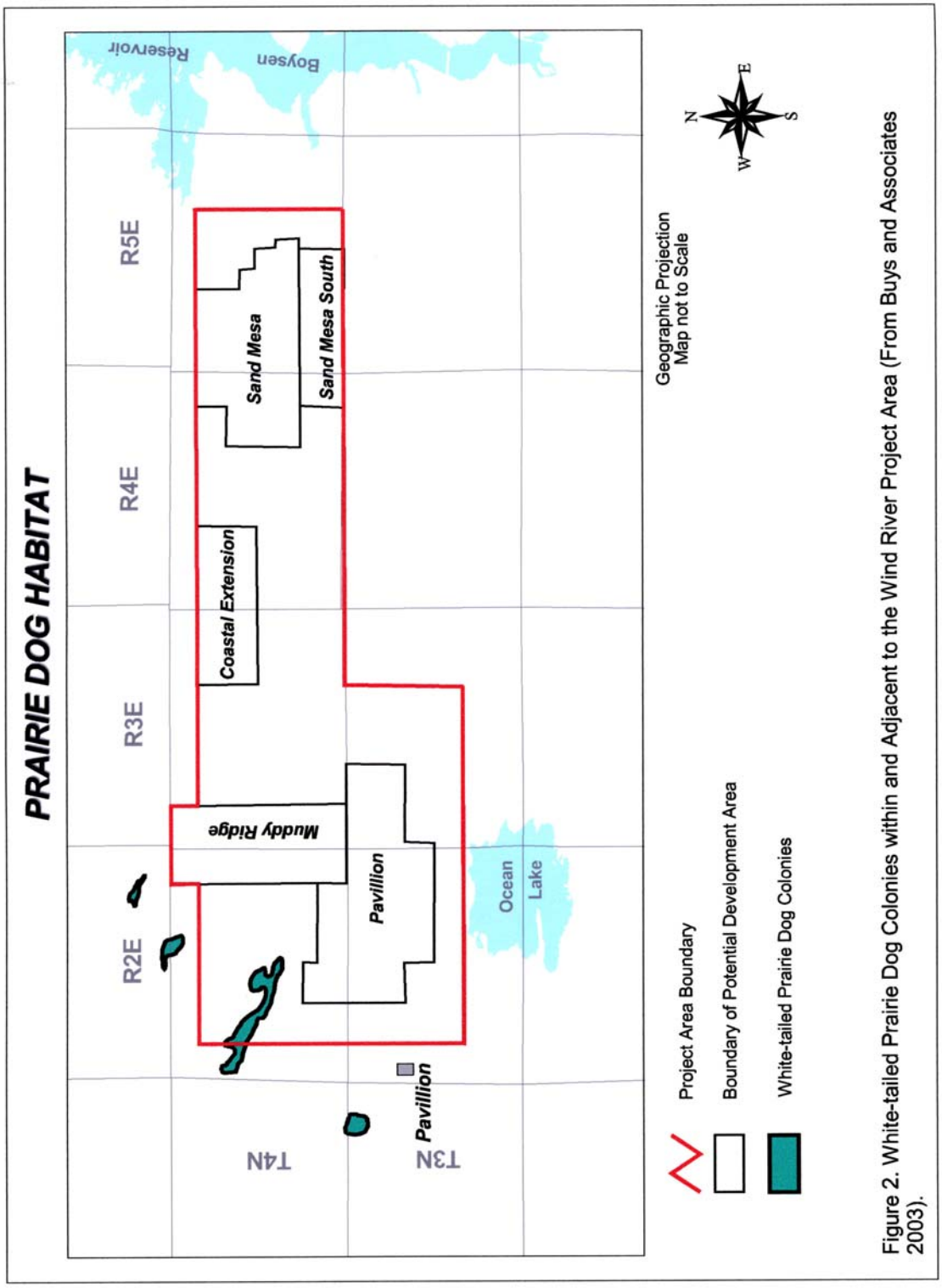

Figure 2. White-tailed Prairie Dog Colonies within and Adjacent to the Wind River Project Area (From Buys and Associates 2003).

4.2 BALD EAGLE

The bald eagle was listed as endangered in all areas of the U.S. south of the 40th parallel in 1967, on the List of Endangered Species issues by the Office of Endangered Species on March 11, 1967 (32 FR 4001 - USFWS 1967). It was re-listed as endangered under the Endangered Species Act of 1973 on July 4, 1976. As a result of the recovery of the bald eagle in the lower 48 States, its status was changed from endangered to threatened in July 1995. The USFWS is presently evaluating the removal of the bald eagle from the endangered species list. When the bald eagle is removed from the endangered species list, it will continue to be protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act (Rutledge 2003).

4.2.1 Life History

The bald eagle (*Haliaeetus leucocephalus*) is a member of the Accipitridae family, which includes hawks, kites, and old-world vultures. The coloration of the adult bald eagle is brownish-black on the back and breast with a white head, neck and tail, and yellow feet and bill. Juvenile bald eagles are a mixture of brown and white, with a black bill. The adult plumage develops when the eagles are sexually mature at about 4-5 years of age. The female bald eagle is slightly larger than the male at 35-37 inches in length, with a wingspan of 79-90 inches. Bald eagles weigh from 10-14 lbs and are estimated to live as long as 30 years, with an average lifespan of 15-20 years (Rutledge 2003).

Bald eagles begin breeding at four years of age and remain with the same mate for life. The eagles build large nests, which are often reused year after year (USFWS 2002a). The female lays 2-3 eggs and incubates them for about 35 days. Both the male and female incubate the eggs. The nests are generally built in large trees in riparian habitat along rivers or streams. A typical nest is around 5 feet in diameter. Nests are also built on cliffs or on the ground, if no other suitable nesting habitat is available. The nesting territory of the bald eagle ranges from 1-2 mi^2. The young eaglets are generally flying within three months. However, disease, lack of food, weather, or human interference may kill eaglets and sometimes only about 50 percent of the young will survive their first year (USFWS 2002a; Rutledge 2003). The nesting season of the bald eagle varies by region. In the Great Plains and western mountain region, breeding generally occurs from January through March.

The bald eagle is associated with aquatic ecosystems throughout most of its range. Nesting almost never occurs further than 3 km (2 mi) from water. Fish predominate in the typical diet of eagles. Many other types of prey are also taken, including waterfowl and small mammals, depending on location, time of year, and population cycles of the prey species. Dead animals or carrion, especially in wintering areas, are also taken when available (60 FR 3600ff - USFWS 1995).

In the fall, when the northern lakes and rivers begin to freeze, most bald eagles migrate south to areas with sufficient food, and return north in the spring to breed (Rutledge 2003). The eagles in the southern portion of the U.S. do not migrate, but remain in the same area year-round (Rutledge 2003). During the winter months, bald eagles communally roost in cottonwoods and other large trees along rivers and forage in upland habitats for carrion and small mammals.

A bald eagle winter roost site has been reported at the north end of Ocean Lake about 20 miles south of the proposed WRPA. The eagles could potentially roost in the proposed WRPA, although no roost sites have been reported there (P. Hnilicka, USFWS, pers. comm., June 2003). The home range of the bald eagle varies from 1,700 to 120,000 acres. Home ranges

are smaller where food is present in large quantities (Rutledge 2003).

4.2.2 Current Status and Range-wide Distribution

Historically the bald eagle ranged throughout North America, with the exception of extreme northern Alaska and Canada and central and southern Mexico. The species nested on both the Atlantic and Pacific coasts from Florida to Baja California, in the south, and from Labrador to the western Aleutian Islands, Alaska in the north. In many of these areas bald eagles were abundant. They inhabited large rivers and lakes throughout North America and nested in 45 of the 48 lower 48 States. It is estimated that before European settlers colonized the United States, bald eagles may have numbered 500,000. As the European settlers moved westward, the habitat of the eagles was rapidly destroyed leaving the eagles fewer areas for hunting and nesting. This resulted in a sharp decline in the bald eagle population by the late 1800s. Between 1917 and 1953 commercial fisherman in Alaska, killed more than 100,000 bald eagles, because of concerns that the eagles would reduce the economically valuable salmon population. The dramatic decline in the population of bald eagles led to the passage of the Bald Eagle Act in 1940 (Rutledge 2003).

The bald eagle population further decreased after the use of the pesticide DDT became widespread. The high concentration of DDT in the reproductive organs of the adult eagles caused thinning of the developing eggshells, which resulted in the eggs being crushed during incubation. Large quantities of DDT were also stored in fatty tissue, including gonadal tissue, which may have also caused the eagles to become infertile.

As a result of the listing of the species as endangered in 1967, the banning of DDT in 1972, the initiation of recovery and reintroduction programs, and increased public awareness, the bald eagle population began to recover. Today bald eagles are reported in nearly every state in the lower 48 states, either as spring and summer residents, winter residents, or migrants. In the State of Wyoming, the bald eagle is reported to be common (International Birding Information Resource Data 2000). The bald eagle population has increased to 70,000 individuals, with half of the North American population in Alaska and 20,000 in British Columbia (Rutledge 2003). More than 6,000 breeding pairs of bald eagles have recently been reported in North America (Eliot 2002). Although the bald eagle has made significant recovery since the 1970s, habitat loss continues to remain a threat to the bald eagle's full recovery.

4.2.3 Aerial Survey for Bald Eagles and other Raptors

An aerial survey for the bald eagle and other raptors was conducted on April 16 to 17, 2003, as described in Section 3.2 (Buys & Associates 2003a). Although no bald eagle nests were observed during the survey, two active raptor nests were documented within the survey area. These included one red-tailed hawk nest and one nest of an unknown raptor species. The nest of this unidentified species was potentially that of a prairie falcon or another red-tailed hawk. The active red-tailed hawk nest was located on the north side of Muddy Ridge in the SE/SW 1/4 of Section 14 in T4N:R2E. One adult was present at this nest, but it was not evident if any eggs or fledglings were also in the nest. The second active nest of the unidentified raptor was located in the SE/SE 1/4 of Section 9 in T4N:R2E on a south facing exposure, underneath a rock ledge of Muddy Ridge.

Three other raptor nests were located during the aerial survey. However, all of them appeared to be inactive red-tailed hawk nests. The first was located in the SE/NE 1/4 of Section 23 in T4N:R2E and contained soil inside and showed no evidence of recent use. The second nest

located was in the NE/SW 1/4 of Section 29 in T4N:R3E and also showed no evidence of recent use. The third nest was found in the NE/SW 1/4 of Section 28 in T4N:R3E. This nest appeared to be older and was only partially intact. All three of these inactive nests were located on north-facing exposures of Muddy Ridge.

4.3 CANADA LYNX

Much of the regulatory action related to the Canada lynx in the lower 48 States is associated with litigation. On December 30, 1982 the Canada lynx was classified as category 2 candidate species, indicating that more information was necessary to determine whether the species' population was declining. On October 6, 1992 the USFWS published a notice in the Federal Register stating that it did not have sufficient information to indicate that listing the North Cascades population of the lynx was warranted. A lawsuit was filed challenging the finding. On December 27, 1994, the USFWS published a notice stating that listing the Canada lynx in the lower 48 states was not warranted, because of the lack of residency in the lower 48 states and inability to substantiate threats to its continued existence. This determination was challenged in a lawsuit. After additional lawsuits and legal decisions, the USFWS published a notice in the Federal Register on March 24,2000 listing the Canada lynx as threatened in the contiguous U.S. (65 FR 10652 - USFWS 2000).

4.3.1 Life History

The Canada lynx (*Lynx canadensis*) is one of three major species of wildcats found in North America. The lynx is a medium-sized cat with long legs; large, well-furred paws; long tufts on the ears; and a short, black-tipped tail (65 FR 16502ff - USFWS 2000). Adult males weigh an average of 10 kg (22 lbs), are 85 cm (33.5 in) head to tail, while females average 8.5 kg (19 lbs) and 82 cm (32 in.) in length. The long legs and large feet of the Canada lynx make it highly adapted for hunting in deep snow.

The Canada lynx breeds between March and April in the north (Lynx Biology Team 2000). Kittens are born in May to June in south central Yukon. The male lynx does not help with rearing of the young. Yearling females give birth during periods when snowshoe hares, the primary food, are abundant. Few, if any, live kittens are born during the low phase of the hare cycle. During periods of hare abundance in the northern taiga, liter size averages 4 to 5 kittens (Lynx Biology Team 2000). Lynx use large woody debris, such as downed logs and windfalls to provide denning sites with security and thermal cover for kittens. A den site in Wyoming was located in a mature subalpine fir/lodgepole pine forest with abundant downed logs and a high amount of horizontal cover (65 FR 16052 - USFWS 2000).

Canada lynx are highly specialized predators whose primary prey is the showshoe hare *(Lepus americanus*). It has evolved to survive in areas that receive deep snow. Snowshoe hares use forests with dense understory that provides forage, cover to escape from predators, and protection during extreme weather. The association between lynx and snowshoe hare is considered a classic predator-prey relationship; in northern Canada and Alaska, lynx populations fluctuate on approximately 10-year cycles that follow the cycles of the hare populations (65 FR 16052 - USFWS 2000). Lynx also prey opportunistically on other small mammals and birds, particularly when hare populations decline. However, a shift to alternate food sources may not compensate for the decrease in hares consumed. In the northern habitats, when hare densities decline, the lower quality diet causes sudden decreases in the productivity of adult female lynx and decreases survival of kittens, which causes the number of breeding lynx to level off or decrease. In southern forests, where the densities of snowshoe

hares are lower, and predation of the hare by other animals is higher, the potential for high-density hare populations with extreme cyclic fluctuations is reduced. Therefore, lynx densities at the southern part of their range never achieve the high densities that occur in the northern boreal forest (65 FR 16052ff - USFWS 2000).

The dependence of lynx on snowshoe hare has been described in Washington, Montana, and Canada. In Alberta, lynx productivity was related to prey availability, particularly snowshoe hare (Nellis et al. 1978, Brand and Keith 1979). Other studies of lynx food habits in Canada reveal that lynx prey on other species including tree and ground squirrels (Moore 1976, van Zyll de Jong 1966), small rodents (Van Zyll de Jong 1966), grouse (van Zyll de Jong 1966, Brand et al 1976, Nellis et al. 1978), and carrion (Saunders 1963, Brand et al. 1976, Nellis et al. 1978).

The size of the lynx home range varies by the animal's gender, abundance of prey, season, and density of lynx populations. Documented home ranges vary from 8 to 800 sq km (3-300 sq mi.) and are much larger at the southern than portions of the ranges. The home range of the lynx in the southern extent of the species' range is large compared to those in the northern portion of the range (USFWS 2000).

4.3.2 Current Status and Range-wide Distribution

Historic lynx data in the contiguous U.S. are scarce and exist primarily in the form of trapping records. Many States did not differentiate between bobcats and lynx in trapping records. Therefore, long-term lynx trapping data are not available for most states. Surveys designed specifically for lynx were rarely conducted, and many reports of lynx were collected incidental to other activities. The lack of data makes it difficult to draw definitive conclusions about lynx population trends (65 FR 165052 - USFWS 2000).

The historical and present range of the Canada lynx north of the contiguous U.S. includes Alaska and the part of Canada that extends from the Yukon and Northwest Territories south across the U.S. border and east to New Brunswick and Nova Scotia. In the contiguous 48 states, the lynx historically occurred in the Cascades Range of Washington and Oregon, the Rocky Mountain Range in Montana, Wyoming, Idaho, eastern Washington, eastern Oregon, northern Utah, and Colorado; the western Great Lakes Region; and the northeastern U.S. from Maine southwest to New York (USFWS 2000).

In the contiguous U.S. the distribution of the lynx is associated with the southern boreal forests, comprising of sub-alpine coniferous forest in the West and primarily mixed coniferous/ deciduous forest in the East. In Canada and Alaska the lynx inhabit the boreal forest ecosystem known as the taiga (65 FR 10652 - USFWS 2000).

4.3.3 Distribution in Wyoming

Historically, lynx have been observed in every mountain range in the State. Concentrations of observations occur in western Wyoming in the Wyoming and Salt River ranges and continuing north through the Tetons and Absaroka ranges in and around Yellowstone National Park. Most records of Canada lynx have also come from the western slope of the Wind River Range, with fewer observations in the Bighorn and Uinta Mountains (USFWS 2002a). Only 30 verified records of lynx have been reported Statewide since 1856 (USFWS 2000). Documented reported of lynx in the Yellowstone National Park are rare, and no recent verified records exist from the Greater Yellowstone Ecosystem (USFWS 2000). The Canada lynx has also been reported from the Big Horn Mountains in north-central Wyoming. Until 1957, there were

bounties on the lynx in Wyoming. Since 1973, the lynx has been listed as a protected non-game species and its harvest was closed.

In Wyoming, the Canada lynx lives in subalpine/coniferous forests of mixed age and structural classes. Mature forests with downed logs and windfalls provide cover for denning sites, escape, and protection from severe weather. Early successional forest stages provide habitat for the lynx's primary prey, the snowshoe hare. The home range of the lynx in Wyoming ranges from 5 to 94 mi^2. Individuals are capable of moving extremely long distances in search of food (USFWS 2002A).

In 1996 the Wyoming Game and Fish Department began a lynx study in west-central Wyoming and production of kittens was documented in 1998. Based on available information, it was not possible to determine the status or trend of lynx throughout Wyoming (65 FR 16052ff) (USFWS 2000).

In north-central Washington and northwestern Montana, Canada lynx mainly prey on snowshoe hares (Koehler et al. 1979, Koehler 1990). In each study area, snowshoe hares were closely associated with forests dominated by lodgepole pine (*Pinus contorta*) and/or spruce-fir (*Picea engelmannii - Abies lasiocarpa*), and lynx locations and/or sightings were likewise associated with the same cover types (Koehler et al. 1979, Koehler 1990). Records of lynx in Wyoming also indicate that most lynx or lynx sign between 1973 and 1986 were in lodgepole pine (18%) and spruce-fir (41%) communities (Reeve et al. 1986). According to Reeve et al. (1986), more than 50 percent of lynx records in Wyoming occurred in the northwestern region of the state.

The proposed WRPA does not contain high elevation lodgepole pine/spruce-fir habitat types preferred by this species and does not support a population of snowshoe hares (WGFD 2000). There are also no recorded sightings in the vicinity of the proposed WRPA (T. Root, USFWS, pers. comm., June 2003). Therefore, it is unlikely that Canada lynx occur on or near the proposed WRPA.

4.4 GRAY WOLF

Gray wolves were originally classified as four separate subspecies. The eastern timber wolf (*Canis lupus lycaon*) was listed as endangered in Minnesota and Michigan (USFWS 1974) and the northern Rocky Mountain wolf (*C.l. irremotus*) was listed as endangered in Montana and Wyoming in May 1974 (USFWS 1974). The Mexican wolf (*C. lupus baileyi*) was listed as endangered in April 1976 (USFWS 1976a) and the gray wolf (*C. l. monstrabilis*) was listed as endangered in Arizona, New Mexico, and Texas (USFWS 1976b). On March 9, 1978 the gray wolf was re-listed as endangered at the species level (*Canis lupus*) throughout the conterminous 48 states and Mexico, except for Minnesota, where the gray wolf was reclassified as threatened (USFWS 1978). Critical habitat for the gray wolf was also designated in the 1978 FR notice. On November 22, 1994 portions of gray wolf habitat in Idaho, Montana, and Wyoming were designated as "nonessential experimental populations" in order to initiate gray wolf reintroduction in central Idaho and the Greater Yellowstone Area (59 FR 60252ff). Today, there are two species of wolves protected by the endangered species act, the gray wolf and the red wolf (*C. rufus*) (68 FR 15804).

On April 1, 2003, the gray wolf in the Western Distinct Population Segment (DPS) and Eastern DPS was reclassified from endangered to threatened, except where they were already classified as threatened or as an experimental population (68 FR 15802 - USFWS 2003a). They were also removed from the list of endangered and threatened wildlife in all or parts of 16 southern

and eastern States where the gray wolf historically did not occur.

All wolves within Wyoming are considered part of the nonessential experimental population. Although these wolves remain listed and protected under the ESA, additional flexibility is provided for their management under the provisions of the final rule and special regulations promulgated for the nonessential experimental population on November 22, 1994 (59 FR 60252). Requirements for interagency consultation under Section 7 of the Act differ based on land ownership and/or management responsibility where the animals occur (USFWS 2002a). Additional flexibility is provided for managing wolves inhabiting the National Park or National Wildlife Refuge System (e.g., Forest Service lands). Wolves that are designated as nonessential experimental populations in these areas are treated as "proposed" rather than listed species (USFWS 2002a).

4.4.1 Life History

The gray wolf is the largest wild member of the dog family (Canidae), with adults ranging from 18-80 kg (40-175 lbs), depending on sex and subspecies (68 FR p. 15804, April 1, 2003). In the northern Rocky Mountains adult male gray wolves average 45 kg (100 lbs), while females weigh slightly less. The fur color of wolves is frequently a grizzled gray, but it can vary from pure white to coal black. Wolves may appear similar to coyotes (*Canis latrans*) and some domestic breeds such as the German shepherd or Siberian husky. However, their longer legs, larger feet, wider head and snout, and straight tail distinguish them from both coyotes and dogs.

Wolves are primarily predators of medium-sized and large mammals. Typical prey species in North America include white-tailed deer and mule deer, moose, elk, woodland caribou, and barren ground caribou, bison, muskox, bighorn sheep and Dall sheep, mountain goat, beaver, and snowshoe hare, with small mammals, birds, and large invertebrates occasionally being taken. In the midwest wolves have also killed domestic animals including horses, cattle, sheep, goats, llamas, pigs, geese, ducks, turkeys, chickens, pheasants, dogs, and cats (FR 2003).

Wolves are social animals, normally living in packs of 2-12 wolves, although two packs within Yellowstone National Park were reported to have 22 and 27 members in 2000. Packs are primarily family groups consisting of a breeding pair, their pups from the current year, offspring from the previous year, and occasionally an unrelated wolf. Packs typically occupy, and defend from other packs and individual wolves, a territory of 50-550 sq km (20-214 mi^2). In the northern Rocky Mountains territories tend to be larger, usually from 520 to 1040 km^2 (200 to 400 mi^2) (68 FR 15804 - USFWS 2003a).

Normally only the top-ranking male and female in each pack breed and produce pups. Litters are born from early April into May and range from 1-11 pups, averaging 4-6 pups. Normally a pack has a single litter annually, but occasionally 2-3 litters have been documented. Yearling wolves frequently disperse from their natal packs and may become nomadic, covering large areas as lone animals or they may locate suitable unoccupied habitat and a member of the opposite sex and begin their own territorial pack. Dispersal movements of 800 km (500 mi) have been documented (68 FR 15804 - USFWS 2003a).

4.4.2 Current Status and Range-wide Distribution

In North America, gray wolves formerly occurred from northern Alaska, Canada and Greenland to the central mountains and high interior plateau of southern Mexico. European settlers in North America and their cultures often had superstitions and fears of wolves. Their attitudes,

coupled with perceived and real conflicts between wolves and human activities along the frontier, led to widespread persecution of wolves. Poisoning, trapping, and shooting spurred by the Federal, State, and local government bounties resulted in the extirpation of this once widespread species from more than 95 percent of its range in the lower 48 states. At the time of the passage of the ESA in 1973, it is likely that only several hundred wolves remained in northeastern Minnesota and on Isle Royale, Michigan, and possibly a few scattered wolves in the upper Peninsula of Michigan, Montana, and the Southwest. The gray wolf was extirpated from Wyoming by the 1930s, and from that time until the early 1990s there were occasional wolf sightings in Wyoming, but no reproduction was documented (Wyoming Game and Fish Department 2002).

4.4.3 Gray Wolf Recovery Program

With the goal of reestablishing a sustainable gray wolf population in the northern Rocky Mountains (Wyoming, Idaho, and Montana), the USFWS reintroduced 31 wolves to Yellowstone National Park and 35 wolves to central Idaho in 1995 and 1996. The northern Rocky Mountain wolf population consists of three recovery areas: Northwest Montana, Central Idaho, and the Greater Yellowstone Area. The Greater Yellowstone recovery area includes all of Wyoming, including Yellowstone National Park, Grand Teton National Park, the National Elk Refuge, and adjacent parts of Idaho and Montana.

The USFWS has defined a viable and recovered wolf population in the northern Rocky Mountains as one containing at least 30 breeding pairs of wolves, with an equitable and uniform distribution throughout Wyoming, Idaho, and Montana for three years (USFWS 2002a). The USFWS determined that 2001 was the second year in which at least 30 breeding pairs of wolves inhabited the northern Rocky Mountain recovery area. If the wolf population remains at current levels or increases in number and distribution, and state management plans are in place, delisting may be proposed within the next two years (Wyoming Game and Fish Department 2002).

4.5 GRIZZLY BEAR

The grizzly bear (*Ursus arctos horribilis*) was listed as threatened on July 28, 1975 (USFWS 1975). Since then, much effort has been expended by various Federal and State land and wildlife agencies, tribal governments, and segments of the public to conserve this species (USFWS 1993).

4.5.1 Life History

Grizzly bears are generally larger than black bears and can be distinguished by longer, curved claws, humped shoulders, and a face that appears to be concave. A wide range of coloration from light brown to nearly black is common. Guard hairs are often paled at the tips; hence the name “grizzly.” In the lower 48 states, the average weight of grizzly bears is 400-600 lbs for males and 250-350 lbs for females. Adults stand 3.5-4.5 feet at the hump, when on all fours, and may reach more than eight feet in height when they rear up on their hind legs. Grizzly bears are relatively long-lived, and individuals have been known to live 40 years (USFWS 1993).

Grizzly bears have solitary patterns of behavior, except when caring for young or breeding. The mean density of grizzly bears in productive habitat is estimated to be one bear per eight square miles. In the Northern Continental Divide Ecosystem, the density is estimated to be one bear

per 15-23 square miles (USFWS 1993).

Breeding appears to occur from late May through mid-July, with a peak in mid-June. Litter size varies from one to four cubs, with an average of two cubs. The gestation period is between 229 to 266 days with birth occurring around February 1st. Upon emergence from the den, the grizzly bears move considerable distances from high, snow-covered elevations to lower elevations to reach palatable, emerging vegetation, or to feed on winter-killed or weakened ungulates on foothill winter ranges. Reproductive intervals for females average three years. The limited reproductive capacity of grizzly bears precludes any rapid increase in the population (USFWS 1993).

The size of the home range of grizzly bears varies in relation to food availability, weather conditions, and interactions with other bears. In addition, individual bears may extend their range seasonally or from one year to the next (USFWS 1993).

4.5.2 Current Status and Range-wide Distribution

The grizzly bear has a wide range of habitat tolerance. Historically, the grizzly bear was distributed in various habitats from the mid-plains and throughout Western North America, and from Central Mexico to the Arctic Ocean. The westward expansion of European settlers in the U.S and urban development caused a rapid decrease in distribution and numbers of grizzly bears. Between 1800 and 1975, grizzly bear populations in the lower 48 States decreased from estimates of over 50,000 to less than 1,000. Grizzly bears were exterminated from Texas by about 1890, and by 1922 the last of the grizzly bears in California had disappeared. Settlement of the western U.S., logging, livestock grazing, unregulated hunting, and protection of human life were responsible for the exterminations (USFWS 1993).

Today the grizzly bear distribution has been reduced to less than 2 percent of its historical range in the lower 48 States. Only five areas in the lower 48 States in mountainous regions, national parks, and wilderness areas of Washington, Idaho, Montana, and Wyoming currently contain either self-perpetuating or remnant populations. One of the areas occupied by the grizzly bear is the area within and surrounding Yellowstone National Park, which includes Grand Teton National Park, John D. Rockefeller Memorial Parkway, large contiguous portions of the Shoshone, Bridger-Teton, Targhee, Gallatin, Beaverhead, and Custer National Forests, BLM lands, and more than 222 km^2 (86 mi^2) of State and private lands in Montana, Wyoming, and Idaho. The population estimate in this area is approximately 236 bears (USFWS 1993).

Contiguous, relatively undisturbed mountainous habitat having a high level of topographic and vegetative diversity characterizes the habitat where grizzly bears are found today. However, habitat loss, changes to important components within their habitat, and direct and indirect human-caused mortality continue to cause decline in the grizzly bear population (FWS 2002). Since grizzly bears are attracted to carrion and waste products of construction camps, recreational camps and sprawling residential areas that have encroached into their habitat, human-bear interactions have continued to increase (USFWS 1993). Currently the two leading challenges in grizzly bear conservation are the reduction of human-caused mortality and the conservation of the remaining habitat (USFWS 2002).

4.5.3 Grizzly Bear Recovery Plan

The original Grizzly Bear Recovery Plan was approved in 1982 and revised in 1993 (USFWS 1993). The goal of the revised recovery plan is to identify actions necessary for the

conservation and recovery of the grizzly bear. The Plan defines a sequence of actions that will provide for the conservation and recovery of the grizzly bear in selected areas of the lower 48 States. They include the following:

- Minimize sources of human-bear conflict.
- Limit habitat loss or degradation resulting from human actions such as road building, timber harvest, oil and gas exploration and development, mining, and recreations.
- Improve habitat and or security, where applicable.
- Determine the relationship between bear density and habitat value to better understand limiting factors.
- Develop techniques to successfully move bears where the populations are in need of augmentation.
- Improve public relations and education to develop better support for and understanding of the species and to minimize adverse human interactions.
- Continue grizzly bear and habitat research to ensure adequate scientific knowledge is available on which to base management decisions.

4.6 MOUNTAIN PLOVER

The plover was petitioned for listing as threatened on July 7, 1997. On February 16, 1999, the USFWS filed a notice of a proposal to list the mountain plover as a threatened species pursuant to the ESA (64 FR 7587) (USFWS 1999). The comment period for the listing proposal was re-opened on December 5, 2002 (67 FR 234) (USFWS 2002b). On September 9, 2003, a notice was published in the Federal Register (68 FR 53083) stating that the mountain plover would be removed list of proposed species, since the threats to the species, as identified in the proposed rule, were not as significant as earlier believed. Since the mountain plover is no longer proposed for listing under the ESA, it will not be discussed further in this BA.

4.7 SAGE GROUSE

Another species of concern that may occur in the WRPA is the sage grouse. Although the sage grouse is not a Federally listed as threatened or endangered at this time, it is a species of high interest among Federal and State agencies and several petitions for listing the sage grouse have been submitted to the USFWS (K. Erwin, USFWS, pers. comm., June 2003). Since this species is not presently proposed for listing, it will not be discussed further in this BA.

4.8 MIGRATORY BIRDS

Federal agencies are obligated to protect the many species of migratory birds, including eagles and other raptors protected under the Migratory Bird Treaty Act (16, U.S.C. 703) and the Bald and Golden Eagle Protection Act (16 U.S.C. 668). Numerous species of birds migrate through the WRPA in spring and fall or breed in the WRPA. Wetland game birds that may summer in the WRPA include blue-winged teal, canvasback, gadwall, lesser scaup, northern pintail, and redhead, among others (Table 5). Spring or fall migrants that have been observed within the WRPA include red-breasted merganser, ring-necked duck, snow goose, and tundra swan. Neotropical migratory bird species travel long distances from wintering grounds in the tropics to breeding grounds in North America. Some of these species have been observed in the WRPA. Level I neo-tropical migratory bird species (i.e., those given priority conservation action) that have been reported in the WRPA include Brewer's sparrow, sage sparrow, and long-billed curlew (Table 6).

Table 5. Game and Migratory Bird Species within the WRPA

Common Name	Scientific Name
Wetland Species	
American coot	*Fulica americana*
American wigeon	*Anas americana*
Barrow's goldeneye	*Bucephala islandica*
Blue-winged teal	*Anas discors*
Bufflehead	*Bucephala albeola*
Canada goose	*Branta canadensis*
Canvasback	*Aythya valisineria*
Cinnamon teal	*Anas cyanoptera*
Common merganser	*Mergus merganser*
Common goldeneye	*Bucephala clangula*
Common snipe	*Gallinago gallinago*
Gadwall	*Anas strepera*
Green-winged teal	*Anas crecca*
Harlequin duck	*Histrionicus histrionicus*
Hooded merganser	*Lophodytes cucullatus*
Lesser scaup	*Aythya affinis*
Mallard	*Anas platyrhynchos*
Northern pintail	*Anas acuta*
Northern shoveler	*Anas clypeata*
Red-breasted merganser	*Mergus serrator*
Redhead	*Aythya americana*
Ring-necked duck	*Aythya collaris*
Ruddy duck	*Oxyura jamaicensis*
Sandhill crane	*Grus canadensis*
Snow goose	*Chen caerulescens*
Sora	*Porzana carolina*
Trumpeter swan	*Cygnus buccinator*
Tundra swan	*Cygnus columbianus*
Virginia rail	*Rallus limicola*
Wood duck	*Aix sponsa*
Upland Species	
Chukar	*Alectoris chukar*
Gray partridge	*Perdix perdix*
Greater sage grouse	*Centrocerus urophasianus*
Mourning dove	*Zenaida macroura*
Ring-necked pheasant	*Phasianus colchicus*

Source: WGFD 1999.

Table 6. Migratory Bird Species of Management Concern in Wyoming.

Species	Habitats	Comments	Observed In WRPA
Level I			
Brewers Sparrow (*Spizella breweri*)	Basin-prairie and mountain-foothills, shrublands, especially sagebrush, woodland-chaparral.	Nests in a shrub. Feeds on insects, seeds.	Yes
Sage Sparrow (*Amphispiza belli*)	Basin-prairie and mountain-foothills shrublands.	Nests usually in or under sagebrush. Feeds on insects, seeds.	Yes
Table 3.8-2 (ContinuLong-billed Curlew (*Numenius americanus*)	Sagebrush-grasslands, eastern great plains, great basin-foothills, mountain foothills, and wet-moist meadow grasslands, irrigated native meadows, with aquatic areas nearby.	Nests on the ground near water, sometimes in a moist hollow. Feeds on insects, aquatic invertebrates. Locally common.	Yes
Level II			
Dickcissel (*Spiza americana*)	Shortgrass prairie, eastern great plains grasslands.	Nest is bulky, placed in grass. Feeds on insects, seeds.	Yes
Lark Bunting (*Calamospiza melanocorys*)	Shortgrass prairie, shrub-steppe, basin-prairie and mountain-foothills shrublands, eastern great plains and great basin-foothills, grasslands, agricultural fields.	Nests on the ground, with rim of the nest usually flush with the ground. Feeds on insects, especially grasshoppers, and seeds.	Yes
Lark Sparrow (*Chondestes grammacus*)	Shrub-steppe, pine-juniper, woodland-chaparral, basin-prairie and mountain-foothills shrublands, grasslands, agricultural areas.	Nests in a hollow depression on the ground, feeds on seeds, and insects.	Yes
Loggerhead Shrike (*Lanius ludovisianus*)	Pine-juniper, woodland-chaparral, basin-prairie and mountain-foothills shrublands.	Nest is usually hidden below the crown in the crotch or low branch of a deciduous tree or shrub. Feeds on insects, small vertebrates, carrion.	Yes
Marsh Wren (*Cistothorus palustris*)	Wetlands, marshes, drier habitats during migration.	Nest is attached to reeds. Feeds on insects, snails. Abundant in some areas.	Yes
Sage Thrasher (*Oreoscoptes montanus*)	Basin-prairie and mountain-foothills shrublands.	Nest is concealed in or beneath sagebrush. Feeds on insects, and some fruit.	Yes
Vesper Sparrow (*Pooecetes gramineus*)	Shrub-steppe, basin-prairie and mountain-foothills shrublands, grasslands, agricultural areas.	Nests in an excavated depression on the ground. Food is 50% insects, 50% grass and forb seeds.	Yes

Species	Habitats	Comments	Observed In WRPA
White-throated Swift (*Zonotrichia albicollis*)	Aerially feeds over most habitats with cliffs below 9,000 ft.	Nests deep in a crack or crevice of a rock wall. Feeds on flying insects.	Yes
Broad-tailed Hummingbird (*Selasphorus platycercus*)	Riparian shrub, mountain-foothills grasslands, coniferous forests, wet-moist meadows with Douglas fir, Englemann spruce-subalpine fir.	Nests usually on a horizontal limb of a deciduous or coniferous tree, near or over a mountain stream. Feeds on nectar, and insects.	No
Brown Creeper (*Certhia americana*)	Coniferous forests. Lower habitats during the winter.	Nest is a hammock-like cup, usually beneath loose bark, rarely in a cavity. Feeds primarily on insects, some nuts, seeds.	No
Cordilleran Flycatcher (*Empidonax occidentalis*)	Moist areas of coniferous forests, aspen-riparian, aspen-conifer.	Nests in a variety of areas from streambank to cave, cliff ledge, or cavity in a small tree. Feeds almost entirely on insects; also some berries, seeds.	No
Dusky Flycatcher (*Empidonx oberholseri*)	Ponderosa pine savannah, pine juniper, aspen, cottonwood-riparian, woodland-chaparral, riparian shrub.	Nests in the crotch of a juniper or sage, or near the base of a thorny shrub in dry, open forests.	No
Grasshopper Sparrow (*Ammodramus savannarum*)	Shortgrass prairie, shrub-steppe, basin-prairie shrublands, eastern great plains grasslands, wet-moist meadow grasslands, agricultural areas.	Nest is sunk in a slight depression on the ground. Feeds on insects, and seeds.	No
Gray Flycatcher (*Empidonax wrightii*)	Pine-juniper, woodland-chaparral, basin-prairie and mountain-foothills shrublands.	Nests in the crotch of a juniper or sage, or near the base of a thorny shrub. Feeds exclusively on insects.	No
MacGillivray's Warbler (*Oporomis tolmiei*)	Aspen, cottonwood riparian, riparian shrub, below 9,000 ft.	Nests close to the ground in dense shrubs. Feeds mostly on insects.	No
Red-naped Sapsucker (*Sphyrapicus nuchalis*)	Aspen and cottonwood-riparian from 7,000 to 9,000 ft. Also coniferous forests. Lower habitats during migration.	Nests in a cavity in a deciduous tree, often near water. Feeds on insects, tree sap.	No
Townsend's Solitaire (*Myadestes townsendi*)	Coniferous forest, aspen.	Nests often amid tree roots or other shelter on the ground. Feeds on insects, fruit, and worms.	No

Species	Habitats	Comments	Observed In WRPA
Willow Flycatcher (*Empidonax trailii*)	Montane riparian, plains/basin riparian, riparian shrub including willow, hawthorn, water birch, alder, below 9,000 ft.	Nests in an upright or slanting fork in a shrub. Feeds primarily on insects, occasionally berries.	No
Wilson's Warbler (*Wilsonia pusilla*)	Riparian shrub from 7,000 to 10,500 ft.	Nest is usually placed on the ground, often in a vine tangle. Feeds on insects, occasionally berries.	No

Source: Cerovski et al 2001.

5.0 DIRECT AND INDIRECT IMPACTS OF THE PROPOSED PROJECT

The threatened and endangered wildlife identified by the USFWS (2002a) as potentially inhabiting the proposed WRPA include the bald eagle, black-footed ferret, Canada lynx, gray wolf, and grizzly bear. The potential impacts of the proposed gas development project to these threatened and endangered species is discussed below for the Proposed Action, Alternative A, Alternative B, and Alternative C (No Action).

5.1 PROPOSED ACTION

A total of 325 wells may be drilled in the WRPA under the Proposed Action. This is in addition to the existing 178 producing wells. Short-term disturbance from the Proposed Action would be approximately 1,982 acres or 2.15 percent of the WRPA. Long-term disturbance is anticipated to be 422.7 acres or 0.46 percent. This is in addition to the 410.5 acres of disturbance from existing development.

5.1.1 Bald Eagle

Bald eagles are known to occur in the general vicinity of the WRPA and have been reported to roost at Ocean Lake in the winter, which is about 2 miles to the south of the WRPA (P. Hnilicka, USFWS, pers. comm., January 2003). Thus, there is the potential of bald eagles to roost in the WRPA in the winter. However, no bald eagles or bald eagle nests were observed in the WRPA and a two-mile buffer during an aerial survey conducted in late April 2003 (Buys & Associates 2003a). The closest known bald eagle nest is located at Diversion Dam approximately 30 miles to the west of the WRPA (P. Hnilicka, USFWS, pers. comm., June 2003).

The bald eagle may be directly and/or indirectly affected by the proposed Wind River Gas Field Development Project. Since bald eagles feed on carrion, the presence of road-killed big game carcasses on access roads could attract bald eagles and other raptors. If bald eagles are injured or killed as a result of vehicle collisions while feeding on the carrion, it would result in a "take," which is prohibited by the Endangered Species Act. If the avoidance and minimization measures, discussed in Section 7.1 of this BA, are followed, impacts to the bald eagle are unlikely to occur.

5.1.2 Black-footed Ferret

Based on the white-tailed prairie dog survey, a total of four white-tailed prairie dog colonies, covering 1,243 acres, occur in and adjacent to the WRPA. The approximate density of active prairie dog burrows is 10.3 burrows/acre (25.5 burrows/hectare). This exceeds the USFWS minimum threshold of eight burrows/acre (20 burrows/hectare) (USFWS 1989). The number of ferret families that could be supported by the prairie dog colonies was calculated using a model developed by Biggens et al (1989). The prairie dog colonies had a rating of 1.9, which was greater than the minimum rating of 1.0 needed to support black-footed ferrets. Since the WRPA is included in a "block clearance" from the conducting ferret surveys (USFWS 2004), which indicates that this species is unlikely to be present in these prairie dog towns, it is not anticipated that the Proposed Action would impact the black-footed ferret.

5.1.3 Canada Lynx

In Wyoming, the Canada lynx lives in subalpine/coniferous forests of mixed age and structural classes. Mature forests with downed logs and windfalls provide cover for denning sites, escape, and protection from severe weather. Early successional forest stages provide habitat for the lynx's primary prey, the snowshoe hare (USFWS 2002a). Since subalpine/coniferous forests are not found in the WRPA, Canada lynx are not expected to be present. Therefore, implementation of the Proposed Action would not impact the Canada lynx or its habitat.

5.1.4 Gray Wolf

Gray wolves, once common in the Greater Yellowstone Ecosystem, have recently been reintroduced into the area. Although the gray wolf is officially listed as threatened, all gray wolves in Wyoming are now considered part of a "nonessential experimental population." As such, additional management flexibility is provided for wolves outside the National Park or National Wildlife Refuge System. Wolves designated as nonessential experimental populations are treated as "proposed," rather than listed.

A collared gray wolf was reported between and Kinnear and Ocean Lake, which is in the general vicinity of the WRPA (P. Hnilicka, USFWS, pers. comm., June 2003). A wolf feeding on a carcass of big game species (e.g., pronghorn antelope, mule deer and other game species) could be accidentally killed by collision with a vehicle driven by construction crews. If the avoidance and minimization measures described in Section 7.4 of this BA are followed, impacts to the gray wolf are unlikely to occur from the Proposed Action.

5.1.5 Grizzly Bear

The grizzly bear has a wide range of habitat tolerance, but is mainly found in relatively undisturbed contiguous mountain habitat having a high level of topographic and vegetative diversity. Bears are attracted to carrion, waste products of construction camps, recreational areas and sprawling residential areas that have encroached into the bear habitat, resulting in increased human-bear interactions (USFWS 1993). Although the habitat in the WRPA is not typical grizzly bear habitat, there have been unconfirmed reports of grizzly bear sitings in the area (P. Hnilicka, USFWS, pers. comm., June 2003). If the avoidance and minimization measures described in Section 7.5 are followed, impacts to the grizzly bear from the Proposed Action are unlikely to occur.

5.1.6 Fish Species

The USFWS (2002a) did not identify the WRPA as potential habitat for threatened and endangered fish species, since many of the streams within the WRPA are shallow and intermittent. This would preclude the presence of the large endangered fish species. Thus, there would be no impacts from the Proposed Action to endangered fish species.

5.1.7 Plant Species

Little is known about the presence of endangered and sensitive plant species in the WRPA. However, threatened or endangered plant species are not expected to be present in the WRPA (USFWS 2002a). Thus, there would be no impacts from the Proposed Action to threatened or endangered plants.

5.1.7 Migratory Birds

Impacts to migratory birds in the WRPA would be dependent upon the timing of project-related activities. The disturbance from construction, drilling, and completion activities would be relatively short-term in any particular location, but such disturbance during the breeding and nesting season could result in some nest abandonment, direct mortality, reproductive failure, displacement of birds, and/or destruction of nests. Ground nesting birds would be particularly susceptible to nest destruction. Shrub nesting birds may also be affected due to destruction of vegetation. Impacts would not have a measurable effect on migratory bird populations as a whole or populations of individual species.

5.2 ALTERNATIVE A

A total of 485 new wells would be drilled under Alternative A, resulting in disturbance of approximately 2,818.7 acres or 3.06 percent of wildlife habitat in the WRPA over the short term. Reclamation actions would decrease the long-term disturbance to 611.9 acres or 0.67 percent of the WRPA.

5.2.1 Bald Eagle

Under Alternative A, the disturbance to potential bald eagle habitat would be greater than the disturbance under the Proposed Action. However, if the avoidance and minimization measures, described in Section 7.1, are implemented, potential impacts to the bald eagle from Alternative A would be unlikely to occur.

5.2.2 Black-footed Ferret

Under Alternative A, potential disturbance to the white-tailed prairie dog colonies within the WRPA would be greater than the disturbance from the Proposed Action. If the avoidance and minimization measures, described in Section 7.2, are followed, impacts to the black-footed ferret from Alternative A are unlikely to occur.

5.2.3 Canada Lynx

Since Canada lynx habitat is not present in the WRPA, Alternative A would not impact the Canada lynx.

5.2.4 Gray Wolf

Under Alternative A, the disturbance to potential gray wolf habitat would be greater than the disturbance from the Proposed Action. However, if the avoidance and minimization measures described in Section 7.4 are implemented, potential impacts to the gray wolf would be unlikely to occur.

5.2.5 Grizzly Bear

Under Alternative A, the disturbance to potential grizzly bear habitat would be greater than the disturbance under the Proposed Action. However, if the avoidance and minimization measures described in Section 7.5 are implemented, potential impacts to the grizzly bear would be unlikely to occur.

5.2.6 Fish Species

The USFWS (2002a) did not identify the WRPA as potential habitat for threatened and endangered fish species, since many of the streams in the area of the Alternative A are shallow or intermittent. This would likely preclude the presence of endangered fish species. Therefore, no impacts to the endangered fish species are anticipated to occur.

5.2.7 Plant Species

Threatened or endangered plant species are not expected to be present in the WRPA. Therefore, Alternative A is unlikely to affect these plant species.

5.2.8 Migratory Birds

Under Alternative A, the disturbance to migratory bird habitats would be greater than the disturbance under the Proposed Action. However, if the avoidance and minimization measures, described in Section 7.8, are implemented, potential impacts to migratory bird species from Alternative A would be unlikely to occur.

5.3 ALTERNATIVE B

Under Alternative B a total of 233 new wells would be drilled, resulting in disturbance of 1,609 acres or 1.75 percent of the WRPA. This initial disturbance would be less than under the Proposed Action. Residual disturbance under Alternative B would be 325.1 acres or 0.35 percent of the WRPA.

5.3.1 Bald Eagle

Under Alternative B, the disturbance to potential bald eagle habitat would be less than the disturbance under the Proposed Action. If the avoidance and minimization measures, described in Section 7.1, are implemented, impacts to the bald eagle would be unlikely to occur.

5.3.2 Black-footed Ferret

Alternative B would result in a lower potential of disturbance to white-tailed prairie dog colonies than the Proposed Action. Since the WRPA is included in a “block clearance” by the USFWS (2004), in which prairie dog colonies are cleared from the recommendation of ferret surveys, potential impacts to black-footed ferrets are unlikely to occur.

5.3.3 Canada Lynx

Since Canada lynx habitat is not present in the WRPA, Alternative B would not impact the Canada lynx.

5.3.4 Gray Wolf

Under Alternative B, the disturbance to potential gray wolf habitat would be 438 acres less than the disturbance under the Proposed Action. If the avoidance and measures, described in Section 7.4, are implemented, potential impacts to the gray wolf are unlikely to occur.

5.3.5 Grizzly Bear

Under Alternative B, the disturbance to potential grizzly bear habitat would be less than the disturbance under the Proposed Action. If the avoidance and minimization measures, described in Section 7.5, are implemented, potential impacts to the grizzly bear are unlikely to occur.

5.3.6 Migratory Birds

Under Alternative B, the disturbance to migratory bird habitats would be less than the disturbance under the Proposed Action. If the avoidance and minimization measures, described in Section 7.8, are implemented, potential impacts to migratory bird species from Alternative B would be unlikely to occur.

5.4 ALTERNATIVE C (NO ACTION)

Under Alternative B (No Action), the Proposed Action would be denied. Drilling would only occur on private minerals and on tribal minerals to offset potential drainage of the tribal minerals. It is anticipated that a total of 100 wells would be drilled, resulting in an initial disturbance of 316.6 acres and residual disturbance of 79.3 acres. This disturbance is less than the short-term and song-term disturbance from the Proposed Action or Alternative B.

Under the No Action Alternative individual APDs would be approved on a case-by-case-basis. Wildlife and vegetation resources would continue to be impacted, when individual wells are drilled. However, there could be an increased probability of occurrence of unexpected adverse impacts, since overall field development would not occur in a well-planned manner.

5.4.1 Bald Eagle

Under Alternative C, the disturbance to potential bald eagle habitat would be less than the disturbance under the Proposed Action or Alternative B. If the avoidance and minimization measures described in Section 7.1 are implemented, potential impacts to the bald eagle from Alternative C would be unlikely to occur.

5.4.2 Black-footed Ferret

Alternative C would result in a very low potential of disturbance to white-tailed prairie dog colonies since drilling would only occur on private minerals in the Pavillion Field. In addition, the WRPA is included in a “block clearance” by the USFWS (2004), which cleared the prairie dog colonies from the recommendation for conducting ferret surveys. Therefore, potential impacts to black-footed ferrets from Alternative C are unlikely to occur.

5.4.3 Canada Lynx

Since Canada lynx habitat is not present in the WRPA, Alternative C would not impact the Canada lynx.

5.4.4 Gray Wolf

Under Alternative C, the disturbance to potential gray wolf habitat would be less than the disturbance under the Proposed Action or Alternative B. If the avoidance and minimization measures, described in Section 7.4, are implemented, potential impacts to the gray wolf from Alternative C would be unlikely to occur.

5.4.5 Grizzly Bear

Under Alternative C, the disturbance to potential grizzly bear habitat would be 1,389 acres less than the disturbance under the Proposed Action or Alternative B. If the mitigation measures, described in Section 7, are implemented, potential impacts to the grizzly bear would be further reduced.

5.4.6 Migratory Birds

Under Alternative C, the disturbance to migratory bird habitats would be less than the disturbance under the Proposed Action or Alternative B. If the avoidance and minimization measures, described in Section 7.8, are implemented, potential impacts to migratory bird species from Alternative C would be unlikely to occur.

6.0 CUMULATIVE IMPACTS

Cumulative effects, as defined in the *Final ESA Section 7 Consultation Handbook* (1998), include the effects of future State, tribal local or private actions that are reasonably certain to occur in the area of the Federal action subjected to consultation. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act (USFWS 1998).

The geographic area considered in the cumulative impacts analysis for the threatened and endangered species under the Proposed Action and alternatives is the Boysen Reservoir watershed. Future State, tribal, local or private actions that are reasonably certain to occur within or near the area of the Proposed Action (i.e., WRPA) include:

- Agriculture,
- Oil and gas development,
- Livestock grazing,
- Recreation,
- Gravel mining, and
- Residential and commercial development.

VAlthough these future activities cannot be quantified at this time, these activities, in addition to the Proposed Action, could result in direct, indirect, and cumulative impacts to the threatened or endangered species that may be present in the WRPA.

6.1 BLACK-FOOTED FERRET

According to a letter from the USFWS, dated February 2, 2004, black-footed ferret surveys are no longer necessary in white-tailed prairie dog colonies in certain parts of Wyoming because they had already been searched for the ferrets or didn't present any realistic opportunities for ferret reintroduction (US FWS 2004). The black-footed ferret survey "block clearance" includes the white-tailed prairie doge colonies in the general area of the Proposed Action (Townships 3 and 4 and Ranges 2-5). Therefore, cumulative effects to the black-footed ferret from future State, tribal, local or private actions, that are reasonably certain to occur in the area of the Proposed Action or alternatives, are not anticipated.

6.2 BALD EAGLE

Bald eagles nests were not observed within the WRPA, but the eagle may use the area for roosting in the winter (P. Hnilicka, USFWS, personal communication, 2003). If the avoidance and minimization measures described in Section 7.1 are followed, cumulative effects to the bald eagle as a result of future State, tribal, local or private actions, that are reasonably certain to occur in the area of the Proposed Action or alternatives, are not anticipated.

6.3 CANADA LYNX

There is no suitable habitat for the Canada lynx within and adjacent to the WRPA. Therefore, cumulative effects to the Canada lynx of future State, tribal, local or private actions, that are reasonably certain to occur in the area of the Proposed Action or alternatives, are not anticipated.

6.4 GRAY WOLF

Gray wolf packs have not been reported within the proposed WRPA, but an individual wolf was reported in the general vicinity of the WRPA. If the measures described in Section 7.4 are followed, cumulative effects to the gray wolf as a result of future State, tribal, local or private actions, that are reasonably certain to occur in the area of the Proposed Action or alternatives, are not anticipated.

6.5 GRIZZLY BEAR

The habitat in the WRPA is not characteristic of grizzly bear habitat. However, there have been unconfirmed reports of grizzly bears in the area. If the avoidance and minimization measures described in Section 7.5 are followed, cumulative effects to the grizzly bear as a result of future State, tribal, local or private actions, that are reasonably certain to occur in the area of the Proposed Action or alternatives, are not anticipated.

6.6 FISH SPECIES

There are no reports of the presence of endangered fish species within the WRPA. Therefore, cumulative effects to endangered fish species as a result of future State, tribal, local or private actions, that are reasonably certain to occur in the area of the Proposed Action or alternatives, are not anticipated.

6.7 PLANT SPECIES

There are no reports of the presence of threatened or endangered plant species within the WRPA. Therefore, cumulative effects to threatened and endangered plant species as a result of future State, tribal, local or private actions, that are reasonably certain to occur in the area of the Proposed Action or alternatives, are not anticipated.

6.8 MIGRATORY BIRDS

Numerous species of migratory birds will pass through the WRPA during the spring and fall migration. Some migratory bird species also breed in the vicinity of the WRPA in the summer. The Proposed Action or alternatives and reasonably foreseeable future State, tribal, local or private actions could result in cumulative impacts to these species. However, if the avoidance and minimization measures described in Section 7.8 are followed, cumulative effects to migratory bird species as a result of future State, tribal, local or private actions are not anticipated.

7.0 MEASURES TO AVOID OR MINIMIZE ADVERSE IMPACTS

The measures provided below are recommended by the USFWS to avoid or minimize potential adverse impacts from the Proposed Action or alternatives to the bald eagle, black-footed ferret, Canada lynx, gray wolf, grizzly bear and migratory birds that may be present in the WRPA.

7.1 BALD EAGLE

Measures that would avoid or minimize the potential for adverse effects to the bald eagle include the following:

- Annual raptor surveys should be conducted within one mile of proposed disturbance during the appropriate time of year to observe nesting birds.
- A one-mile buffer disturbance-free buffer should be established around active bald eagle nests until chicks are fully fledged.
- A raptor mitigation and monitoring plan should be developed to include: (1) baseline aerial and/or ground surveys of nesting and roosting areas within the WRPA to determine presence of bald eagles, (2) annual surveys should be conducted of nesting and roosting areas for five consecutive years within the WRPA to determine bald eagle use trends, (3) site-specific raptor surveys within one mile of proposed disturbance associated with each application for permit to drill and right-of-way application, (4) construction of alternate nest structures in the event that a nest may be negatively impacted at a rate of two alternate nest structures to one impacted nest (a permit for active nest removal must be obtained), (6) review and approval of the raptor mitigation and monitoring by the USFWS Wyoming Field Office and Regional Migratory Bird Office, and (7) review and possibly amend the plan after five years of data.
- Animal carcasses should be removed from access roads, road shoulders, and ROWs to minimize the likelihood of vehicle collisions with bald eagles feeding on carrion.
- Power lines and other transmission facilities should meet the standards presented in “Suggested Practices for Raptor Protection on Power Lines. The state of the Art in 1996” (EEI/RRF) to minimize electrocution potential.
- Drivers should undergo an educational program that discusses the potential of bald eagles to feed on road-killed animals. The training should include the following:

- Training in understanding the requirements of the Endangered Species Act and the consequences of "take,"
- Training to avoid vehicle collisions with bald eagles,
- Reducing allowable speed of vehicles in the WRPA,
- Prohibition of unnecessary off-site activities of company personnel,
- Removal of vehicle-killed carcasses from roads and ROWs to eliminate exposure of the eagles to carrion and potential vehicular accidents.

7.2 BLACK-FOOTED FERRET

Measures recommended by the USFWS to avoid or minimize the potential of adverse effects to the black-footed ferret from the Proposed Action or alternatives are provided below.

- Black-footed ferret surveys in white-tailed prairie dog colonies are no longer required for the prairie dog colonies in the WRPA, located in T3-4N and Range 2-5E, since this area is included in a "block clearance." (USFWS 2004). However, if a survey becomes necessary, the 1989 "Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act" would be followed.
- Well pads, roads, facilities and equipment should be placed outside of prairie dog colonies, where possible to avoid the potential of impacting potential black-footed ferret habitat.
- If black-footed ferrets are documented in a prairie dog complex located within the WRPA, all previously authorized project-related activities under way near the prairie dog colony should be suspended immediately.
- Training in understanding the requirements of the Endangered Species Act and the consequences of "take" should be conducted.
- Training should be conducted on the potential of canine distemper to cause disease and mortality in the black-footed ferret, and employees should not be permitted to bring pets to the work site during or after hours.
- All suspected observations of black-footed ferrets, their sign, or carcasses on the proposed WRPA should be reported to the BIA and USFWS within 24 hours.

7.3 CANADA LYNX

Since there is no suitable habitat within the WRPA for the Canada lynx, no specific measures to avoid or minimize adverse effects would be necessary.

7.4 GRAY WOLF

Measures that should be implemented to avoid or reduce the potential of adverse effects to the gray wolf from the Proposed Action or alternatives are provided below.

- Training in understanding the requirements of the Endangered Species Act and the consequences of "take,"
- Operators should be informed about the potential use of roads and adjacent areas by the gray wolf.
- Driving speeds should be reduced.
- Travel at night should be minimized to reduce the potential of interaction with the gray wolf.
- Vehicle-killed carcasses should be removed from roads and ROWs to minimize the potential of vehicle collisions with the gray wolf.

7.5 GRIZZLY BEAR

Measures that should be implemented to avoid or reduce the potential of adverse effects to the grizzly bear from the Proposed Action and alternatives are provided below.

- Training in understanding the requirements of the Endangered Species Act and the consequences of "take."
- Operators should be informed about the potential of use of roads and adjacent areas by the species.
- Driving speeds should be reduced.
- Travel at night should be minimized to reduce the potential of interaction with grizzly bears.

7.6 FISH SPECIES

Endangered fish species are not expected to be present in the proposed WRPA, since there are only intermittent streams within the WRPA (P. Hnilicka, USFWS, pers. comm., January 2003). Therefore, no avoidance and minimization measures are required.

7.7 PLANT SPECIES

Threatened and endangered plant species are not expected to be present within the WRPA (P. Hnilicka, USFWS, pers. comm., January 2003. Therefore, no avoidance and minimization measures are required.

7.8 MIGRATORY BIRDS

Measures that should be implemented to avoid or reduce the potential of adverse effects to migratory bird species from the Proposed Action and alternatives are provided below.

- Avoid disturbances to habitats of high value for migratory birds (e.g., riparian and wetland habitats).
- Reserve pits that contain potentially hazardous materials would be fenced and netted or flagged, in accordance with BIA and BLM requirements.
- Seed and stabilize disturbed areas after completion of drilling with seed mixtures and that would benefit migratory bird species, as prescribed in the APD and ROW application.
- Evaluate all project facility sites for occurrence and distribution of Waters of the U.S., special aquatic sites, and jurisdictional wetlands. Project facilities would be placed 500 feet from ponds, and streams. If complete avoidance is not possible, impacts would be minimized through minor relocation of well pads and facilities.

8.0 EFFECTS OF THE PROPOSED PROJECT ON THREATENED AND ENDANGERED SPECIES

If the avoidance and minimization measures described above are implemented, the Proposed Action and alternatives are not expected to result in any change in the status of the threatened and endangered species in the short term during the implementation of the Wind River Gas Development Project and in the long term during and after project completion.

9.0 DETERMINATION OF EFFECTS FOR THREATENED AND ENDANGERED SPECIES

This section of the BA evaluates the potential of the Proposed Action, Alternative A, Alternative B, and Alternative C to result in adverse effects to endangered and threatened species, including the bald eagle, black-footed ferret, Canada lynx, gray wolf, and grizzly bear. An effects determination statement of "*no effect*," "*is not likely to adversely affect,*" or "*is likely to adversely affect*" is provided for each listed species.

9.1 BALD EAGLE

Based on the analysis of the Proposed Action and alternatives; the current status of the bald eagle in the WRPA; future State, tribal, local, or private actions that are reasonably certain to occur in the WRPA; and incorporation of the avoidance or minimization measures recommended in this BA; it is determined that implementation of the Proposed Action, Alternative A, Alternative B or Alternative C "*is not likely to adversely affect*" the threatened bald eagle.

9.2 BLACK-FOOTED FERRET

Based on the analysis of the Proposed Action and alternatives, the current status of the black-footed ferret in the proposed WRPA; future State, tribal, local, or private actions that are reasonably certain to occur in the WRPA; and incorporation of avoidance or minimization measures recommended in this Biological Assessment, it is determined that implementation of the Proposed Action or Alternatives A, B or C "*is not likely to adversely affect*" the endangered black-footed ferret.

9.3 CANADA LYNX

Based on the lack of suitable habitat in the WRPA, it is unlikely that Canada lynx would occur in the WRPA. Therefore, the Proposed Action or Alternatives A, B, or C will have "*no effect*" on the Canada lynx.

9.4 GRAY WOLF

Based on the analysis of the Proposed Action and alternatives, the current status of the gray wolf in the WRPA; future State, tribal, local, or private actions that are reasonably certain to occur in the WRPA; and incorporation of avoidance or minimization measures recommended in this BA, it is determined that implementation of the Proposed Action, Alternative A, Alternative B, or Alternative C "*is not likely to adversely affect*" the threatened gray wolf.

9.5 GRIZZLY BEAR

Based on the analysis of the proposed project, the current status of the grizzly bear in the WRPA; future State, tribal, local, or private actions that are reasonably certain to occur in the WRPA; and incorporation of avoidance or minimization measures recommended in this BA, it is determined that implementation of the Proposed Action or Alternatives A, B or C "*is not likely to adversely affect*" the threatened grizzly bear.

9.6 FISH SPECIES

Endangered fish species are not expected to be present in the WRPA, because the shallow or intermittent streams in the WRPA do not support these species. Therefore, the Proposed Action, Alternative A, Alternative B or Alternative C will have "*no effec*t" on endangered fish species.

9.7 PLANT SPECIES

Since no endangered plant species have been reported within the WRPA, the Proposed Action or alternatives will have "*no effect*" on endangered plant species.

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APPENDIX H

CONSULTATION

AND

BIOLOGICAL ASSESSMENT

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Wind River Agency
P. O. Box 158
Fort Washakie, Wyoming 82514-015

September 20, 2004

Mr. Brian Kelly, Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services
400 Airport Parkway
Cheyenne, WY 82001

RE: INFORMAL CONSULTATION ON WIND RIVER NATURAL GAS FIELD DEVELOPMENT PROJECT

Dear Mr. Kelly:

The Bureau of Indian Affairs is requesting informal consultation with the U.S. Fish and Wildlife Service pursuant to section 7(a)(2) of the Endangered Species Act of 1973, as amended, 50 CFR §402.13. We are requesting your review of our determination of effects to listed species from the Wind River Natural Gas Field Development Project, located in Fremont County, Wyoming.

PROJECT DESCRIPTION

Tom Brown, Inc., Samson Resources Company and Saba Energy of Texas, hereafter referred to as "the Operators", have notified the Wind River Agency of the Bureau of Indian Affairs (BIA) and the Lander Field Office of the Bureau of Land Management (BLM) that they intend to drill and develop natural gas wells in the WRPA in central Wyoming. The proposed exploration and development wells, access roads, pipelines, and other ancillary facilities are located on tribal, private, and federal surface, and on tribal and private minerals. Facilities located on federal or tribal surface estate and Tribal minerals would be permitted by BIA and BLM. Facilities located on privately owned surface and minerals would be permitted with the Wyoming Oil and Gas Conservation Commission (WOGCC).

The Wind River Project Area (WRPA) is located in Townships 3 and 4 North and Ranges 2 through 5 East in Fremont County, Wyoming approximately 21 miles northwest of Riverton, Wyoming and is bounded on the east by Boysen Reservoir. The WRPA consists of five development areas: Pavillion, Sand Mesa, Muddy Ridge, Sand Mesa South, and Coastal Extension. Access to the WRPA is from US Highway 26 and WY133 and 134 and other secondary roads (paved two-lane highways), light-duty roads (gravel surface roads that are maintained), and unimproved roads (dirt and gravel roads and tracks that are generally not maintained). Within the WRPA, there are a total of 45.6 miles of secondary roads, 104.2 miles of light-duty roads, and 185.1 miles of unimproved roads.

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The Operators anticipate that future development in the WRPA would likely be concentrated within and near existing development areas rather than in outlying areas where development currently does not exist, with the exception of the exploratory and potential development wells proposed for the Sand Mesa, Coastal Extension, and Sand Mesa South.

The WRPA consists of a relatively level, gently sloping valley, with low lying, hilly terrain at elevations that range from 5,500 feet to less than 4,750 feet within the lower elevations of Cottonwood Creek, Muddy Creek and Fivemile Creek drainages. The majority of the land is currently used for agriculture, livestock grazing, and oil and gas development. The eight primary vegetative cover types in the WRPA include Wyoming big sagebrush, desert shrub, cropland, mixed grass prairie, greasewood fans/flats, saltbush fans/flats and shrub riparian habitat.

ALTERNATIVES

Proposed Action. The Proposed Action involves drilling 325 natural gas wells, and constructing access roads, pipelines, and ancillary facilities. Wells may be directionally drilled under the following circumstances: 1) presence of topographic features where vertical drilling would not be technically feasible, 2) areas of high cultural/archaeological concern, 3) areas where drilling would result in a high potential for impact (e.g., "take") to threatened, endangered and state-sensitive species and relocation of the well would not be feasible, and 4) considerations of health and safety associated with occupied residences.

The forecasted success rate for the Proposed Action is 81 percent (i.e., 263 producing wells), which was determined by summarizing development plans projected by the Operators over the next twenty-year planning period. Development estimates were based on reasonably foreseeable drilling projections for areas within the WRPA where the planned activities would occur. The Proposed Action is in addition to the existing 178 producing wells. Additional natural gas compression and treatment capacity required for the Proposed Action is estimated at 32,800 hp. Some of the additional compression capacity would be located outside of the WRPA. The Proposed Action would continue for 20 years with a life of the project (LOP) of 20-40 years. Short-term disturbance resulting from the Proposed Action would be 1,982 acres or approximately 2.15% of the WRPA. After reclamation, the remaining long-term disturbance would be 422.7 acres or 0.46% of the WRPA.

Alternative A. Alternative A would consist of an increased number of wells to 485 wells, and associated access roads, pipelines and ancillary facilities. Directional drilling may be utilized under the circumstances described above. An overall success rate of 76 percent (i.e., 369 new wells) is assumed. During the construction phase, Alternative A would disturb up to 2818.7 acres or 3.06 percent of the WRPA. With implementation of reclamation disturbance would be reduced to 611.9 acres, or about 0.67 percent of the WRPA. The Wind River Gas Field Development Project would continue for up to 20 years with a life of the project (LOP) of greater than 40 years.

Alternative B. Alternative B would consist of a decreased number and density of new wells to 233 wells, and associated access roads, pipelines, and ancillary facilities. Directional drilling may be utilized under the conditions described above. Assuming a success rate of 78 percent, the Operators anticipate that 182 of the 233 wells will be producing gas wells. During the construction phase, Alternative B would result in surface disturbance of 1609.6 acres or 1.75 percent of the WRPA. With implementation of reclamation under Alternative B, impacts would be reduced to 325.1 acres, or about 0.35 percent of the WRPA. The Wind River Gas Field

Development Project would continue for 20 years with a life of the project (LOP) of 20-40 years.

Alternative C - No Action. This alternative would allow Applications for Permit to Drill (APDs) and rights-of-way on private lands within WRPA. Additional wells would be developed as needed to prevent drainage of tribal minerals. Under the No Action Alternative, a total of 100 new gas wells may be developed in the Pavillion field. Assuming a success rate of 100 percent, there would be 100 producing wells. With implementation of Alternative C, approximately 316.6 acres of surface disturbance would result, or 0.34 percent of the WRPA. After reclamation, total disturbance would be reduced to 79.3 acres or 0.09 percent of the WRPA.

RELATED PROJECTS IN AREA

Previous Environmental Assessments and Biological Assessments have been conducted for oil and gas development by Tom Brown, Inc. for the following proposed projects.

- EA for Tom Brown, Inc., Pavillion North Oil/Gas Leasing Proposal Wind River Indian Reservation, Fremont County, Wyoming (BIA 1992).
- EA for Tom Brown, Inc., Haymaker Creek, Indian Butte, Little Dome and Owl Creek Oil/Gas Lease Option Proposals located within the Wind River Indian Reservation of Fremont County, Wyoming (BIA 1994).
- Tom Brown, Inc. and Brownlie, Wallace, Armstrong & Bander Exploration Wind River Oil and Gas Exploration License Agreement Environmental Assessment and Finding of No Significant Impact (BIA 1996).

THREATENED AND ENDANGERED SPECIES IN THE WRPA

BALD EAGLE

The bald eagle (*Haliaeetus leucocephalus*) is listed as threatened under the Endangered Species Act and is found throughout the State of Wyoming. The life history, current status and surveys conducted for bald eagles are described in Section 4.2 of the attached Biological Assessment.

Determination

Based on the analysis of the Proposed Action and alternatives; the current status of the bald eagle in the WRPA; future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Biological Assessment; and incorporation of the avoidance or minimization measures recommended in this BA; it is determined that implementation of the Proposed Action, Alternative A, Alternative B or Alternative C "*is not likely to adversely affect*" the bald eagle.

Avoidance/Minimization Measures

Measures that would avoid or minimize the potential of adverse effects to the bald eagle include the following:

- Annual raptor surveys would be conducted within one mile of proposed disturbance during the appropriate time of year to observe nesting birds.
- A one-mile buffer disturbance-free buffer would be established around active bald eagle nests until chicks are fully fledged.
- A raptor mitigation and monitoring plan would be developed to include (1) baseline aerial and/or ground surveys of nesting and roosting areas within the WRPA to determine

presence of bald eagles, (2) annual surveys of nesting and roosting areas for five consecutive years within the WRPA to determine bald eagle use trends, (3) site-specific raptor surveys within one mile of proposed disturbance associated with each application for permit to drill and right-of-way application, (4) construction of alternate nest structures in the event that a nest may be negatively impacted at a rate of two alternate nest structures to one impacted nest (a permit for active nest removal must be obtained), (6) review and approval of the raptor mitigation and monitoring by the USFWS Wyoming Field Office and Regional Migratory Bird Office, and (7) review and possible modification of the plan after fie years of data.

- Animal carcasses would be removed from access roads, road shoulders, and ROWs to minimize the likelihood of vehicle collisions with bald eagles feeding on carrion.
- Anti-perching structures would be installed on structures that may attract raptors.
- Company drivers would undergo an educational program that discusses the potential of bald eagles to feed on road-killed animals. The training would include:
  - Requirements of the Endangered Species Act and the consequences of "take,"
  - Training to avoid collisions with bald eagles,
  - Reducing allowable speed of vehicles in the WRPA,
  - Removal of vehicle-killed carcasses from roads and ROWs to eliminate exposure of the eagles to carrion and potential vehicular accidents.

Surveys

An aerial survey for the bald eagle and other raptors was conducted on April 16 to 17, 2003. The aircraft flew over all habitat that appeared to be suitable for eagles and other raptors to construct nests, including cliff faces of the dominant ridges and any other bluffs or structures that could potentially support a raptor nest. The aircraft flew above and around all aspects of a bluff or ridge edge to allow sufficient observation of the habitat for existing raptor nests. When a nest was observed, the location was recorded with a hand-held GPS unit in order to mark the nest location on a map. Nest occupancy or signs of occupancy, such as white-wash, feathers, or eggs was recorded (Buys & Associates 2003a).

Although no bald eagle nests were observed during the survey, two active raptor nests were documented within the survey area. These included one red-tailed hawk nest and one nest of an unknown raptor species. The nest of this unidentified species was potentially that of a prairie falcon or another red-tailed hawk. The active red-tailed hawk nest was located on the north side of Muddy Ridge in the SE/SW 1/4 of Section 14 in T4N:R2E. One adult was present at this nest, but it was not evident if any eggs or fledglings were also in the nest. The second active nest of the unidentified raptor was located in the SE/SE 1/4 of Section 9 in T4N:R2E on a south facing exposure, underneath a rock ledge of Muddy Ridge.

During the aerial survey there were two separate observations of golden eagles, perched on top of bluffs in the western portion of Muddy Ridge. The second observation was approximately six miles west of the first observation, along the same bluff ridge. Both eagle observations were located approximately one-half mile to one mile south of the proposed WRPA.

BLACK-FOOTED FERRET

The black-footed ferret (*Mustela nigripes*) is considered to be one of the most endangered mammals in North America (FWS 1988). This species inhabits prairie dog colonies and is a predator of prairie dogs. It uses the prairie dog burrows for shelter and rearing of its young. Section 4.1 of the attached BA provides information on life history, status and distribution, and the results of white tailed prairie dog surveys.

Determination
Based on the analysis of the Proposed Action and alternatives; the current status of the black-footed ferret in the proposed WRPA; future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Biological Assessment; and incorporation of avoidance or minimization measures recommended in this Biological Assessment, it is determined that implementation of the Proposed Action or Alternatives A, B or C "*is not likely to adversely affect*" the endangered black-footed ferret.

Avoidance/Minimization
Measures that would avoid or minimize the potential of adverse effects to the black -footed include the following:

- Surveys for black-footed ferrets in white-tailed prairie dog colonies are not required for the prairie dog colonies in Township 3-4N and Range 2-5E, since this area is included in a "block clearance" (USFWS 2004). However, if a survey becomes necessary the 1989 "Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act" would be followed.
- Well pads, roads, facilities and equipment would be placed outside of prairie dog colonies, where possible, to avoid the potential of impacting potential black-footed ferret habitat.
- If black-footed ferrets are documented in a prairie dog complex located within the WRPA, all previously authorized project-related activities in progress near the prairie dog colony would be suspended immediately.
- Training in understanding the requirements of the Endangered Species Act and the consequences of "take" would be conducted.
- Training would be conducted on the potential of canine distemper to cause disease and mortality in the black-footed ferret, and employees would not be permitted to bring pets to the work site.
- All suspected observations of black-footed ferrets, their sign, or carcasses on the proposed WRPA should be reported to the BIA and USFWS within 24 hours.

Prairie Dog Survey
A white-tailed prairie dog survey was conducted on July 10-11, 2003 in the WRPA to determine if the prairie dog colonies were large enough to support black-footed ferrets (B&A 2003b). The results of the survey indicated that the acreage of the prairie dog complex was 1,243 acres and the burrow density was 10.3 burrows/acre. This density exceeds the minimum threshold of 9 burrows/acre. A complex rating (R) of 1.9 also indicates that the complex is capable of supporting black-footed ferrets. Additional detail of the survey is provided in Section 4.1 of the BA.

CANADA LYNX
Based on the lack of suitable habitat in the WRPA, it is unlikely that Canada lynx (*Lynx* Canadensis)would occur in the WRPA. Therefore, the Proposed Action or Alternatives A, B, or C will have "*no effect*" on the Canada lynx.

GRAY WOLF
The gray wolf (*Canis lupus*)is listed as threatened under the Endangered Species Act. In 1994 portions of gray wolf habitat in Idaho, Montana, and Wyoming were designated as "nonessential experimental populations" in order to initiate the gray wolf reintroduction project and provided additional flexibility for the management of the wolves (USFWS 1994). More detailed information on the gray wolf is provided in Section 4.4 of the BA.

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Determination
Based on the analysis of the Proposed Action and alternatives, the current status of the gray wolf in the WRPA; future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Biological Assessment; and incorporation of avoidance or minimization measures recommended in this BA, it is determined that implementation of the Proposed Action, Alternative A, Alternative B, or Alternative C "*is not likely to adversely affect*" the gray wolf.

Avoidance/Minimization
Measures that should be implemented to avoid or reduce the potential of adverse effects to the gray wolf are provided below.

- Training in understanding the requirements of the Endangered Species Act and the consequences of "take."
- Operators and their employees would be informed about the potential use of roads and adjacent areas by the gray wolf.
- Reduction of driving speeds by the company personnel.
- Travel at night would be minimized to reduce the potential of interaction with the gray wolf.
- Animal carcasses would be removed from access roads, road shoulders, and ROWs to minimize the likelihood of vehicle collisions with gray wolves feeding on carrion.

Grizzly Bear

The grizzly bear (*Ursus arctos horribilis*) is listed as threatened under the Endangered Species Act. The grizzly bear is generally found in the mountainous regions of Wyoming, Idaho, Montana, and Washington. A more detailed description of the grizzly bear and its habitat is provided in Section 4.5 of the attached BA.

Determination
Based on the analysis of the proposed project, the current status of the grizzly bear in the WRPA; other existing and future land uses in the area; and incorporation of avoidance or minimization measures recommended in this BA; it is determined that implementation of the Proposed Action or Alternatives A, B or C "*is not likely to adversely affect*" the grizzly bear.

Avoidance/Minimization
Measures that would be implemented to avoid or reduce the potential of adverse effects to the grizzly bear are provided below.

- Training in understanding the requirements of the Endangered Species Act and the consequences of "take."
- Operators would be informed about the potential of use of roads and adjacent areas by the grizzly bear.
- Driving speeds would be reduced.
- Travel at night would be minimized to reduce the potential of interaction with grizzly bears.
- Carrion would be removed from roads and ROWs, and garbage would be removed from worker living areas to prevent attraction of grizzly bears to the construction areas.

FISH
Endangered fish species are not expected to be present in the WRPA, because the shallow or intermittent streams in the WRPA do not support these species. Therefore, the Proposed

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Action, Alternative A, Alternative B or Alternative C will have "*no effect*" on endangered fish species.

PLANTS

Threatened and endangered plant species are not expected to be present within the WRPA (P. Hnilicka, USFWS, pers. comm., January 2003). Therefore, the Proposed Action or alternatives will have "*no effect*" on endangered plant species.

MIGRATORY BIRDS

Migratory birds are protected under the Migratory Bird Treaty Act (16 U.S.C. 703) and the Bald and Golden Eagle Protection Act (16 U.S.C. 668). Numerous species of migratory birds migrate through the WRPA in spring and fall and some species breed or winter in the WRPA. Neotropical migrants have also been reported from the WRPA. More detail on the migratory bird species that have been observed in the WRPA is provided in Section 4.8 of the attached Biological Assessment.

Avoidance/Miniminization

- Avoid disturbances to habitats of high value for migratory birds (e.g., riparian and wetland habitats).
- Reserve pits that contain potentially hazardous materials would be fenced and netted or flagged, in accordance with BIA and BLM requirements.
- Seed and stabilize disturbed areas after completion of drilling with seed mixtures and that would benefit migratory bird species, as prescribed in the APD and ROW application.
- Evaluate all project facility sites for occurrence and distribution of Waters of the U.S., special aquatic sites, and jurisdictional wetlands. Project facilities would be placed 500 feet from ponds, and streams. If complete avoidance is not possible, impacts would be minimized through minor relocation of well pads and facilities.

A Biological Assessment of the threatened and endangered species that may occur within the WRPA is enclosed with this cover letter. If you have any questions on this BA, please contact me at 307-332-3718.

Sincerely,

Ramon A. Nation
Deputy Superintendent
Trust Services
Wind River Agency

enclosures

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References

Buys & Associates. 2003a. Aerial Survey of the Wind River Project Area. Prepared for Bureau of Indian Affairs, Wind River Agency. April 2003.

Buys & Associates. 2003b. White-tailed Prairie Dog Survey within and adjacent to the Wind River Project Area. Prepared for the Bureau of Indian Affairs, Wind River Agency. August 2003.

USFWS. 1994. Endangered and Threatened Wildlife and Plants: Establishment of a Nonessential Experimental Population of the Gray Wolf; Final Rule. 59 FR 60253. November 22, 1994.

USFWS. 2004. Letter from the US Fish and Wildlife Service regarding changes in the requirements for black-footed ferret surveys. February 2, 2004.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

In Reply Refer To:
ES-61411/W.01/WY8832

Memorandum

To: Ramon Nation, Deputy Superintendent, Bureau of Indian Affairs, Wind River Agency, Fort Washakie, Wyoming

From: Brian T. Kelly, Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming

Subject: Consultation for the Proposed Wind River Natural Gas Development Project

Thank you for your letter and biological assessment of September 20, 2004, received in this office on September 23, regarding the proposed Wind River Natural Gas Field Development Project (WRPA) located in T3-4N, R2-5W in Fremont County, Wyoming. The U.S. Fish and Wildlife Service's (Service) Cheyenne Ecological Services Field Office has previously provided comments for this proposed project in our letter of August 31, 2004. This office has also coordinated with Pat Hnilika, of the Service's Fish and Wildlife Management Assistance Office in Lander, regarding this project.

You have requested consultation pursuant to section 7(a)(2) of the Endangered Species Act of 1973 (Act), as amended, 50 CFR §402.13 and 402.14 for your determination of potential effects to listed and proposed species from this project. The Service is providing you with concurrence based on our review of the biological assessment.

The WRPA consists of five separate development areas; Pavillion, Muddy Ridge, Sand Mesa, Sand Mesa South, and Coastal Extension. These areas consist of nearly 91,500 acres of combined private, federal and state lands. The proposed action includes 325 traditional natural gas wells on 325 well pads as well as associated facilities such as roads and pipelines. The development stage is expected to take 20 years while the life of the project may extend to 40 years.

You have made a "may affect, not likely to adversely affect" determination for bald eagle (*Haliaeetus leucocephalus*) based on their potential use of the project area for both nesting and roosting. The Service concurs with your determination based on your commitment to conduct surveys for nesting and roosting bald eagles and other raptors within 1-mile of proposed new disturbance and the commitment to implement a 1-mile disturbance-free buffer around active bald eagle nests and roosts. The project proponent has also agreed to develop a raptor mitigation and monitoring plan to further the conservation of bald eagles and other raptors.

You have made a "may affect, not likely to adversely affect" determination for black-footed ferret (*Mustela nigripes*). The Service's letter of February 2, 2004, served to block-clear several areas in Wyoming where surveys for black-footed ferrets are no longer warranted. We believe that ferrets are unlikely to occur in the block-cleared areas due to the inadequate size of the complexes, history of plague and history of survey efforts. White-tailed prairie dog towns within the WRPA have been block-cleared, therefore surveys for ferrets are not warranted. To further the conservation of the white-tailed prairie dog and the myriad of species that rely on prairie dogs and their habitat, you have stated that the project proponent is committed to avoid prairie dog towns, where possible. Based on the above information, the Service believes that black-footed ferrets will not be affected by the WRPA. However, we further encourage the project proponent to protect prairie dog towns for the benefit they may have for future reintroduction of black-footed ferrets.

You have made a "may affect, not likely to adversely affect" determination for gray wolf (*Canis lupus*) based on a sighting in the general vicinity of the WRPA. Although wolves could occur within the project area, the habitat is described as marginal and more suitable habitat exists outside of the WRPA. The Service believes that the project is not likely to jeopardize the continued existence of the gray wolf based on the above information.

You have made a "may affect, not likely to adversely affect" determination for grizzly bear (*Ursus arctos horribilis*) based on several unconfirmed sightings within the WRPA. The Service concurs with your determination based on the unlikelihood of grizzly bears occurring within the WRPA on a regular basis as more suitable habitat exists outside of the project area. Additionally, your commitment to remove carrion from right of ways and access roads and promptly remove garbage will further minimize possible human-bear encounters.

This concludes informal consultation pursuant to the regulations implementing the Act. This project should be re-analyzed if new information reveals effects of the action that may affect listed species or designated or proposed critical habitat in a manner or to an extent not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to a listed species or designated or proposed critical habitat that was not considered in this consultation; and/or, if a new species is listed or critical habitat is designated that may be affected by this project.

The Service commends the project proponent for developing a Raptor Mitigation and Monitoring Plan and we look forward to reviewing the completed document in the final environmental impact statement. In addition to raptors, the biological assessment also identified many species of other migratory birds that may occur within the WRPA. We have reviewed your commitments to minimize impacts to migratory birds which include avoiding wetlands and riparian areas, fencing and netting reserve pits and reclaiming well pads. However, the commitments did not include measures to reduce the long term loss of sagebrush habitats vital to obligates such as the sage thrasher, loggerhead shrike, brewers sparrow and sage sparrow. The Service recommends that construction activities avoid these habitats where possible and be prohibited in these habitats during the nesting season.

To improve reclamation and minimize the long term footprint of the well pad we recommend that well pad facilities (i.e., condensate tank, dehydrator, anti-freeze tanks) be placed at minimum

distances from each other. We also highly encourage the project proponent to expedite reclamation of unused areas of the well pad immediately following completion of the well to avoid the loss of stockpiled topsoil from wind erosion.

We appreciate your efforts to ensure the conservation of endangered, threatened, and candidate species and migratory birds. If you have further questions regarding our comments or your responsibilities under the Act, please contact Kathleen Erwin of my staff at the letterhead address or phone (307)772-2374, extension 28.

cc: Shoshone Business Council, Wind River Reservation, Ft. Washakie (J. Washakie)
Northern Arapaho Business Council, Wind River Reservation, Ft. Washakie (R. Brannan)
BLM, Lander Field Office, Lander (Field Supervisor)
FWS, Region 6, Federal Activities Coordinator, Denver (B. Dach)
FWS, Region 6, FWMAO, Lander (P. Hnilika)
WGFD, Statewide Habitat Protection Coordinator, Cheyenne (V. Stelter)
WGFD, Non-Game Coordinator, Lander (B. Oakleaf)