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Rawlins and Rock Springs Field Offices

July 2004

**RECORD OF DECISION
ENVIRONMENTAL IMPACT STATEMENT
Desolation Flats Natural Gas Field
Development Project
Sweetwater and Carbon Counties, Wyoming**



TN
880.2
.D36
2004

MISSION STATEMENT

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

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U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
RECORD OF DECISION
DESOLATION FLATS NATURAL GAS
FIELD DEVELOPMENT PROJECT
SWEETWATER & CARBON COUNTIES, WYOMING

INTRODUCTION

In 1999 several operators, including Marathon Oil Company, submitted a proposal to the Bureau of Land Management (BLM) to conduct exploratory drilling and development of up to 592 wells during the next 20 years within the area known as Desolation Flats. The Desolation Flats Natural Gas Field Development Project area is approximately 233,542 acres and is located within the administrative jurisdictions of the BLM Rawlins and Rock Springs Field Offices in Sweetwater and Carbon Counties, south of Wamsutter, Wyoming. The EIS for the Desolation Flats Natural Gas Field Development Project Area (DFPA) analyzes a proposal by Marathon Oil Company, Cabot Oil and Gas Company and other leaseholders to drill additional development infill and exploratory wells on their leased acreage within the DFPA of south central Wyoming.

The Great Divide Resource Management Plan (RMP) (1990) and the Green River RMP (1997) provide the general guidance for the Desolation Flats area. Approximately 94 percent of the DFPA is guided by the Great Divide RMP and the remaining 6 percent is guided by the Green River RMP. Both RMPs designated the respective portions of the DFPA as open to oil and gas leasing and development. An existing network of roads, including roads built to BLM standards and other roads of varying quality and use, exist in the DFPA.

Under the Green River RMP, the Adobe Town Wilderness Study Area (WSA) was delineated and described as having wilderness characteristics. The DFPA shares a common boundary with the Adobe Town WSA which lies to the west of the DFPA. The administrative boundary between Rawlins Field Office and Rock Springs Field Office distributes management of Adobe Town WSA between the two BLM offices, with the Green River RMP providing the overall guidance. DFPA is also within a larger area known as the "Greater Green River Basin", an immense geographical area of southwestern Wyoming. The Greater Green River Basin currently has a large number of existing and proposed oil and gas developments.

Originally the oil and gas development proposed by the Marathon Oil Company and other operators (the Operators) included up to 592 wells and associated production and transmission systems. Subsequently the composition of the leasehold ownership changed and the proposal was modified to focus on exploration and drilling in the most economically and technically feasible portions of the DFPA. With this modification the Proposed Action alternative focused on exploration and development of the most economical and technically feasible portions of the DFPA. The Proposed Action alternative proposed up to 385 wells and associated production and transmission facilities. The EIS analyzes the impacts of three alternatives: the Proposed Action as redefined by Cabot Oil Company and other Operators; Alternative A an alternative that examines the original proposal as submitted in 1999, and Alternative B, the no-action alternative.

The FEIS was conducted and prepared under the authorities of the National Environmental Policy Act of 1969 and regulations, 40 Code of Federal Regulations (CFR) Part 1500-1508 and the Federal Land Policy and Management Act of 1976 (FLPMA).

DECISION

The decision is to select and approve the Proposed Action as described in the EIS. This decision is consistent with the approved Great Divide Resource Management Plan (1990) and the Green River Resource Management Plan. Standard oil and gas leasing stipulations addressing compliance with the basic requirements of environmental statutes. This decision is not the final approval for the actions associated with the Proposed Action alternative. Prior to issuing any permit or authorization to implement these activities on the BLM-administered lands, the BLM must analyze each component of the Proposed Action on a site-specific basis and subject to NEPA. These permits and authorizations include but are not limited to: Application for Permit to Drill (APD), Notice of Staking, Right of Way Grant or Special Use Permit.

REASONS FOR THE DECISION

My reasons for selecting the Proposed Action with minor modifications are as follows.

- We are satisfied that the decision to approve the Desolation Flats gas field development as proposed by the Operators and with minor modifications through the use of mitigation measures and best management practices is in conformance with the BLM land use plans covering the DFPA.
- The Desolation Flat Project EIS was prepared in response to leaseholders desiring to exercise the terms and conditions of their respective oil and gas leases in the project area. The environmental impacts of this decision were fully disclosed in the Draft and Final EISs. Opportunities for public involvement and BLM responses to public comment are also disclosed.
- Three key issues were identified: cumulative impacts to air quality; impacts to the Adobe Town Wilderness Study Area; and impacts from gas field development and activities on wildlife habitat.
 - Air Quality. Concerns were expressed by other Federal agencies including Environmental Protection Agency (EPA), U.S.D.A. Forest Service and the State of Wyoming regarding the impacts to air quality and specifically to visibility in Class I Airsheds, and additional emissions that would contribute to regional haze. These concerns were addressed through air quality near-field and far-field modeling and analyses. Air quality models predicted that the activities associated with the Desolation Flat gas field development individually would not produce adverse direct visibility impacts. However, DFPA activities would contribute to the cumulative impacts when considered with other oil and gas projects in production or proposed nearby. Because of the lesser level of development and activities proposed comparatively the impacts of the Proposed Action were

slightly less than those estimated for Alternative A both directly and cumulatively. The BLM in cooperation with the above mentioned agencies will continue to monitor air quality impacts both locally and regionally. Mitigation measures and monitoring requirements are included and attached to this Decision.

- Adobe Town Wilderness Study Area (WSA). Conservation groups requested that BLM consider a citizens' proposal for additions to the Adobe Town WSA, a portion of which is included and adjacent to the DFPA. This alternative was considered and eliminated from detailed study. The majority of the Desolation Flats project area is leased for oil and gas and some infrastructure from previously authorized oil and gas operation exists. To protect the scenic characteristics of the WSA, visual resources best management practices will be applied within the DFPA as appropriate, through Conditions of Approval provisions associated with APDs and other authorizing instruments.
- Wildlife Habitat. The effects of development to big game crucial winter range, raptors, mountain plover and greater sage grouse were of concern to Biodiversity Conservation Alliance and National Wildlife Federation. Their concerns centered on the adequacy of present standard mitigation to address current conditions. With the uncertainty of the U.S. Fish and Wildlife Service's listing of the greater sage grouse, habitat management recommendations have been in flux. As the life-of-project is estimated to be 30 to 50 years, with the majority of development and activities expected to occur within the first 20 years, project activities and authorizations are to be guided by the mitigation measures and monitoring plans included in the EIS and hereby made part of this decision (as attached). The use of best management practices, technology and research will be considered at the time APDs and other applications for authorizations are submitted. This measure will provide the BLM the flexibility to address habitat recommendations as they evolve.
- The purpose of and need for the exploring and developing the Desolation Flats oil and gas resources was to allow the proponents to access and development of their leaseholds, consistent with the Minerals Leasing Act of 1920 (MLA) and regulations 43 CFR 3100. The selected alternative meets the purpose and need for the proposed action.
- The adoption of the Proposed Action includes all practical means to avoid or minimize environmental harm. To ensure the environmental consequences of the field development activities will be minimal, the decision includes not only the required environmental safeguards and resource protection measures prescribed by the Great Divide and Green River RMPs, it also includes additional mitigation or protective measures identified in the DFPA Draft and Final EISs, as attached to this decision.
- Benefits from this alternative include the extraction of an estimated 1.1 trillion cubic feet of natural gas, positive economic effects on local economies, increased employment opportunities, improved road infrastructure and accessibility, and increased tax revenues for local governments.

- A primary goal of the National Energy Policy is to add energy supplies from diverse sources including domestic oil, gas, and coal in addition to hydropower and nuclear power. The BLM recognizes that the exploration and development of natural gas and oil resources is essential to meet the nation's future energy needs. As a result development of these Federal resources is integral to the BLM's oil and gas leasing programs under the authorities of FLPMA and the MLA.
- The BLM oil and gas leasing program encourages the development of domestic oil and gas resources and reduction of the United States' dependence on foreign sources of energy. The leasing and subsequent production of Federal oil and gas resources provides the United States, the State of Wyoming and affected local counties with income in the form of lease royalty payments. The alternative selected meets the goals of the National Energy Policy and achieves the objectives of the Federal oil and gas leasing programs managed by the BLM. This alternative is supported by the Wyoming Governor and other state and local officials.

The decision was made in full consideration to public, local, state, and other federal agency input. No substantial issues remain unresolved within the scope of this proposal, as raised by government agencies, industry, groups, or individuals.

PUBLIC INVOLVEMENT

On May 18, 2000 the BLM published in the Federal Register a notice of intent to prepare an environmental impact statement. Additionally a scoping notice was prepared and distributed to Federal, tribal, state and local governments, conservation groups, industry groups, and individuals May 24, 2000. The notice requested input and comments to the proposed Desolation Flats Natural Gas Field Development Project (DFPA). Public meetings to discuss the proposal were held in Rock Springs (June 7, 2000), and Rawlins (June 8, 2000) Wyoming. During the period of May 24, 2000 through June 23, 2000, 76 written responses were received by the BLM. These comments were used to determine the extent of analysis, issues and concerns, opportunities, and to develop alternatives to the proposed action. Chapter 6 of the Draft EIS contains a detailed list of those contacted under consultation and coordination. Issues and concerns generated are detailed in the Draft EIS on page 1-19 through page 1-22. Opportunities identified can be found at "1.7 Opportunities" on page 1-23. Alternatives identified and either dropped from detailed consideration or carried forward for analysis are discussed in Chapter 2 – "Proposed Action and Alternatives".

The Notice of Availability of the Draft Environmental Impact Statement for the Desolation Flats Natural Gas Field Development Project was published in the Federal Register April 25, 2003. With the publication of the EPA's Notice of Availability the following week, a 60-day review and comment period started, ending July 1, 2003. Formal public meetings to discuss the DEIS were held in Rock Springs (June 5, 2003), and Rawlins (June 4, 2003) Wyoming. During the comment period 188 written responses were received. The comments made on the Draft EIS were included in the Final EIS. Comments and BLM response are detailed in Section 5 of the Final EIS.

On May 28, 2004 the BLM published in the Federal Register a Notice of Availability of Final Environmental Impact Statement for the Desolation Flats Natural Gas Field Development Project for a 30-day review period. The review period commenced June 4, 2004 with the publication of EPA's Notice of Availability in the Federal Register. By the end of the comment period, July 6, 2004 the BLM had received 655 written comments by facsimile and electronic and conventional mail.

Most of the comments received were statements requesting the BLM select Alternative B – No Action. One commenter noted that a comment made to the Draft EIS was omitted in the Final EIS and did not receive a response from the BLM. The comment and response are provided in the "Errata" section. All comments that were received during the EIS process were considered in the preparation in both the Draft and Final EISs and in this Record of Decision.

ALTERNATIVES ANALYZED IN DETAIL

The EIS analyzed three alternatives in detail: the Proposed Action, Alternative A and Alternative B, No Action. These alternatives are summarized below. A full description of each alternative analyzed in detail may be found in Chapter 2 of the Draft EIS and incorporated into Final EIS.

Proposed Action (Selected Alternative)

The activities proposed by the proponents include 385 wells at 361 locations with a forecasted viability success rate of 65 percent. This would result in a total build-out of 250 producing wells. A supporting access and transportation system of up to 450 miles of upgraded and new roads; approximately 361 miles of pipelines; 4 compressor stations, one gas processing plant, 3 water evaporation ponds, 2 disposal wells and 10 water wells would be associated with the target number of well locations. Total short-term surface disturbance is estimated at about 4,900 acres. The proponents proposed 2 to 4 well locations per aliquot section dependent on the geological resources.

Alternative A

The original proposal made by the proponents was analyzed for impacts that might occur if all portions of the project area were explored for development. These additional wells would be located in the areas of the Desolation Flats Field that are marginally economical to uneconomical in an effort to maximize resource recovery. This alternative included 592 natural gas wells at 555 locations with a forecasted viability success rate of 65 percent. A supporting access and transportation system of up to 830 miles of upgraded and new roads; approximately 555 miles of new pipeline; 6 compressor stations, 2 gas processing plants, 4 water evaporation ponds, 3 disposal wells and 16 water wells would be associated with achieving the target number of well locations. Two to four well locations per aliquot section would be needed depending on the geological resources.

Alternative B – No Action

The development proposal made by the Operators would be rejected. The BLM would consider and review individual site-specific activities and facilities requested in APDs and other

application for use of public lands. Each proposal would be subject to NEPA process and analysis on a case-by-case basis.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Further descriptions of these alternatives may be found in Chapter 2 of the Draft and Final EIS.

Expanded Wilderness Alternative. The Rawlins Field Office (RFO) and Rock Springs Field Office (RSFO) received a proposal entitled "A Citizens' Proposal to evaluate lands surrounding the Adobe Town Wilderness Study Area (WSA) for Wilderness Status" (Citizens Proposal). All lands contained in the Citizens' Proposal are contiguous to the existing Adobe Town WSA. Lands contained in the Citizens' Proposal include public lands in both the RFO and RSFO that are within the DFPA. An alternative was considered to analyze the Citizens' Proposal to evaluate lands surrounding the Adobe Town WSA for wilderness status. This alternative was eliminated from further consideration and detailed study because the proposal would be more appropriately addressed within the context of the BLM's land use plan review process. A detailed discussion of eliminating this alternative from further consideration can be found in the draft EIS, section 2.6 "Alternatives Considered but Eliminated from Detailed Study", part 2.6.1 "Expanded Wilderness Alternative".

Required Directional Drilling. The BLM reviewed the request that some percentage of the wells proposed by the operators would be directionally drilled, and an alternative was considered that all wells be drilled from multi-well pads. Required directional drilling for all wells could reduce surface disturbance including roads, acres of disturbance from well pad construction and miles of pipeline to construct. However, experience drilling in similar formations has yielded insight into the opportunities and limitations of directional drilling. The Proposed Action and Alternative A both provide for directional drilling when practical; particularly when adverse topographic, cultural resource impacts, Historic Trail viewshed considerations, and avoiding habitats of threatened, endangered, or other sensitive species make it desirable. There is no limit to the number of directional / multi-pad wells that may be drilled, but mandating that every well, regardless of geologic or surface conditions must be drilled directionally is not reasonable. A detailed discussion of the rationale behind dropping this alternative from further consideration can be found in the draft EIS, section 2.6 "Alternatives Considered but Eliminated from Detailed Study", part 2.6.2 "Directional Drilling".

MITIGATION, COMPLIANCE AND MONITORING

Construction, drilling, and production operations will be routinely inspected by BLM personnel. In addition, each Operator may be required to have an Environmental Compliance Coordinator. The Environmental Compliance Coordinator will be responsible for assuring that mitigation measures are applied and monitoring activities are conducted as necessary to assure surface impacts are minimized. Operators and the BLM will provide qualified representatives on-site during construction to validate construction commensurate with the approved design.

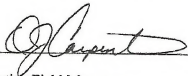
The following provides a brief summary of how the transportation, reclamation, and wildlife protection plans provide for compliance, monitoring, and/or adaptive environmental management. The Reclamation Plan (Appendix A) involves components designed to protect or otherwise minimize impacts to many area resources including surface waters and groundwater,

vegetation communities, wildlife, livestock grazing, recreation, and visual resources. The process to assure appropriate reclamation is provided in Appendix A, Figure A-1.1. Reclamation monitoring will be the responsibility of both the BLM and the Operators. Monitoring will be accomplished through joint, coordinated monitoring efforts. Details on BLM/Operator monitoring responsibilities will be provided in site-specific plans. Monitoring protocol and success criteria are outlined in detail in the Sections A-6.2 and A_6.3 of Appendix A. Monitoring data will be compiled by the BLM to provide future guidance for successful reclamation.

The Wildlife Protection Plan (Appendix D) is designed to determine the extent of adverse effects, if any, occurring to sensitive wildlife resources, and in the event adverse effects are found, the plan calls for increased protection measures. Currently proposed techniques and associated responsibilities are shown in Appendix D, Tables D-2.1, D-2.2, and D-2.3. An annual review of wildlife monitoring techniques, and collected data will be conducted by BLM, Operators, WGFD, and USFWS. Annual reviews will help determine if protection measures have been adequate or if additional protective measures are required. To further specify responsibilities and commit financial obligations, a cooperative agreement among participating agencies and operators will be required.

RECOMMENDED ALTERNATIVE

I recommend that the Proposed Action as modified by the mitigation measures and best management practices would best meet the interests of the public and the proponents.



Acting Field Manager
BLM Rawlins Field Office

7/27/04

Date



for Michael R. Holbert
BLM Rock Springs Field Officer Manager


27 July 04
Date

APPROVAL

Based on the recommendations of the Rawlins and Rock Springs Field Office Managers, I approve the decision to explore and develop the Desolation Flats Project Area by the Operators as described by the Proposed Action. Consistent with 43 CFR Part 3160 this decision will be in full force and effect commencing with the date it is signed by the authorizing officer.

Appeal Procedures. Under the regulations found at 43 CFR Subpart 3165, this decision may be appealed by any adversely affected party to the Interior Board of Land Appeals. Procedures and timeframes for submitting an appeal of this decision are described at 43 CFR 3165.4 If an appeal is filed, the notice of appeal *must* be filed with the State Director, Bureau of Land Management – Wyoming State Office, P.O. Box 1828 Cheyenne, WY or delivered to BLM – Wyoming State Office, 5353 Yellowstone Road, Cheyenne Wyoming within 30 days of the date the BLM's Notice of Availability of this decision has been published in the Federal Register.

If you wish to file a petition for a stay of the effectiveness of this decision while your appeal is under review by the Board, the petition of stay must accompany your notice of appeal as required by the procedures and timeframes codified at 43 CFR 3165.4(c). Copies of the notice of appeal and the petition for stay must also be submitted to the Interior Board of Land Appeals and to the appropriate Office of the Solicitor at the same time the original documents are filed with this office. If you request a stay, you have the burden of proof to demonstrate that a stay should be granted.


Robert A. Bennett
Wyoming State Director

7/27/04
Date

ATTACHMENTS

1. Index of mitigation measures by document and subject
2. Appendix A
3. Appendix B
4. etc

Index of Mitigation Measures by Document and Subject

Mitigation and Guidelines for monitoring are found in the following places for the draft and final EISs, and this ROD:

6.1 ROD

EIS Location		ROD	Title
Appendix	A—Draft	A	Criteria for meeting "Acceptable Plan
Appendix	B—Draft	B	Standard Mitigation Guidelines
Appendix	C—Draft	C	Reclamation Plan
Appendix	D—Draft	D	Hazardous Materials Management Plan
Appendix	H—Draft	E	Wildlife Monitoring/Protection Plan
Appendix	A—Final	F	Formal and Informal Consultation for Desolation Flats Project

6.2 Draft EIS

Chapter 2 – Part 2.5.2.11 – Project Wide Mitigation Measures

Chapter 4 – Analysis of Environmental Consequences, Additional Mitigation Measures:

Part	Section	Page	Part	Section	Page
4.2.5	Air Quality	4-29	4.8.2.4	Sensitive Species	4-90
4.7.5	Wildlife	4-72	4.13.5	Transportation	4-124
4.8.1.4	TE & S Species	4-79			

Appendix B – Standard Mitigation Guidelines

Appendix C – Reclamation Plan

Appendix D – Hazardous Materials Management Plan

Appendix H – Wildlife Monitoring / Protection Plan

6.3 Final EIS

Section 2: Addendum and Errata, Part 4.2.5 – Air Quality
Appendix Cultural Resources Management

Because of the importance of mitigation for avoiding or minimizing adverse impacts, a monitoring program will be implemented by the Operators and BLM with input from interested state and other federal agencies. Mitigation and guidelines for monitoring are incorporated into the Proposed Action as applicant-committed measures in the draft EIS at Chapter 2 – Part 2.5.2.11 – Project Wide Mitigation Measures. Other mitigation and monitoring is detailed above.





ERRATA



ERRATA
Modifications and Corrections To The
Desolation Flats Natural Gas Field Development Project
Final Environmental Impact Statement

The Errata Section of the Record of Decision describes changes to the Final EIS to correct errors or omissions identified from comments received to the final EIS.

Correction

Several comments to the final EIS were received that pointed out the BLM's response to a comment submitted by Mr. Ken Kreckle was not adequate. The BLM, in reviewing its response in the final EIS found that its comments were indeed not sufficient due to an oversight. The BLM's response to Mr. Kreckle's comments is as follows.

Ken Kreckle

1. *Since the document fails to present any locations of environmentally suitable well pad locations, etc., and no definable plans for field development, the "no action" alternative should be adopted, or, in the words of DEIS, to, "defer any action at this time until a clearer, more definable full field development scenario is presented by the Operators."*

BLM Response

In part, the nature of the geology in the DFPA makes it difficult, if not impossible, to determine the location of wells far enough in advance to accurately predict their location. Results from new wells often significantly impact the location of subsequent wells based on the success and geologic conditions encountered. The operators have predicted that 385 wells at 361 locations with a success rate of 65% should provide enough wells to extract the minerals they hold leases for.

At this time the location of all future well sites and other disturbance cannot be determined with 100% accuracy by any process the proponents or BLM are aware of. "Setting in stone" well locations in the EIS would require predicting well locations with information in hand, and ignoring the fact that 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 DFPA. Adaptive management of oil and gas resource development is very much a reality in that utilization of new information from drilling 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 BLM's responsibility to ensure surface disturbance is managed in accordance with both the law and sound resource management.

The BLM has a general idea of facility locations, but not specific sites. While the operator and BLM know in general where to place the various actions proposed such as well sites and roads, the exact location will depend on the location of the natural gas resource as discovered, guidance from the DFPA EIS, results from earlier drilling activities, and opportunities and conditions in the field that allow for minimization of environmental impacts, mitigations, and costs. Locating a ground-disturbing activity just a few feet one way or another can often greatly reduce, or increase, the impacts of the action. For any detailed site-specific proposal not fully covered by DFPA EIS, an environmental assessment must be performed and a decision made. This is consistent with the BLM NEPA handbook, the Code of Federal Regulations (43 CFR 3162.5-1, Environmental Obligations) and NEPA. Site specific proposals for individual actions will receive site specific NEPA analysis under the tiering concept utilized by the BLM.

The alternative selected by the BLM for adoption or implementation will be disclosed in the Record of Decision when it is released.

- 2. The nature of the geology makes it impossible to locate the number of wells envisioned in the DEIS. Because production is controlled by stratigraphy [HENDRICKS, 1995], and the sandstone reservoirs occur as isolated, separate, over pressurized compartments [Surdam, 1995], it is difficult to predict 'sweet spots' in these stratigraphic reservoirs except with nearby well control. The results of each new well will significantly impact the location of the subsequent wells. Hence, the development of these reservoirs will occur along trends which can only be defined on a well-by-well basis. It follows that any long range plan involving hundreds of wells cannot be specific.*

BLM Response

We agree with this assertion, it appears reflective of the results observed with exploratory drilling at the DFPA to date.

- 3. Obviously, the results of these wells will determine the course of future development. If such development is warranted, it can be considered at that time. Therefore, due to the geology of the area, a case-by-case consideration of wells and other facilities is the only appropriate alternative.*

BLM Response

The BLM believes this assertion to be true. Each APD and other proposal for disturbance activities will receive a site-specific environmental analysis under NEPA based upon the specifics of the proposal, tiered to a Record of Decision (ROD) to the Desolation Flats project.

- 4. The rejection of the multi-well pad alternative, where 2 to 8 wells could be drilled per each surface location, was largely based on the experience on one operator in the Wamsutter Field. The DEIS states that the technical limits of directional drilling were reached at about 50% deviation. Since the deviations drilled in the Wamsutter case ranged from 15 to 32 degrees, technical capacity was not a limiting factor. Essentially the justification to reject alternative was simply cost. Location costs were cited to be 10 to 20% higher and drill times 30 to 40% higher.*

BLM Response

Mandating multi-well pad drilling within the DFPA was considered but eliminated from detailed study. The reasons are detailed in part beginning on page 2-43 of the DEIS. BLM believes directional drilling can constitute a reasonable alternative in some and perhaps many cases depending on the site specific conditions found at the proposal area. But mandating all drilling in all cases with no exception or allowance for geologic, surface, or economic conditions is not reasonable as detailed in the EISs and other associated documents. Cost, while a consideration, is only one of many factors considered in BLM's decision on how to proceed with a proposal under NEPA.

- 5. - Considering the large number of wells envisioned in the DEIS, it is reasonable to assume economies of scale will reduce these costs.*
 - Given the project length, 20 to 40 years, it is extremely likely that these costs, over time, will further decrease as technology provides increased efficiency.*
 - The inevitable increase in the price of natural gas over this time frame, as the resource becomes more scarce, will also favorably impact the economics.*

BLM Response

The BLM feels these assertions may well prove to be true over the life of the DFPA.

6. *Therefore, in the Desolation Flats area, deviated 'slant' wells represent an economically viable means to produce reserves from under No Surface Occupancy leases. This also points the way for an economically sound utilization of multi-well pads.*

BLM Response

The BLM agrees that slant wells may represent an economically viable means to produce reserves in some, perhaps many parts of the Desolation Flats area, depending on site specific conditions including the geologic and environmental conditions present.

7. *I recommend that the use of multi-well pads be mandated for this development. Assuming 640 acre spacing, a single well pad could service four wells, using deviated wells of about 2000' vertical displacement [10 to 16 degree deviations]. Obviously this would provide a large decrease in the number of locations, and a corresponding decrease in roads and pipelines, thereby drastically reducing the surface impacts. Even if this approach would result in some increase in today's costs, although the undocumented 20% cited is likely overstated, this consideration should not be the overriding determinant. The resultant large scale protection of the environment will justify those costs.*

BLM Response

Mandating multi-well pad drilling within the DFPA was considered but eliminated from detailed study. The reasons are detailed in part beginning on page 2-43 of the DEIS. BLM believes directional drilling can constitute a reasonable alternative in some perhaps many cases depending on the site specific conditions found at the proposal area. But mandating all drilling in all cases with no exception or allowance for geologic, surface, or economic conditions is not reasonable as detailed in the EISs and other associated documents. Costs of implementing a proposal, while a consideration in some cases, is only one factor considered when making a decisions in these matters.

8. *Because of the long time frame envisioned in this DEIS, it is reasonable to predict that advances in technology which can impact this development plan will occur. The spectacular advances in horizontal drilling, artificial fracturing, and seismic over the last twenty years are well known. Work continues in these and other field which will have a direct impacts of the development of this area.*

BLM Response

BLM agrees with your statement.

9. *There are currently many areas proposed, for NSO status, crucial winter ranges and ACEC's, as well as mountain plover nesting concentration. (please refer to the Biodiversity Conservation Alliance alternative for the Great Divide) In addition, 2-mile buffers for sage-grouse leks and 1-mile buffers for raptor nests, (see DEIS pp5-20—5-22) have been proposed.*

BLM Response

Thank you for your comment. The controlling RMP in this case is the Great Divide RMP approved in November, 1990 in which applicable mitigations were reviewed and approved. This proposal is consistent with the Great Divide as detailed in the draft EIS.

10. *In addition, this area may be an excellent candidate for industry-government cooperative venture, similar to the Table Rock example above. Working together, methods can be found to achieve the economic exploitation of the natural gas reserve without adversely affecting the environment.*

BLM Response

The BLM agrees with your assertion, and welcomes such proposals. Within the framework of an approved ROD for DFPA, we believe this is doable under all alternatives.

11. *The No Action alternative will allow further study of on-going environmental protection efforts such as the Adobe Town Potential Wilderness. There are other efforts underway, for example, the Powder Rim ACEC and big game crucial ranges, seeking NSO stips on leases. It would be premature to allow a conceptual plan to interfere with these efforts. In any case, it is essential that specific locations be presented to allow their impacts to be accurately assessed, and suitable alternatives considered. Obviously one cannot assess the impacts of a conceptual well location, one that has no definition in space and time. This assessment needs to occur at the time the well locations are firm.*

BLM Response

BLM believes you are discussing two elements in the "Adobe Town Potential Wilderness" you mention. One is the existing Adobe Town Wilderness Study Area, which is established in the RMP and is managed for wilderness characteristics. The other is the Citizen's wilderness proposal, elements of which are being assessed under the Rawlins RMP revision process. Expanded wilderness was considered but not carried forward for detailed study as outlined in the draft EIS at 2.6.1, page 2-42. Consideration of establishment of additional wilderness areas is outside the scope of the DFPA, and cannot be properly considered in this EIS / ROD process. There is no Powder Rim ACEC in the Great Divide RMP, although one may be developed through the RMP revision process in the future. BLM is unaware of any proposals for NSO stips on leases and this is not being considered by the DFPA. If you mean approval of the DFPA EIS / ROD would be premature for the consideration of those efforts, the BLM disagrees. The DFPA EIS / ROD is ripe for decision. We agree that all the impacts of conceptual well locations cannot be completely analyzed. This will be done under site specific NEPA analysis as proposals come forward. We agree that site specific NEPA assessments need to occur at the time the well locations are firm.

Thank you for your comments to the Desolation Flats Draft EIS.

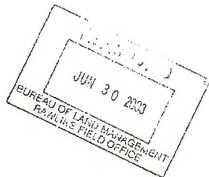


Kenneth Kreckel
Oil & Gas Geosciences

3670 Picard Drive
Casper, Wyoming
Phone: (307)295-2905
email:
kreckel1@yahoo.com

Thursday, June 26, 2003

Bureau of Land Management
Rawlins Field Office
John Spehar, Project Coordinator
PO Box 2407
Rawlins, WY 82301



Re:DEIS, Desolation Flats Natural Gas Exploration and Development Project

Dear Mr. Spehar :

After a careful review of the DEIS, Desolation Flats Natural Gas Exploration and Development Project, I have prepared the attached comments recommending deferring action at this time, or adopting Alternate B-No Action. These comments can be summarized as follows:

- No plan was presented. There are no specific locations for any of the proposed wells, pipelines, producing facilities, etc. It is not possible to assess the environmental impacts of conceptual locations.
- A case by case consideration of this development is the only appropriate approach considering the geology and nature of the exploration and development for these tight gas sands.
- The use of multi-well pads should be required. This alternative is not adequately examined in the DEIS. Multi-well pads are technically and economically feasible and will significantly reduce the surface impacts of this development. A dubious estimate of higher costs, referencing examples based on shallower depths, is used to justify rejecting this technology. No cost/benefit analysis of lessening the surface impacts is presented.
- Current and emerging technologies, notably the hydraulic fracturing of horizontal wells, which have a high potential for reducing the impact of this

development, especially when considering the long time frames envisioned [20 to 40 years], were not adequately addressed.

- Directional and horizontal wells can be used to drain reserves under currently protected sites, as well as proposed NSO areas. The DEIS should specifically address this issue.
- Additional time to examine individual surface impacts, as well as the Proposed Adobe Town Wilderness, is necessary, especially in view of the factors above.
- Development of these gas sands can continue under existing decisions. Exploitation of this valuable natural resource will not be unduly impeded.

I am a geophysicist and former Exploitation Manager with thirty years experience in oil & gas exploration and development. [see attached resume] Much of this experience was gained in tight gas sand developments very similar to Desolation Flats. As Exploitation Manager of the Southern Region [Tyler, Texas] with Marathon Oil Company, I was directly responsible for the development of several tight gas sand fields analogous to the subject development, and have drilled and completed over a hundred wells in such sands. Several of these wells were drilled directionally and subsequently hydraulically fractured with great success. In addition, I have extensive experience with horizontal wells. My background includes several years of work in Wyoming as well, and I am very familiar with the geology of the Greater Green River Basin.

This DEIS is premature and ill defined. I urge any action be deferred at this time until a "clearer, more definable full field development scenario is presented by the Operators."

Sincerely,



Kenneth Kreckel

Kenneth Kreckel
3670 Placid Drive
Casper, Wyoming 82604-4984
307-235-3505
kreckel1@yahoo.com

HIGHLIGHTS

Manager with twenty seven years major oil company experience in the exploration and development of oil and gas reserves in the U.S. and Europe. Specific expertise in geophysics. Currently interested in short to intermediate term consulting assignments. Particularly suited for mentoring, prospect audits and confirmation, corporate evaluations, geophysical evaluations, 3-D survey design, and project management. Career highlights are:

- Proven Oil & Gas finder, with several hundred MMBOE discovered. Personally led the initiation, discovery and subsequent development of the Cotton Valley Reef play.
- Extensive experience in the development of tight gas sand and fractured reservoirs.
- Confirmed judgment in prospect evaluations
- Many years experience managing multidisciplinary teams in successful exploration and development projects.
- Prepared, presented and defended annual budgets amounting in excess of fifty million dollars.
- Proficient at partner and contractor negotiations. Experienced with contracts.
- Performed numerous evaluations of company exploration assets.
- Many years as on-campus recruiter. Skilled in interviews and new employee evaluations.
- Particular ability with office relocations, and the establishment of new exploration offices.
- Recent experience in managing an exploration workstation support team.
- Personally designed and carried out numerous 3-D surveys. Particular expertise in cost-effective, suited-to-purpose surveys.
- Excellent at supervising seismic acquisition, processing and interpretation projects.
- Superior communication skills, especially written.
- Geographically experienced in most U.S. Onshore basins, particularly Gulf Coast and Rocky Mountains. Recent experience in NW Europe offshore basins. Work locations in the U.S. and Europe.

WORK EXPERIENCE

Consulting

2001-Current Casper, Wyoming Consultant
Engaged in reviewing oil & gas exploration and development projects.

Marathon Oil Company

1998-2000 London, England Manager of Exploration Support
Responsible for the technical quality of interpretations of several geophysicists working throughout NW Europe. Managed UNIX workstation support department. Designed and carried out several large 3D surveys.

1990-1998 Tyler, Texas Exploitation Manager
Directed over thirty professionals engaged in exploration and development in East Texas, Gulf Coast onshore and Louisiana. Personally responsible for the initiation and successful development of the Cotton Valley Reef Play, discovering several fields totaling in excess of 200BCF, largely through the application of 3D technology. Also very active in the Austin Chalk and tight gas sand development. Initiated, presented, and secured \$50MM annual budgets.

1988-1990 Midland, Texas Region Geophysicist
Responsible for the technical excellence of seismic interpretations in West Texas, the Mid-Continent, and Michigan Basin. Designed and carried out numerous seismic projects, from acquisition through interpretation.

1978-1988 Cody & Casper, Wyoming Geophysicist and Exploration Supervisor
Interpreted and acquired seismic data throughout the Rocky Mountain Region, particularly the Thrust Belt, Paradox and Powder River Basins. Involved in the discoveries in the Paradox Basin. Supervised exploration teams working Utah and southwest Wyoming.

Texaco, Inc

1974-1978 Bellaire, Texas Geophysicist & Geologist
Developed fields in the Vicksburg of South Texas. Explored in the Atlantic margin, Illinois Basin, and offshore Gulf.

EDUCATION

Michigan Technological University B.S. Geology with Honor 1974

ORGANIZATIONS

Active member of the SEG; longtime member of MENSA

REFERENCES

Supervisors:

Robert J Duencel
205 Waterford Dr
Southlake, TX 76092
817-416-7388

Employees:

Randolph White
Geophysical Manager
Sinclair Oil Corporation
P.O.Box 30825
Salt Lake City, Utah 84130
rwhite@sinclairoil.com

Tom Tatum
Sr Staff Geophysicist
Anadarko Petroleum
P.O.Box 1330
Houston, Texas 77251
tom_tatum@anadarko.com

Fred Taylor
Geologist
Lake Ronel
4607 Dundee
Tyler, Texas
tatlorfw@aol.com



DESOLATION FLATS PROJECT AREA
Reasons in Support of Deferring Action, or Alternate B-No Action

The Desolation Flats DEIS is Only Conceptual

The proposal is a concept, not a plan. There are no specific locations for wells, pipelines or other facilities identified. The Desolation Flats DEIS states in Chapter 1:

"This DEIS analyzes the effects of well pad locations, access roads, production facilities, pipelines, and other facilities associated with natural gas development on resources and land use within the project area."

"Factors considered during the environmental analysis process regarding the natural gas development project include the following:

- The location of environmentally suitable well pad locations, access roads, pipelines, and other production and ancillary facilities that best meet other resource requirements and minimize surface resource impacts yet honor the lease rights within the project area.
- A determination of impacts resulting from the proposed action and alternatives on the human environment, when conducted in accordance with applicable regulations and lease stipulations, and the development of mitigation measures necessary to avoid or minimize these impacts."

1

Since the document fails to present any locations of environmentally suitable well pad locations, etc., and no definable plans for field development, the 'No Action' alternative should be adopted, or, in the words of the DEIS, to:

"defer any action at this time until a clearer, more definable full field development scenario is presented by the Operators."

Geology of the Area Precludes All Alternatives Except B-No Action

2

The nature of the geology makes it impossible to locate the number of wells envisioned in the DEIS. Because production is controlled by stratigraphy [Hendricks, 1995], and the sandstone reservoirs occur as isolated, separate, overpressured compartments [Surdam, 1995], it is difficult to predict 'sweet spots' in these stratigraphic reservoirs except with nearby well control. The results of each new well will significantly impact the location of the subsequent wells. Hence, the development of these reservoirs will occur along trends which can only be defined on a well-by-well basis. It follows that any long range plan involving hundreds of wells cannot be specific.

Alternative B 'No Action' does allow the drilling of an estimated 57 development wells under existing decisions. Additionally the document estimates another 21 wells outside of these areas will be drilled. As stated in the DEIS:

'Additional infrastructure necessary to support existing wells within the DFPA and future wells drilled under the No Action Alternative would be considered on a case-by-case basis.'

- 3 Obviously, the results of these wells will determine the course of future development. If such development is warranted, it can be considered at that time. Therefore, due to the geology of the area, a case-by-case consideration of wells and other facilities is the only appropriate alternative.

Alternatives for Multi-Well-Single Pad Were Not Adequately Addressed

- 4 The rejection of the multi-well well pad alternative, where 2 to 8 wells could be drilled per each surface location, was largely based on the experience of one operator in Wamsutter Field. The DEIS states that the technical limits of directional drilling were reached at about 50 degree deviation. Since the deviations drilled in the Wamsutter case ranged from 15 to 32 degrees, technical capability was not a limiting factor. Essentially the justification to reject this alternative was simply cost. Location costs were cited to be 10 to 20% higher and drill times 30 to 40% higher.

There are some problems with the Wamsutter case, especially the magnitude of the angles. The Wamsutter Field, located on the Wamsutter Arch, produces from significantly shallower depths, up to 5000' less than Desolation Flats [map, Surdam, 1995]. Due to its location near the deepest portion of the Washakie Basin, drilling depths at Desolation Flats range from 9000' to 14500'. Using the average vertical displacement of 1425' from the Wamsutter example, corresponding angles will range from 5 to 10 degrees at Desolation Flats, far less than the 15 to 32 degrees cited. Deviations of this magnitude are so small as to be considered near vertical, and should present no significant completion problems.*

Due to these lower deviations, any increase in costs associated with the use of multi-well pads will be significantly less than the undocumented 20% cited in the DEIS. Even if we assume the 20% increase is correct, this need not translate to a 20% in costs *over the life of the project*. Three other factors will lower costs:

- 5A
- Considering the large number of wells envisioned in the DEIS, it is reasonable to assume economies of scale will reduce these costs.

*Moreover, since the geologic dip on the flanks of the basin range from 8 degrees to 15 degrees [Love, 1970], even vertical wells will encounter similar angles relative to the stratigraphy. It is well understood in the industry that unsteered 'vertical' wells tend to drift up dip, effectively reaching deviations up to the magnitude of the geologic dip. Hence, in these cases, even vertical wells are not truly vertical, but instead may naturally 'deviate' as much as the 5 to 10 degrees suggested for Desolation Flats.

5B

- Given the project length, 20 to 40 years, it is extremely likely that these costs, over time, will further decrease as technology provides increased efficiency.

5C

- The inevitable increase in the price of natural gas over this time frame, as the resource becomes more scarce, will also favorably impact the economics.

6

Therefore, in the Desolation Flats area, deviated 'slant' wells represent an economically viable means to produce reserves from under No Surface Occupancy leases. This also points the way for an economically sound utilization of multi-well pads.

In a study of the Almond Formation in Echo Springs Field in the Green River Basin, near Desolation Flats, Iverson et al [1995] concluded "With the confirmation of Standard Draw draining numerous stacked reservoirs, continued focus on vertical or slant hole completions may be justified." They go on to state "Considering the additional cost of horizontal drilling, economics likely favor vertical or slant hole completions." Note that vertical and slant holes are treated as equivalent, as distinct from horizontal wells. This study focused on the Amoco 254 B-2H well, comparing results from the slant hole portion of the well, which was hydraulically fractured, and the horizontal well, which in 1995, was not. In this case, artificially fractured slant wells were found to be economic.

Slant holes may be justified from a geologic basis as well. In this basin, production is controlled by stratigraphy [Henricks, 1995]. Surdam et al [1995] state: "Sandstone bodies within the overpressured shale section are subdivided stratigraphically and diagenetically into relatively small, isolated, gas saturated, anomalously pressured compartments." Economic production depends on intersecting as many as these 'sweet spots' as possible. These bodies may not vertically coincide. Therefore, slant holes hold the potential of intersecting more of these bodies, thereby increasing production from a single wellbore.

7

I recommend that the use of multi-well pads be mandated for this development. Assuming 640 acre spacing, a single well pad could service four wells, using deviated wells of about 2000' vertical displacement [10 to 16 degree deviations]. Obviously this would provide a large decrease in the number of locations, and a corresponding decrease in roads and pipelines, thereby drastically reducing the surface impacts. Even if this approach would result in some increase in *today's* costs, although the undocumented 20% cited is likely overstated, this consideration should not be the overriding determinant. The resultant large scale protection of the environment will justify those costs.

Current and Future Advances in Technology Have the Potential to Impact This Development

8

Because of the long time frame envisioned in this DEIS, it is reasonable to predict that advances in technology which can impact this development plan will occur. The spectacular advances in horizontal drilling, artificial fracturing, and seismic over the last twenty years are well known.

Work continues in these and other fields which will have a direct impact on the development of this area. To quote an especially pertinent one:

Table Rock Field, Frontier Formation

"Union Pacific Resources' Rock Island 4-H well, located on the north plunge of Table Rock Field, Sweetwater County, Wyoming, was the culmination of a project with the US Department of Energy (DOE) Federal Energy Technology Center (FETC) and Gas Research Institute (GRI). The goal was to find technologies to produce significant tight gas resources from southwestern Wyoming.

Milestones of the project include:

Reducing the drilling time and cost for deep vertical wells by less than half.

Discovering one of the deepest horizontal tight gas sandstone wells in the world (14,950 ft TVD).

Reaching one of the world's deepest horizontal cores.

Maintaining one of the highest gas flow capacities in the tight-gas Frontier Formation in Wyoming.

Initiating future plans for a horizontal drilling effort.

Horizontal drilling for low permeability gas allows large well spacings, improving per well recoveries and reducing the environmental impact. The Rock Island 4-H horizontal well reached 16,784 ft (14,950 ft TVD) in the Frontier formation at 270° F and 10,000 psi."

Tight gas sands generally require artificial fracturing to be economically productive. The main objection to the use of horizontal wells is the difficulty of applying artificial fracturing. This case, completed in 1995, illustrates that it can be done:

Halliburton Fractures World Record Well For Mobil New Natural Gas In Germany

"The Soehlingen Z-10 horizontal well, located about 40 miles southwest of Hamburg, was drilled into an extremely tight sandstone in the Rotliegendes formation to a vertical depth of 15,688 feet -- a world record for horizontal wells -- where it was deviated horizontally for 2,066 feet into the natural gas reservoir. Including the horizontal section, the well was drilled to a total depth of 18,860 feet.

In addition to being the world's deepest horizontal well, the well set a world record for the deepest multiple fractures. Hydraulic fracturing was employed to improve the natural gas flow from the extremely low permeable rock. Halliburton's EuroFrac Team successfully completed a total of four hydraulic fractures along the horizontal section of the wellbore using a highly-efficient and environmentally- friendly fracturing system that included Halliburton's HyBor Gel fracturing fluids and its Liquid Gel Concentrate."

These two projects were successfully completed in onshore tight gas formations very similar in geology and depth to Desolation Flats. Together they illustrate that artificially fractured horizontal wells are technically feasible today. Moreover there is a high potential for advances in these technologies that will directly impact this area. Although the drilling and, more importantly, hydraulic fracturing of horizontal wells in tight gas sand formations are not yet commonplace, these two projects establish the likelihood that they will be more commonly utilized in the near future. As these, and other technologies, become generally available, the number of wells envisioned for Desolation Flats could be significantly reduced. It is imperative that decisions based on today's practices are not taken that effect the next 20 to 40 years. A case-by-case consideration of this development will allow for the consideration of these and other technologies as they become available, without unduly affecting the subject development. Indeed, the development of this area may ultimately benefit by the employment of more efficient technologies.

Directional Wells Can Be Used for the Protection of Currently Identified Sites

9

There are currently many areas proposed, for NSO status, crucial winter ranges and ACEC's, as well as mountain plover nesting concentrations. (please refer to the Biodiversity Conservation Alliance alternative for the Great Divide) In addition, 2-mile buffers for sage grouse leks and 1-mile buffers for raptor nests, (see DEIS pp 5-20-5-22) have been proposed.

As illustrated by the examples above, technology is available to drill and hydraulically fracture even horizontal wells in tight gas sands. Highly deviated and horizontal wells could be utilized to capture reserves under these protected areas. Horizontal wells have the potential to reach 2,000 to 4,000 feet from a surface location. Hydraulic fracturing of these wells can allow them to effectively drain a 640 acre area. Thus it is possible to produce reserves even under the two-mile buffers proposed. Although more costly, horizontal wells can achieve higher recoveries, so the economics regarding their use is not necessarily a prohibitive factor.

10

In addition, this area may be an excellent candidate for industry-government cooperative ventures, similar to the Table Rock example above. Working together, methods can be found to achieve the economic exploitation of the natural gas reserves without adversely affecting the environment.

Time for Study of Potential Protected Areas

11

The No Action alternative will allow further study of ongoing environmental protection efforts such as the Adobe Town Potential Wilderness. There are other efforts underway, for example, the Powder Rim ACEC and big game crucial ranges, seeking NSO strips on leases. It would be premature to allow a conceptual plan to interfere with these efforts. In any case, it is essential that specific locations be presented to allow their impacts to be accurately assessed, and suitable alternatives considered. Obviously one cannot assess the impact of a conceptual well location,

- 12 | one that has no definition in space or time. This assessment needs to occur at the time the well locations are firm.

Development Will Continue Under the No Action Alternative

- 13 | Deferring action will not preclude current development. As stated in the DEIS, up to 78 wells may be drilled under the No Action alternative. Hence, development of this valuable natural resource will not be impeded, and continued exploitation of these natural gas reserves can continue.

References

Dunn, Thomas L., Bernabe Aguado, John Humphreys, and Ronald C. Surdam, "Cements and in-situ widths of natural fractures, Almond formation, Green River Basin, Wyoming", 1995 Field Conference Guidebook, Wyoming Geological Association, 1995.

Halliburton Energy Services, "Halliburton Fractures World Record Well For Mobil New Natural Gas In Germany", Press Release, March 21, 1995.

Hendricks, Michael L., "A review of the components and controls on basin-centered gas in the Greater Green River Basin, southwestern Wyoming", 1995 Field Conference Guidebook, Wyoming Geological Association, 1995.

Iverson, William P., Thomas L. Dunn, and Ronald C. Surdam, "Improvements to formation evaluation, Almond Formation, Green River Basin, Wyoming", 1995 Field Conference Guidebook, Wyoming Geological Association, 1995.

Petroleum Technology Transfer Council, "Exploiting Tight Gas Sand Sweet Spots", Internet page, 1999. [*Based on a workshop cosponsored by PPTC's Rocky Mountain Region on April 26, 1999, in Denver, CO. Contributor: Lee Krystinik and Frank Lim, Union Pacific Resources Co., "Horizontal Well from Table Rick Field, Frontier Formation"*]

Stewart, Wallace W., "Horizontal Wells in Wyoming through 1994", 1995 Field Conference Guidebook, Wyoming Geological Association, 1995.

Surdam, Ronald C, Zung S. Jiao and Jie Liu, "Pressure regime in the Upper Cretaceous shales and sandstones in the Washakie Basin, Wyoming", 1995 Field Conference Guidebook, Wyoming Geological Association, 1995.



APPENDIX A

CRITERIA FOR MEETING "ACCEPTABLE PLAN"



APPENDIX A

Criteria for meeting "Acceptable Plan" in Oil and Gas Lease Terms Desolation Flats Natural Gas Project

The following criteria are provided as guidance for preparing mitigative plans for any surface disturbing activity proposed in the Rock Springs portion of the DFPA. The Rock Springs portion of the DFPA lies within Class II visual resource management area and the area known as the Monument Valley Management Area. These criteria are not all inclusive but are identified as points that should be considered when developing such mitigative plans.

Disturbance Areas

1. Disturbance to pad locations and associated roads should be kept to the minimum needed to safely conducted operations.
2. Use of pad drilling (multiple wells at one surface site) when possible.

Transportation Planning

1. Keep miles of roads/trails to a minimum.
2. All roads should be designed by a professional engineer.
3. Roads should be engineered to avoid concentrating overland flow of water. Roads should be designed and placed to avoid drainage areas. If drainage areas cannot be avoided, then engineered with appropriate spacing of crossings with energy dispersion structures (i.e, armored low-water crossings).
4. Reduce cut and fill areas.
5. Reduce road standards when feasible (i.e., width).
6. Require durable surfacing (i.e, gravel). Gravel according to the transportation plan and Manual 9113 road standards.
7. Layout location of main roads (during transportation planning).
8. Maintenance including surveys of channel conditions below engineered portions of culvert discharges. Timely repair of problems when found.

Visual Resource Management (VRM) - VRM Class II

1. All disturbance would need to meet the Class II VRM objectives. The objective for Class II is to retain the existing character of the landscape. Level of change should be low. Activities may be seen but should not detract the attention of the casual observer. Any change must repeat the basic elements (line, form, color, texture) found in the predominant natural features of the characteristic landscape (Manual 8410-1).

APPENDIX A - ACCEPTABLE PLAN CRITERIA

2. Roads should be designed to avoid straight lines to protect the visual integrity of the Class II viewshed.
3. Pad locations should be hidden by topographical features.
4. Develop "key observation points" for individual actions and require visibility analysis modeling and/or photographic simulations.
5. Centralize production facilities whenever possible.
6. Screen locations where possible.
7. Reduce production facility dimensions (height, width, minimum needed to operate).
8. Use low contrast, non-reflective paint for production facilities.
9. Reduce contrast of base material color and texture (i.e., use of native gravel if available).
10. Follow topographic features (line, form) in order to reduce visibility of disturbance.

Reclamation

1. Reclamation will be done as soon as possible after disturbance and will be in accordance with the approved reclamation plan (as outlined in the EIS).
2. All actions will require an Erosion Control, Revegetation, and Restoration Plan (ERRP) and will conform to the Wyoming policy on reclamation.
3. Protect existing native vegetation.
4. Minimize disturbance of existing environment.
5. Soil stabilization via establishment of ground cover.
6. Establishment of native vegetation /site stabilization (3-5 years). Monitoring of reclamation success.
7. Use of native, certified weed-free seed.
8. Prompt treatment of noxious weed infestations.
9. Restore original contours on pad and road construction.
10. Leave surface as rough as possible.

Paleontological Resources

1. On-the-ground surveys will be required prior to any surface disturbing activity.

APPENDIX A - ACCEPTABLE PLAN CRITERIA

Cultural Resources

1. Follow BLM protocol for implementation of the Nationwide Programmatic Agreement.
2. Consultation with Native American groups should certain features be found (e.g. rock art, stone circles, burials, cairns, flat-top mesas.)

Geological Formations/Hazards (lease term)

1. Avoid slopes in excess of 25 percent
2. Avoid highly erosive areas.

Wildlife

1. Seasonal restriction for mule deer and antelope crucial winter range (11/15-4/30).
2. Avoid raptor concentration areas and seasonal restriction for individual raptor nests (2/1-7/31 nesting and 11/15 - 4/30 for winter concentration areas).
3. Mountain plover aggregation areas will be surveyed in accordance with the FWS's requirements for mountain plovers.
4. Prairie dog town/complexes where possible and if not avoided then cleared for black-footed ferrets.
5. Protection of migratory birds (pit netting).

Soils/Watershed

1. Construction with frozen material or during periods when the soil is saturated or when watershed damage is likely to occur is prohibited.
2. Avoid disturbance within 100 ft of inner gorge of intermittent or ephemeral drainages.
3. Require an erosion control plan.
4. Salvage and the subsequent replacement of topsoil whenever possible (topsoil depth to be determined case-by-case).
5. Avoid erosive soils when possible, otherwise design and construction should be done in such a manner to reduce erosion.
6. Construction across ephemeral drainages would be restricted until after spring runoff.
7. Reserve pits should not be located in areas where groundwater is less than 50 ft and soil permeability is greater than 10(-7) cm/hr.
8. Lining of pits should be decided on a case-by-case basis.
9. Seeding of borrow areas.

APPENDIX A - ACCEPTABLE PLAN CRITERIA

10. No surface disposal of produced water or surface discharge from water wells.
11. Pipeline placement will be determined based on site-specific conditions. Any surface pipelines crossing roads or trails will be buried. When buried pipelines are proposed, they will follow and be placed on the edge of roadways.

Scientific Values (RMP)

1. Protect integrity of paleontological and cultural values.

Other

1. Use of remote sensing devices to reduce number of well visits.



APPENDIX B

STANDARD MITIGATION MEASURES



APPENDIX B
STANDARD MITIGATION GUIDELINES
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APPENDIX B

STANDARD MITIGATION GUIDELINES

1.0 SURFACE DISTURBANCE MITIGATION GUIDELINE

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.

- a. Slopes in excess of 25 percent.
- b. Within important scenic areas (Class I and II Visual Resource Management Areas).
- c. Within 500 feet of surface water and/or riparian areas.
- d. Within either one-quarter mile or the visual horizon (whichever is closer) of historic trails.
- e. Construction with frozen material or during periods when the soil material is saturated or when watershed damage is likely to occur.

1.1 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, applications for permit to drill) and, if necessary, must allow for other mitigation to be applied on a site-specific basis.

2.0 WILDLIFE MITIGATION GUIDELINE

- 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

APPENDIX B: STANDARD MITIGATION GUIDELINES

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*).

2.1 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

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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 GUIDELINE

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.

3.1 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. Reports shall be reviewed for adequacy by the appropriate BLM cultural resource specialist. 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.

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4.0 SPECIAL RESOURCE MITIGATION GUIDELINE

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.

4.1 Example Resource Categories (*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).

4.2 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 GUIDELINE

No Surface Occupancy (NSO) will be allowed on the following described lands (*legal description*) because of (*resource value*).

5.1 Example Resource Categories (*Select or identify category and specific resource value*):

- a. Recreation areas (e.g., campgrounds, historic trails, national, monuments).

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- 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).

5.2 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.



APPENDIX C
RECLAMATION PLAN



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APPENDIX C

RECLAMATION PLAN

1.0 INTRODUCTION

The following erosion control, revegetation, mitigation measures, and management measures are designed to attain successful rehabilitation of disturbed areas associated with the DFPA Natural Gas Production project. These measures are designed to establish the feasibility of reclaiming disturbances associated with this project. The measures were developed based on 1) Bureau of Land Management (BLM) Wyoming State Office reclamation policy (USDI-BLM 1990b); 2) management directives presented in the Great Divide RMP (USDI-BLM 1988a, 1990a) and Green River RMP (USDI-BLM 1996a, 1997); 3) impacts identified in the Environmental Consequences chapter (Chapter 4) of this environmental impact statement (EIS); 4) coordination with BLM staff; and 5) issues identified during the scoping process. The extent of possible disturbed areas to be reclaimed include the drill sites, access road, pipeline ROW's, and staging areas. The following measures apply to the Proposed Action and to Alternatives A and B 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, non-specific manner. Final selection of the measures to be applied at any given location, and modifications of these measures, will be identified by the BLM in coordination the Operators.

This reclamation plan outlines measures that will be taken to effectively reclaim areas disturbed during construction of the DFPA Natural Gas Production Project. These measures will be followed unless exceptions are granted or actions are modified by agreement between the BLM and the Operators. These measures describe how natural gas development activities should 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 BLM.

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 should 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 project area. Activity plans (e.g., applications for permit to drill [APD's]) should address site-specific problems, including monitoring for salt and sediment loading (USDI-BLM 1990b).

In general, temporary reclamation measures should 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, etc. Temporary reclamation measures should be applied only as needed; as in most cases, final reclamation

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measures should 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 should include regrading 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 regrading 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. The duration of the resultant 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 after project completion.

Because wetlands are "waters of the U.S." and are therefore 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 should determine the type of permit (Individual, Regional, or Nationwide) required according to the rules and regulations presented in the Federal Register (1986). Avoidance of waters of the U.S. and wetlands should be the highest priority. A suitable wetland mitigation plan should be developed for the areas of wetlands directly impacted due to project activities where avoidance is not practicable. Impact minimization should 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 should 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 should be designed to replace the area of impact and functional values associated with the disturbed area.

Appropriate BLM and Natural Resources Conservation Service (NRCS) range conservationists were contacted to determine agency-specific seeding recommendations at drill sites and along access road and pipeline ROW's. The recommended seed mixtures in this plan were developed with input from these land management agencies. The reclamation measures in this report assume that baseline data would be collected in various areas along the access road and pipeline ROW's and at drill sites prior to construction activities by an authorized reclamation scientist.

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:

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Short-Term (Temporary) Reclamation:

- Immediately stabilize the disturbed areas by mulching (if needed), providing runoff and erosion control, and through the establishment of new vegetation (required for problem areas; may be optional for other areas depending on consultation with the BLM).
- 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 BLM), runoff and erosion control, and through the establishment of new vegetation. Adequate surface roughness should 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 invasive, non-native species.
- Revegetate the disturbed areas with native plant species useful to wildlife and livestock.
- Enhance aesthetic values. In the long-term, reclaimed landscapes should 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 should 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 should 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

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transects will be established on a permanent basis so that transects can be measured annually through the five year monitoring period.

- Percent cover. Total vegetal cover will be at least 50 percent of predisturbance vegetal cover as measured along the reference transect for establishing baseline conditions.

By the Fifth Year (Final Reclamation):

- Percent cover. Total vegetal cover will be at least 80 percent of predisturbance vegetal 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 BLM 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 should be handled separately from subsoil materials. At all construction sites, topsoil should 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 should be salvaged. Where soils are shallow or where subsoil is stony, as much topsoil should be salvaged as possible. Topsoil should be stockpiled separately from subsoil materials. Topsoil salvaged from drill sites and stored for more than one year should 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 should not exceed a depth of 2-feet. Topsoil should be stockpiled separately from other earth materials to preclude contamination or mixing and should be marked with signs and identified on Construction and Design plans. Runoff should 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 should be cut off only to the ground level, leaving existing root systems intact. Cut vegetation should be removed from wetland areas for

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disposal. Grading activities should be limited to directly over pipeline trenches and access roads. At least 12 inches of topsoil should be salvaged and replaced except in areas with standing water or saturated soils. Use of construction equipment in wetland areas should be limited. Dirt, rockfill, or brush riprap should not be used to stabilize pipeline ROW's. If standing water or saturated soils are present, wide-track or balloon-tire construction equipment should be used or normal construction equipment should be operated on equipment pads or geotextile fabric overlain with gravel fill. Equipment pads etc., should be removed immediately upon completion of construction activities. Trench spoil should 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 should 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 should 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 substrata materials are unconsolidated and loose and cannot be stabilized with revegetation and mulch.

Surface runoff should be controlled at all well sites through the use of interception ditches and berms. A berm approximately 18 inches high should 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 should be treated in a detention pond prior to discharge into undisturbed areas in the same manner as discussed previously. This system should also serve to capture fuel and chemical spills, should they occur.

Erosion and sedimentation control measures and structures should be installed on all disturbed areas. Soil erosion control should be accomplished on sites in highly erosive soils and steep areas with mulching, netting, tackifiers, hydromulch, matting, and excelsior. The type of control measure should depend on slope gradients and the susceptibility of soil to wind and water erosion. Silt fences should be placed at the base of all steep fill slopes and sensitive disturbed areas. All runoff and erosion control structures should be inspected periodically, cleaned out, and maintained in functional condition throughout the duration of construction and drilling. Water bars should 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 9113).

Runoff and erosion control along access road/pipeline ROW'S should 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 should 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 should be directed into undisturbed vegetation away from all natural drainages. Erosion and sedimentation control measures and structures should be installed across all cut-and-fill slopes within 100 feet of drainage channels. All runoff and erosion control structures should be inspected after major runoff events and at a regular schedule. If found to be sub-standard, these structures should 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 should minimize the disturbance to drainage channels and wetlands to the extent practicable and should occur during the low runoff period (June 15 through March 1). Staging areas should be limited in size to the minimum necessary and should be located at least 50 feet from drainage channel bottoms, where topographic conditions permit. Hazardous materials should not be stored and equipment should not be refueled within 100 feet of drainage channels. Drainage channel crossings should be constructed as perpendicular to the axis of the drainage channel and at the narrowest positions as engineering and routing conditions permit. Clean gravel should 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 should be rerouted, and drill sites located, to avoid wetland areas to the maximum extent practicable. The size of staging areas should be limited to the minimum necessary and all staging areas should 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 should be limited to no more than 50 feet. Hazardous materials should not be stored and equipment should not be refueled within 100 feet of wetland boundaries.

Appropriate permits should 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

4.3.1.1 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. See Final Reclamation measures (Section 4.4) for specific information pertaining to mulching.

The actual distance of a pipeline/road ROW requiring stabilization on each side of a drainage channel should 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 should be applied. Silt fences or other sediment filtering devices such as weed-free straw bales should be installed along drainage channel banks where sedimentation is excessive and at the base of all slopes adjacent to wetlands. Figure C-1 presents schematics of water bar and silt fence construction. Sediment filtering devices should 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) should 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 should be covered with jute matting for a minimum of 50 feet on either side of the drainage channel. In addition, to

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protect soil from raindrop impact and subsequent erosion, 2.0 tons/acre of a weed-free straw mulch should 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 should 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 should be used for pipeline construction in certain areas to prevent the flow of water in either a trench that has been backfilled or temporarily left open. Trench breakers are particularly important in wetland areas to minimize subsurface drainage. Trench breakers should 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. Trench breakers should be installed, where necessary. Topsoil should not be used to construct trench breakers.

If a pipeline crosses roads at the base of slopes, vegetative strips should be maintained. If vegetation is disturbed within these limits, temporary sediment barriers such as silt fences and/or staked weed-free straw bales should be installed at the base of the slope adjacent to the road crossing. Temporary sediment barriers should remain in-place until permanent revegetation measures have been judged successful.

4.3.1.2 Final Reclamation

4.3.1.2.1 Upland Areas

Runoff and erosion control along all ROW'S should 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 should be directed into undisturbed vegetation away from all natural drainages. Erosion and sedimentation control measures and structures should be installed across all cut-and-fill slopes. All runoff and erosion control structures should be inspected after major runoff events and on a regular schedule.

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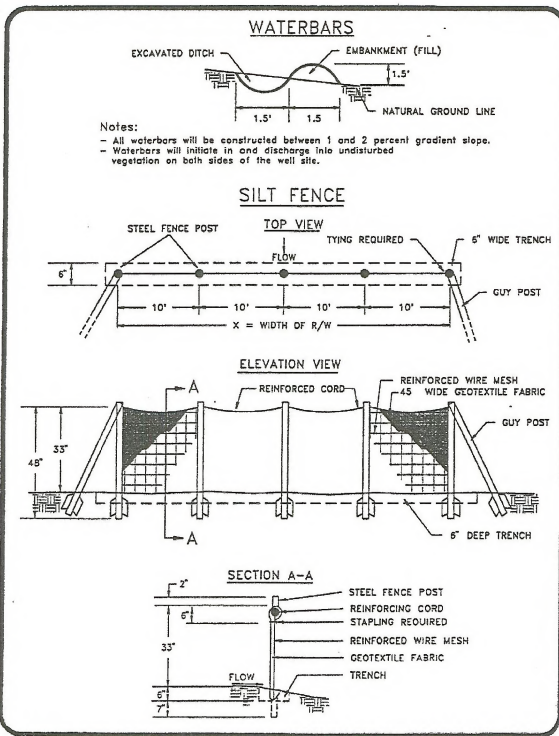


Figure C-1. Water Bar Construction and Silt Fence Construction.

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If found to be substandard or ineffective, these structures should be cleaned out and maintained in functional condition until successful revegetation and soil stability is attained.

Water bars should be constructed across sideslopes at appropriate intervals according to slope gradient immediately following recontouring of the disturbed areas. The spacing should depend on whether mulching is applied in conjunction with placement of water bars. Water bars should be maintained in functional condition throughout the life of the project. Should the integrity of the water bar system be disrupted during seeding, water bars should be repaired and broadcast seeded with the seed raked into the soil. Water bars should be constructed according to hillslope topography at the slope gradient intervals as shown in Table C-1.

Water bars should 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 should 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 C-1. Water Bar Intervals According to Slope Gradient¹.

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

¹Based on Grah (1989)

4.3.1.2.2 Wetlands and Drainage Channel Crossings

Disturbance to the ephemeral and intermittent drainage channels should be avoided and/or minimized. All channel crossings not maintained for access roads should be restored to near predisturbance conditions. Drainage channel bank slope gradients should be regraded to conform with adjacent slope gradients. Channel crossings should be designed to minimize changes in channel geometry and subsequent changes in flow hydraulics. Culverts should be installed for ephemeral and intermittent drainage channel crossings. All drainage channel crossing structures should be designed to carry the 25- to 50-year discharge event as directed by the BLM. Silt fences should be constructed at the base of slopes at all drainage channel crossings. Minor routing variations should be implemented during access road, pipeline, and drill site layout to avoid washes. The area of disturbance in the vicinity of washes should be minimized. Per the Great Divide Resource Area Resource Management Plan (RMP), a 500-foot-wide buffer strip of natural vegetation should be maintained between all construction activities and drainage channels.

Trench plugs should be employed at non-flumed drainage crossings to prevent diversion of drainage channel flows into upland portions of pipeline trenches during construction. Application

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of riprap should be limited to areas where flow conditions prevent vegetative stabilization; riprap activities must comply with COE permit requirements. Pipeline trenches should be dewatered in such a manner that no silt laden water flows into active drainage channels (i.e., prior to discharge the water should be filtered through a silt fence, weed-free straw bales, or allowed to settle in a sediment detention pond).

4.4 Final Reclamation

4.4.1 Topsoil Respreading and Seedbed Preparation

In preparation for seeding, topsoil that was initially removed should 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 should 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 should be used to loosen the subsoil. The subsoil surface should be left rough. After topsoil has been respread and if it is loose, it should 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 should be ripped as described above. These areas should then be mulched with a hydromulch/seed/tackifier mix. Erosion control blankets with seed incorporated into the matting should be installed per manufacturer's specifications to enhance soil stabilization.

4.4.2 Seed Application

Upon completion of final grading, soil surfaces should either be seeded, or erosion control measures should be used until the site is seeded. Late fall is typically a good time of year to seed, however timing of seeding should be adjusted depending upon weather, soil moisture conditions and the plant species being used. The seedbed should 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 should be scarified to ensure good seed-soil contact. After completion of seedbed preparation, the seed mixtures presented in Tables C-2 through C-5, or a similar mix should 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 retopsolled.

Seed should be used within 12 months of viability testing. Legume species purchased commercially must have been properly inoculated with nitrogen-fixing bacteria. Seed should 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 should 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 should be broadcast applied at twice the application rate of drilled seed. A spike-toothed harrow or similar equipment should be used where ripping has been insufficient to provide cover for the broadcast seed.

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Any soil disturbance that occurs outside the recommended permanent seeding season, or any bare soil left unstabilized by revegetation, should be treated as a winter-construction problem and mulching should be considered, or the site stabilized.

The seed mixtures presented in Tables C-2 through C-5, or similar mixtures should 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 C-2) should be applied to disturbances in the sagebrush-dominated mixed desert shrub and juniper woodland community types. Seed Mixture #2 (Table C-3) should be applied to disturbances in the more moist alkaline mixed desert shrub community types. Seed Mixture #3 (Table C-4) should be applied to greasewood-dominated mixed desert shrub communities in alkaline valley bottoms and bluffs. Seed Mixture #4 (Table C-5) should 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 should be used, and final seed mixes applied in the revegetation effort should be designed in coordination with the BLM.

Final determination of the appropriate seed mixture should 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, should 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 entire area disturbed by the project should be re-seeded until an adequate cover of vegetation is established. Private and agricultural lands should 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 should be mulched following seeding to protect the soil from wind and water erosion, raindrop impact, surface runoff, and invasive, non-native species 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.

All sensitive disturbed areas should be mulched immediately following seeding with 1.5 to 2.0 tons/acre of a weed-free straw mulch. Mulching materials should be free of invasive, non-native species and undesirable plant species as defined by state or county lists. Hay mulch may be used, but it should 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 invasive, non-native species with a hay mulch such as smooth brome, timothy, orchardgrass and other minor species. The lessee should maintain all disturbances relatively weed-free for the life of the project through implementation of an invasive, non-native species monitoring and eradication program.

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Table C-2. Seed Mixture¹ #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 (<i>Agropyron smithii</i>)	Rosanna	2.0	0.5
Bluebunch wheatgrass (<i>Agropyron spicatum</i>)	Secar	2.0	0.5
Bottlebrush squirreltail (<i>Sitanion hystrix</i>)	-	2.0	0.5
Indian ricegrass (<i>Oryzopsis hymenoides</i>)	Nezpar	2.0	0.5
Needle-and-Thread (<i>Stipa comata</i>)	-	2.0	0.5
Forbs			
Gooseberryleaf globemallow (<i>Sphaeralcea grossulariaefolia</i>)	-	1.0	0.5
Cicer milkvetch (<i>Astragalus cicer</i>)	Monarch	1.0	0.5
Shrubs			
Wyoming big sagebrush (<i>Artemisia tridentata</i>)	-	2.0	0.25
Antelope bitterbrush (<i>Purshia tridentata</i>)	-	1.0	0.5
Fourwing saltbush (<i>Atriplex canescens</i>)	-	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.

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Table C-3. Seed Mixture¹ #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 (<i>Muhlenbergia wrightii</i>)	El Vado	2.0	0.5
Alkaligrass (<i>Puccinellia distans</i>)	Fults	5.0	0.5
Alkali sacaton (<i>Sporobolus airoides</i>)	Salado	3.0	0.5
Forbs			
Strawberry clover (<i>Trifolium fragiferum</i>)	O'Connors, Salina	2.0	0.5
Shrubs			
Fourwing saltbush (<i>Atriplex canescens</i>)	-	1.0	0.5
Shadscale (<i>Atriplex confertifolia</i>)	-	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.

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Table C-4. Seed Mixture¹ #3 - Greasewood-Dominated Valley Bottoms and Bluffs.

Species	Cultivar or Variety	Seed Application Drilled Rate (pl ^s lbs/ac)	Planting Depth (if drilled) (inches)
Grasses			
Western wheatgrass (<i>Agropyron smithii</i>)	Rosanna	3.0	0.5
Pubescent wheatgrass (<i>Agropyron tricophorum</i>)	Luna	2.0	0.5
Alkali sacaton (<i>Sporobolus airoides</i>)	-	2.0	0.25
Russian wildrye (<i>Elymus junceus</i>)	Vinall	2.0	0.25
Forbs			
Cicer milkvetch (<i>Astragalus cicer</i>)	Monarch	3.0	0.5
Shrubs			
Fourwing saltbush (<i>Atriplex canescens</i>)	-	1.0	0.5
Gardner saltbush (<i>Atriplex gardneri</i>)	-	1.0	0.5
Winterfat (<i>Ceratoides lanata</i>)	-	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.

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Table C-5. Seed Mixture¹ #4 - Wet Meadow Community Types.

Species	Cultivar or Variety	Seed Application Drilled Rate (pl ^s lbs/ac)	Planting Depth (if drilled) (inches)
Grasses			
Spike muhly (<i>Muhlenbergia wrightii</i>)	El Vado	2.0	0.5
Redtop (<i>Agrostis stolonifera</i>)	-	1.0	0.5
Tufted hairgrass (<i>Deschampsia cespitosa</i>)	-	4.0	0.25
Forbs			
Red clover (<i>Trifolium pratense</i>)	Kenland	2.0	0.5
Strawberry clover (<i>Trifolium fragiferum</i>)	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.

Wherever utilized, mulch should be spread uniformly so that at least 75 percent of the soil surface is covered. If a mulch blower is used, the straw strands should not be shredded less than eight inches in length to allow effective anchoring. On slopes less than 30 percent, straw mulch should be applied by a mechanical mulch blower at a rate of 2.0 tons/acre after seeding. The mulch should be crimped into the soil surface using a serrated disc crimper. Where broadcast straw mulch is applied on windswept slopes, a biodegradable plastic netting should 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 should be applied and staked firmly to the soil surface.

Where utilized, hydromulch and tackifier should 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 should be considered. In extremely dry areas where mulch degradation may be slow, mulching rates should 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

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reduce erosion to non-significant levels. The following measure should be considered by the operator and the BLM to stabilize such sites: incorporating a custom blend of seed into erosion control blankets. 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 should 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 should be determined by agreement between the BLM and Operators.

4.4.4 Livestock Control

Livestock grazing should be monitored on and along all drill sites, access road, and pipeline ROW's. Should grazing negatively impact revegetation success, measures should 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 should be maintained in functional condition during all phases of the project. Where access requires the disruption of an existing fence, a cattle guard should be installed at the junction.

4.4.5 Off-Road Vehicle Control

Off-road vehicle control measures should 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

Should fugitive dust generated during construction of the drill sites, access road/pipeline ROW'S, or staging areas become a problem, dust abatement measures should 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 should annually inspect and review the condition of all drill sites, access road/pipeline ROW'S, and any other disturbed areas associated with the project. This official should 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 should take place following each major runoff event. Photographs should 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.

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The following specific items should 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;
- invasive, non-native species 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; and
- overgrazing/trampling of riparian and wetland areas.

4.5.2 Reclamation Success Monitoring

Reclamation success should be based upon the objectives specified in this plan; therefore, monitoring should be tied to these objectives. The actual monitoring procedures for quantitative and qualitative evaluations of reclamation success should be implemented as specified by the BLM or other authorizing agencies.

Reclamation success should be monitored both in the short term (temporary reclamation) and in the long term (final reclamation). Monitoring of temporary reclamation measures should 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 should 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 should be determined through monitoring and evaluation of percent ground cover to include a measure of vegetal cover (by species), litter/mulch, rock/gravel, and bare ground. Ground cover should be documented at each 1-foot interval along a 100-foot line intercept transect. Seedling density and relative abundance should be determined by selection of plots at the 20-, 40-, 60-, and 80-foot marks on the transect. Grazing impacts should be assessed as an ocular estimate of the percent utilization along the transect.

Soil stability should 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.

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The access road boundaries, pipelines, and unused portions of the drill sites should be monitored until attainment of 80 percent of predisturbance vegetative cover within five years of seeding. This standard should 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 prescribed under the Performance Standard section of this plan.

4.5.3 Wetland and Drainage Channel Crossings

Wetland areas and natural drainage channel crossings should be monitored for a minimum of three years for invasive, non-native species invasion and establishment of undesirable species. Invasive, non-native species should not be allowed to establish at any time. If found in a reclaimed wetland or drainage channel crossing, the invasive, non-native species should be removed. Undesirable species should not be allowed to establish. At the third year of monitoring, presence of undesirable species should be negligible. The lessee should maintain wetland areas and drainage channel crossings according to this standard throughout the development of an invasive, non-native species and undesirable species monitoring and eradication program.

4.5.4 Photomonitoring

Permanent photomonitoring points should be established at appropriate vantage locations that provide adequate visual access to drill sites, along pipeline and access road rights-of-way, and to ancillary facilities. Each photomonitoring point should be permanently marked with re-bar and identified on a topographic map of the area. The location of each point should be described in detail to assist in relocation from year to year. Photos should be taken at each photomonitoring point prior to initiation of construction. Photos, framing the same scene as previously taken, should be taken each year until reclamation standards have been met.



APPENDIX D

HAZARDOUS MATERIALS MANAGEMENT PLAN



APPENDIX D

HAZARDOUS MATERIALS MANAGEMENT PLAN

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APPENDIX D

HAZARDOUS MATERIALS MANAGEMENT PLAN

1.0 INTRODUCTION

The Desolation Flats Project Area (DFPA) natural gas producing operators, including Marathon Oil Company, Yates Petroleum, AEC Oil & Gas (USA) Inc., EOG Resources, Inc, Tom Brown, Inc., Basin Exploration, Inc., Questar Exploration and Production Company, Merit Energy Company, and Devon SFS Operating, Inc., (hereafter referred to as "the Operators"), propose to explore and develop natural gas reserves in the Desolation Flats Area of Carbon and Sweetwater Counties, Wyoming. The Bureau of Land Management (BLM) 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 Desolation Flats Project was obtained from DFPA 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 DFPA to approved disposal facilities.

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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 Mesaverde/Lewis and Wasatch Formations and other formations underlying the DFPA Area. Water would also be produced as a by-product of gas and oil extraction operations. Table D-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 (mmcf) 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 (mcf) per well (Table D-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 Desolation Flats 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/Wyoming Oil and Gas conservation Commission (WOGCC) rules and regulations (Notice to Lessees [NTL]-4A). BLM and 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:

- Carbon and Sweetwater County special use permits,
- BLM rights-of-way (ROWs) applications,
- 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.

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Table D-1. Hazardous and Extremely Hazardous Materials Potentially Produced by the DFPA Natural Gas Project, Carbon and Sweetwater Counties, Wyoming, 2001.

Production Product	Hazardous Constituents ¹	Extremely Hazardous Constituents ²	Approximate Quantity Produced per Well ³
Natural Gas	-- Hexane PAHs ⁴ POM ⁵	None	0.4 mmcfd 4-24 mcf/d
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.
mcf/d = thousand cubic feet per day.
gpd = gallons per day.

⁴ PAHs = polynuclear aromatic hydrocarbons.

⁵ POM = polycyclic organic matter.

2.1.2 Condensates

Condensates 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 Desolation Flats wells is anticipated to be approximately 252 gallons per day (gpd) from most wells (Table D-1).

Condensates would be stored in tanks at well locations and centralized facilities, and all tanks would be fenced and bermed to contain the entire storage capacity of the largest tank plus one foot of freeboard as mandated by the BLM. Condensates would be periodically removed from storage tanks and transported by truck, in adherence to DOT rules and regulations, off the DFPA. 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.

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2.1.3 Produced Water

Produced water from Desolation Flats wells is anticipated to range in volume from 0 to 630 gpd, and would average approximately 168 gpd for most wells (Table D-1). Produced water quality from wells within the DFPA is variable and would be monitored periodically. Based on WOGCC-required water quality analyses of produced water samples from several DFPA wells, no hazardous or extremely hazardous materials are known to occur. Water from the Wasatch and Mesaverde/Lewis Mesa Verde Formations at locations in the Washakie and Great Divide Basins is known to contain the following hazardous materials: lead (CAS 7439-92-1), cadmium (CAS 7440-43-9), chromium (CAS 7440-47-3), radium 226, and uranium. However, water quality analyses of gross radiation for existing wells on the DFPA indicated only background radiation levels. No other hazardous or extremely hazardous materials are known to be present in the produced water.

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 Wyoming Department of Environmental Quality (WDEQ) permitted disposal well facility. Where applicable, National Pollutant Discharge Elimination System (NPDES) permits would be obtained from the WDEQ, 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 approval of disposal methodologies,
- RCRA compliance as necessary,
- WDEQ Water Quality Division (WDEQ-WQD) approval of wastewater disposal,
- WOGCC evaporation pond permits, and
- Wyoming State Engineer's Office (WSEO) dewatering permits (Form U.W. 5).

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 D-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 South Baggs; 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.

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Table D-2. Hazardous and Extremely Hazardous Materials Potentially Utilized During Construction, Drilling, Production, and Reclamation Operations by the Desolation Flats Natural Gas Project, Carbon and Sweetwater Counties, Wyoming.

Source	Hazardous Constituents ¹	Extremely Hazardous Constituents ²	Approximate Quantity Used Per Well ³
Fuel			
Gasoline	-- Benzene Toluene Ethylbenzene p-xylene m-xylene PAHs ⁴ POM ⁵ Tetraethyllead	-- Tetraethyllead	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

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Coolant/Antifreeze and Heat Transfer Agents	--	None	
	Ehylene glycol Triethylene glycol		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

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CL-29	--- Formic acid Ammonium chloride Zirconium nitrate Zirconium sulfate	None	59 gal
BA-20	--- Acetic acid	None	38 gal
	--- Fine mineral fibers	Sand	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 DFPA. The hazardous and extremely hazardous materials likely to be found in gasoline are listed in Table D-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 D-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 D-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

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compressor stations would be produced by the proposed project, and hazardous materials contained in this natural gas are identified in Table D-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 project area.

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 D-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 D-2). All drilling operations would be conducted in compliance with applicable BLM, WOGCC, and WDEQ rules and regulations.

All known hazardous materials present in the proposed drilling fluids and additives are listed in Table D-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

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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-approved materials would be approved by the 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 Desolation Flats 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: LGC-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 D-2).

The hazardous materials present in fracturing fluid components are listed in Table D-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

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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, pozzolans, 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 D-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 D-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).

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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 Desolation Flats. 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 D-3. Hazardous and Extremely Hazardous Materials Potentially Present in Combustion Emissions of the Desolation Flats Natural Gas Project, Carbon and Sweetwater Counties, Wyoming, 2001.

Emission	Hazardous Constituents ¹	Extremely Hazardous Constituents ²
Hydrocarbons	-- PAHs ³	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 = polynuclear aromatic hydrocarbons.

3.0 MANAGEMENT POLICY AND PROCEDURE

DFPA 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

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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.

DFPA 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.

DFPA Operators have evaluated field operations in the DFPA 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 shall be available for review at the BLM Rawlins and Rock Springs field offices. 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 Desolation Flats 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 D-4 (below) provides a generic list of hazardous chemical categories for the oil and gas exploration and production industry.

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Table D-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#772-27-1)	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)
Calcium Compounds Calcium bromide (CAS#71626-99-8) Calcium hypochlorite (CAS#7778-54-3) Calcium oxide (CAS#1305-78-8) Gypsum (CAS#10101-41-4) Lime (CAS#1305-78-8)	Immediate (Acute)
Cement (CAS#65997-15-1)	Immediate (Acute)
Cement Additives - Accelerators Calcium chloride (CAS#10035-04-8) Gypsum (CAS#10101-41-4) Potassium chloride Sodium chloride (CAS#7647-14-5) Sodium metasilicate	Immediate (Acute)
Cement Additives - Fluid Loss Cellulose polymer Latex	Immediate (Acute)

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Hazardous Chemical Category (With Examples of Representative Chemicals)	Physical and Health Hazards
Cement Additives - Miscellaneous Cellulose flakes (CAS#9004-34-6) Coated aluminum Gilsomite (CAS#12002-43-6) Lime (CAS#1305-78-8) Long chain alcohols	Immediate (Acute)
Cement Additives - Retarders Cellulose polymer Lignosulfonates	Immediate (Acute)
Cement Additives - 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)

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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 Styrene, maleic 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 Polyamionic 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)
Fuels Diesel (CAS#68476-34-6) Fuel oil Gasoline (CAS#6006-61-9)	Immediate (Acute), Delayed (Chronic), Fire
Gelling Agents Cellulose and guar derivatives	Immediate (Acute)

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Hazardous Chemical Category (With Examples of Representative Chemicals)	Physical and Health Hazards
Gel Stabilizers Sulfites Thiosulfates	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)
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 acids 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

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Hazardous Chemical Category (With Examples of Representative Chemicals)	Physical and Health Hazards
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
Salt Solutions Aluminum chloride (CAS#7446-70-0) Ammonium chloride (CAS#12125-02-9) Calcium bromide (CAS#17626-89-8) 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) Nitrioltriacetic 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)

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Hazardous Chemical Category (With Examples of Representative Chemicals)	Physical and Health Hazards
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 alcohol (CAS#75-65-0) Toluene (CAS#108-88-3) Turpentine (CAS#8006-64-2) Xylene (CAS#1330-20-7)	Immediate (Acute), Delayed (Chronic), Fire
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 - Flammable Amines Ammonium salts Fatty alcohols Isopropanol (CAS#67-56-1) Oxyalkylated phenols Petroleum naphtha (CAS#8030-30-6) Sulfonates	Immediate (Acute), Fire
Surfactants - Miscellaneous Amine salts Glycols Phosphonates	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)

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Hazardous Chemical Category (With Examples of Representative Chemicals)	Physical and Health Hazards
Weight Materials Barite (CAS#7727-43-7) Calcium carbonate (CAS#1317-65-3) Galena Hematite (CAS#1317-60-8) Siderite	Immediate (Acute)



APPENDIX E

WILDLIFE MONITORING AND PROTECTION PLAN



APPENDIX E

WILDLIFE MONITORING/PROTECTION PLAN
DESOLATION FLATS NATURAL GAS DEVELOPMENT PROJECT

Prepared for:

U.S. Bureau of Land Management
Rawlins Field Office
Rawlins, Wyoming

and

U.S. Bureau of Land Management
Rock Springs Field Office
Rock Springs, Wyoming

By:

Mary Read, BLM-RFO Wildlife Biologist
DFPA Review Team



APPENDIX E

WILDLIFE MONITORING/PROTECTION PLAN

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ABBREVIATIONS AND ACRONYMS

ANS	Artificial Nesting Structure
APD	Application for Permit to Drill
APLIC	Avian Powerline Interaction Committee
BA	Biological Assessment
BLM	Bureau of Land Management
BO	Biological Opinion
CSU	Controlled Surface Use
DFPA	Desolation Flats Project Area
EIS	Environmental Impact Statement
GIS	Geographic Information System
LOP	Life-of-Project
RFO	Rawlins Field Office
ROW	Right-of-Way
RSFO	Rock Springs Field Office
TEP&C	Threatened, Endangered, Proposed, and Candidate Species
USFWS	U.S. Fish and Wildlife Service
WGFD	Wyoming Game and Fish Department
WYNDD	Wyoming Natural Diversity Database



APPENDIX E: WILDLIFE MONITORING PLAN

1.0 INTRODUCTION

The Wildlife Monitoring/Protection Plan was prepared in conjunction with the Environmental Impact Statement (EIS) for the Desolation Flats Natural Gas Development Project, Sweetwater and Carbon counties, Wyoming. The goal of the plan is to avoid and/or minimize adverse impacts to wildlife that may be present on project-affected areas by monitoring and protecting wildlife populations and associated habitat on the Desolation Flats Project Area (DFPA) during the course of project development and operations and by developing appropriate mitigative actions. Implementation of the plan will allow managers and project personnel opportunities to achieve and maintain desired levels of wildlife productivity and populations on the DFPA (e.g., at pre-project levels) by minimizing and/or avoiding 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 DFPA simultaneously with the development of natural gas reserves. A Review Team (Review Team), comprised of personnel from the U.S. Bureau of Land Management (BLM) Rawlins Field Office (RFO) and Rock Springs Field Office (RSFO), the U.S. Fish and Wildlife Service (USFWS), the Wyoming Game and Fish Department (WGFD), and Industry (Operators), has been identified to determine wildlife monitoring and protection requirements and needs on an annual basis within the DFPA (USDI-BLM 2000).

The Proposed Action for the Desolation Flats Natural Gas Development Project involves the development of a maximum of 385 new wells at 361 well locations and associated facilities (roads, pipelines, compressor stations) on the DFPA over the next 15-20 years. The proposed life-of-project (LOP) is estimated to be from 30 to 50 years. Alternative development strategies also have been proposed (i.e., Increased Development Alternative, No Action Alternative). A complete description of the proposed project and alternatives is provided in Chapter 2.0 of the EIS.

Proposed inventory, monitoring, and protection measures will be implemented under each potential development scenario (i.e., alternative), unless information revealed in the coordinated review of annual wildlife reports (see Section 2.1) 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 in 2003, and it is estimated that the implementation will continue for a maximum of 20 years; however, the plan may be terminated at the end of any year when there is sufficient evidence that wildlife populations and productivity in the DFPA have been successfully protected. The plan will receive a major review for effectiveness every five to six years, or as determined by the Review Team.

2.0 IMPLEMENTATION PROTOCOL

This section provides a preliminary wildlife inventory, monitoring, and protection protocol for the DFPA. A summary of primary protocol components is provided in Table E-1. Inventory and monitoring requirements are included in this table. In areas where development may reach 4 well locations per section, then additional inventory, monitoring, and protection measures are provided, unless otherwise agreed to by the Review Team, and are located in Table E-2. Standard protocol for Application for Permit to Drill (APD) and right-of-way (ROW) application field reviews are provided in Table E-5. Alternative protocols likely will be developed in the future in response to specific needs identified in annual wildlife reports (see Section 2.1). Methods are provided for each wildlife species and/or category, and additional species and/or

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categories may be added based on 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 management agency (i.e., RFO and RSFO, USFWS, and WGFD) and individual concerns identified during the preparation of the EIS.

Considerable efforts will be required by agency and Operator (e.g., Marathon, EOG, Tom Brown, Questar, etc.) personnel for plan implementation. Many of the annually proposed agency data collection activities 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 further agency cost-sharing approaches will be considered such that public demands and statutory directives are achieved (USDI-BLM 2000).

2.1 ANNUAL REPORTS AND MEETINGS

During project development (i.e., 15-20 years), Operators will provide an updated inventory and description of all existing project features (i.e., locations, size, and associated human activity at each feature), as well as those tentatively proposed for development during the next 12 months. This inventory will be submitted to the BLM by the Operators no later than October 15 of each year. These data will be coupled with annual wildlife inventory, monitoring, and protection data obtained from the previous year and included in annual reports. Annual reports will be prepared by the BLM. When annual wildlife inventory, monitoring, and protection data are gathered by parties other than the BLM, those parties (e.g., Operators, WGFD) will be requested to provide the data to the BLM by October 15 of each year. Upon receipt of these data, annual reports will be completed in draft form by the BLM and submitted to Operators, USFWS, 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 BLM and held in January/February of the following year to discuss and modify, as necessary, proposed wildlife inventory, monitoring, and protection protocol for the subsequent field season.

Decisions regarding annual Operator-specific financing and personnel requirements will be made at these meetings. A protocol regarding how to accommodate previously unidentified development sites will also be determined during the annual meeting. Final decisions will be made by the BLM based on the input from the Review Team and all affected parties.

A final annual report will be issued by the BLM to all potentially affected individuals and groups by February/March of each year. Annual reports will summarize annual 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 and/or categories to be monitored).

Where possible, the data presented in reports will be used to identify potential correlations between development and wildlife productivity and/or abundance. Addendum E-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 BLM. The BLM's Geographic Information System (GIS) will be used for information storage, retrieval, and planning, and annual GIS data updates will be conducted.

APPENDIX E: WILDLIFE MONITORING PLAN

Table E-1: Summary of General Wildlife Reporting, Inventory, and Monitoring, Desolation Flats Natural Gas Development Project Sweetwater and Carbon Counties, Wyoming, 2002.

REPORTING		
<i>Action</i>	<i>Dates</i>	<i>Responsible Entity¹</i>
Annual area wide tentative plan of development showing locations of existing and newly proposed development features.	Annually by October 15.	Operators
Annual reports summarizing findings and presenting protection actions.	Annually by: Draft - December Review Team Meeting - January/February Final - February/March	BLM with reviews by Operators, USFWS, WGFD, and other interested parties.
Meetings to finalize future years' inventory, monitoring, and protection measures.	Early December/January and as necessary.	BLM with participation by USFWS, Operators, WGFD, and other interested parties.
INVENTORY AND MONITORING		
<i>Action</i>	<i>Dates</i>	<i>Responsible Entity</i>
Raptor nest inventories (DFPA plus one mile buffer).	Every 5 years during April-May.	BLM; Operator-provided financial assistance for aircraft rental.
Raptor productivity monitoring (on the DFPA plus a one-mile buffer).	Every 5 years during March to mid-July.	BLM with Operator-provided financial assistance for aircraft rental as necessary.
Aerial greater sage-grouse lek inventories (DFPA plus a two-mile buffer).	Every 5 years during March-April.	BLM; Operator-provide financial assistance for aircraft rental.
Greater sage-grouse lek attendance monitoring on and within two-miles of the DFPA.	Annually during March to mid-May.	Selected leks will be visited at least once by the BLM and/or WGFD, such that all known leks are visited every three years.
Greater sage-grouse winter habitat inventory and monitoring within and adjacent to the DFPA.	As required during December-February.	BLM, in coordination with WGFD; Operator-provided financial assistance for aircraft rental.
Big game crucial winter range use monitoring (crucial winter range on the DFPA plus a one-mile buffer, or as determined by the Review Team).	As required and/or available.	BLM, in coordination with WGFD; Operator-provided financial assistance for aircraft rental.

¹With Operator assistance, it is anticipated that agency obligations will not greatly exceed currently approved personnel or financial commitments.

APPENDIX E: WILDLIFE MONITORING PLAN

Raw data collected each year also will be provided to other management agencies (e.g., WGFD, USFWS, Wyoming Natural Diversity Database[WYNDJ]) at the request of those agencies. In addition, sources of potential disturbance to wildlife will be identified, where practical (e.g., development activities, weather conditions, etc.).

Additional reports may be prepared in any year, as necessary, to comply with other relevant wildlife laws, rules, and regulations (e.g., black-footed ferret survey reports, raptor reports).

Additional meetings will be held as necessary in any given year by the BLM, Operators, and/or USFWS in Rawlins to inform and update Operator personnel on the findings of the annual reports (USDI-BLM 2000).

2.2 ANNUAL INVENTORY AND MONITORING

The inventory and monitoring protocol will be as identified below for each wildlife species and/or category. This protocol will be unchanged across development alternatives, except as authorized by the BLM or specified in this plan. Additional wildlife species and/or categories and associated surveys may be added or omitted in future years, pending the coordinated review of annual wildlife reports. Opportunistic wildlife observations may be made throughout the year by agency and Operator personnel present in the DFPA.

The frequency of inventory and monitoring will be dependent upon the level of development in the DFPA (see Tables H-1 and H-2). In general, inventory and monitoring frequency will increase with increased levels of development. Inventory and monitoring results may identify the need for further scientific studies. The Review Team and/or BLM 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 E-5).

2.2.1 Raptors

Raptor inventories of potentially affected areas were conducted in early May 2000 and will continue to be conducted every five years thereafter for the LOP to determine the location of raptor nests/territories and their activity status by the BLM (Table E-1). At this time, no raptor concentration areas are known to exist. Approximate raptor nest locations on and adjacent to the DFPA have been identified and are presented in the Wildlife and Fisheries Technical Report for the Desolation Flats Natural Gas Development Project (HWA 2002). These surveys may be implemented aerially (e.g. via helicopter) or from the ground with operator-provided financial assistance. Data collected during surveys will be recorded on Raptor Nesting Record, Raptor Observation Data Sheets, or other similar data forms (Addendum E-1).

Nest productivity monitoring will be conducted by the BLM at active nests that are located within the project area (DFPA 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 generally will be conducted from the ground, and attempts will be made to determine the cause of any documented nest failure. Operators may provide financial assistance for aircraft rental, as necessary.

Additional raptor nest activity and productivity monitoring measures will be applied in areas with high levels of development (i.e., areas with ≥ 4 locations/section) on and within one mile of the

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DFPA (see Table E-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 (see Table E-5).

Table E-2: Additional Wildlife Inventory and Monitoring Measures On and Adjacent to Areas with High Levels of Development (>4 Locations/Section), Desolation Flats Project Area, Sweetwater and Carbon Counties, Wyoming, 2002.

Action	Dates	Responsible Entity ¹
Raptor nest inventory/monitoring on areas with ≥ 4 locations/section plus a one-mile buffer and selected undeveloped comparison areas.	Annually during April and May.	BLM surveyor with Operator-provided financial assistance for aircraft rental.
Raptor nest inventory/monitoring on areas with ≥ 4 locations/section plus a one-mile buffer and selected undeveloped comparison areas..	Annually during March - July.	BLM surveyor with Operator-provided financial assistance for BLM seasonal support.
Selected sensitive species inventory/monitoring on suitable habitats in areas with ≥ 4 locations/section plus a one-mile buffer and selected undeveloped comparison areas.	Annually during spring and summer.	BLM, Operators in coordination with USFWS; Operator-provided financial assistance, not to exceed \$5,000 per operator in any given year.
Aerial greater sage-grouse lek inventory on areas with ≥4 locations/section plus a two-mile buffer and selected undeveloped comparison areas.	Annually during March-April.	BLM surveyor with operator-provided financial assistance for aircraft rental.
Greater sage-grouse lek attendance monitoring on areas with ≥4 locations/section plus a two-mile buffer and selected undeveloped comparison areas.	Annually during March to mid-May.	Each known lek will be visited at least once annually by the BLM and/or WGFD; subsequent visits will occur in BLM/WGFD selected leks by the BLM in coordination with the WGFD.
Greater sage-grouse winter habitat inventory and monitoring in areas with ≥4 locations/section and undeveloped comparison areas.	Available years.	BLM surveyor in coordination with the WGFD; Operator-provided financial assistance.
Other studies on areas with ≥4 locations/section and selected undeveloped comparison areas.	Year-long and in any year as deemed necessary by BLM and/or USFWS.	BLM in coordination with USFWS and WGFD; Operator-provided financial assistance, not to exceed \$5,000 per Operator in any given year.

¹With Operator assistance, it is anticipated that agency obligations will not greatly exceed currently approved personnel or financial commitments.

All raptor nest/productivity surveys will be conducted using procedures that minimize potential adverse effects to nesting raptors. Specific survey measures for reducing detrimental effects are listed in Grier and Fyfe (1987) and Call (1978) and include the following:

- (1) Nest visits will be delayed for as long as possible in the nesting season.
- (2) 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.

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- (3) Nests will be approached tangentially and in an obvious manner to avoid startling adults.
- (4) Nests will not be visited during adverse weather conditions (e.g., extreme cold, precipitation events, windy periods, hottest part of the day).
- (5) Visits will be kept as brief as possible.
- (6) All inventories will be coordinated by the BLM.
- (7) The number of nest visits in any year will be kept to a minimum.
- (8) All raptor nest location data will be considered confidential (USDI-BLM 2000).

These actions may reduce impacts to nesting raptors. It should be noted that the RFO, in coordination with the USFWS, monitors active/inactive raptor nests within the project area and may band raptors, specifically ferruginous hawks, during June and July. The RFO wildlife biologists have a USFWS permit to proceed with banding.

2.2.2 Big Game Species

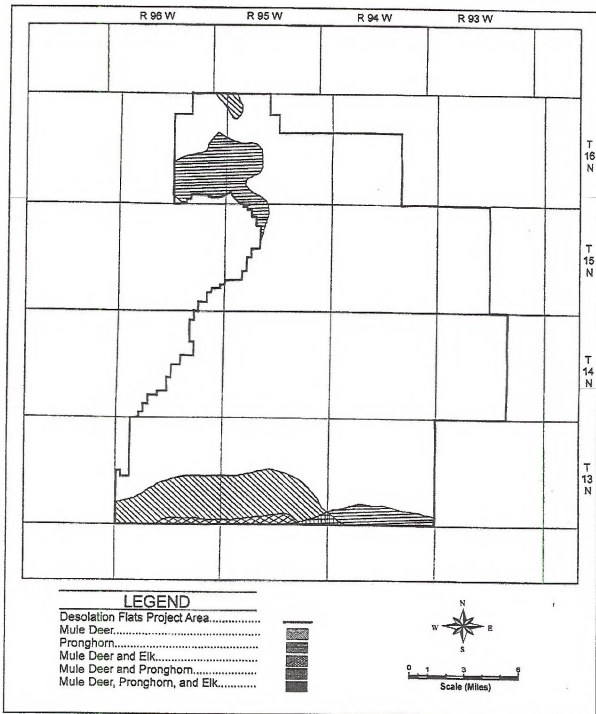
To determine the need for application of crucial winter range seasonal stipulations and assess potential impacts to big game species occurring on the DFPA, data on big game use of crucial winter ranges on the DFPA and an adjacent one-mile buffer will be requested annually by the BLM from the WGFD, as deemed necessary by the BLM (see Table E-1). Big game crucial winter ranges are shown in Map E-1. If data indicates further study is needed, then the BLM will be responsible for the data collection, in coordination with the WGFD (USDI-BLM 2000).

Migration corridors and transitional ranges have been identified to some degree within and adjacent to the DFPA. There may be a need to identify these areas in more detail if impacts to big game movement are identified during these critical time periods. Big game migration corridors and transitional zones are broader in scope and may require additional studies/monitoring if the BLM, WGFD, and/or Review Team determine this need.

2.2.3 Threatened, Endangered, Proposed, and Candidate Species

The level of inventory and monitoring required for threatened, endangered, proposed, and candidate species (TEP&C) will be commensurate with established protocol for the potentially affected species. Survey protocol developed in conjunction with the Biological Assessment (BA) for this project will be conducted as a component of this wildlife protection plan. Methodologies and results of these surveys will be included in annual reports or provided in separate supplemental reports. A preliminary list of TEP&C species proposed for management and known to occur, or potentially to occur, in the vicinity of the DFPA is shown in Table E-3. As TEP&C species are added to or withdrawn from the USFWS list, appropriate modifications will be incorporated to this plan and specified in annual reports. Additional species of concern known to occur, or potentially occur, in the vicinity of the DFPA are shown in Table E-4 (BLM Wyoming State Sensitive Species).

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Map E-1. Big game crucial winter ranges located within the Desolation Flats Project Area.

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TEP&C species data collected during the surveys described below will be considered confidential and will be provided only as necessary to those requiring the data for specific management and/or project development needs. Site- and species-specific TEP&C species surveys will continue to be conducted as necessary in association with all APD and ROW application field reviews (see Table E-5). Data will be collected on appropriate General Wildlife Observation Data Sheets or similar forms (see Addendum E-1). Alternate/additional forms may be used as specified by the BLM (USDI-BLM 2000).

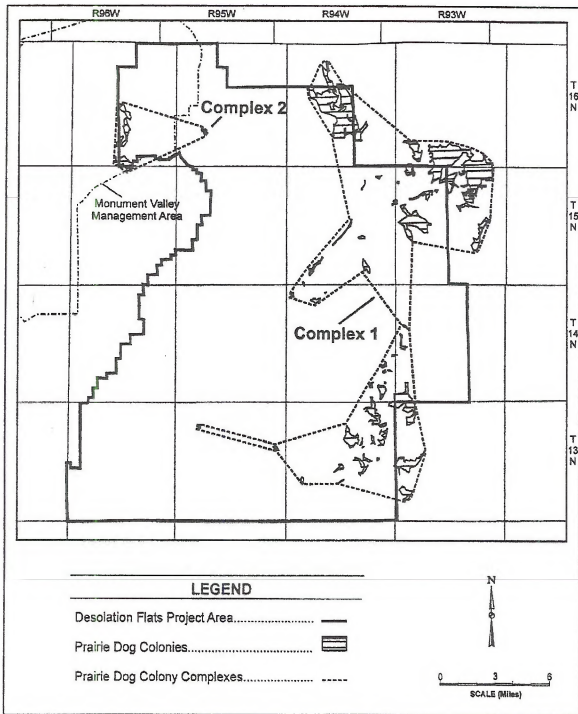
Table E-3: Threatened, Endangered, Proposed, and Candidate Species Documented or Potentially Occurring on or in the Vicinity of the Desolation Flats Project Area, 2002.

Species	Scientific Name	Status	Distribution
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Threatened (proposed for de-listing)	Nesting, winter resident, migrant, statewide
Black-footed Ferret	<i>Mustela nigripas</i>	Endangered	Possible resident in prairie dog colonies
Canada Lynx	<i>Lynx Canadensis</i>	Threatened	Resident of forested areas, may travel through
Uta Ladies' Tresses	<i>Spiranthes diluvialis</i>	Threatened	Possible statewide, suitable habitat < 6,500 feet
Bonytail	<i>Gila elegans</i>	Endangered	Downstream resident of Green River
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	Endangered	Downstream resident of Green River
Humpback Chub	<i>Gila cypha</i>	Endangered	Downstream resident of Green River
Razorback Sucker	<i>Xyrauchen texanus</i>	Endangered	Downstream resident of Green River
Mountain Plover	<i>Charadrius montanus</i>	Proposed Threatened	Grasslands statewide
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Candidate	Riparian areas west of the Continental Divide

2.2.3.1 Black-footed Ferret

BLM biologists will determine the presence/absence of prairie dog colonies at each proposed development site during APD and ROW application field revisions (see Table E-5). Prairie dog colonies (i.e., potential black-footed ferret habitat) on the area were mapped in April 2000 and burrow densities determined. White-tailed prairie dog colonies located on the DFPA are shown on Map E-2. Colonies that meet USFWS criteria as potential black-footed ferret habitat, per the USFWS 1989 Guidelines, will be surveyed for black-footed ferrets by either the BLM or USFWS-certified, Operator-financed, and BLM-approved biologist prior to BLM authorizing disturbance of these colonies. Surveys will only be conducted as deemed necessary during consultation between the BLM and USFWS. Black-footed ferret surveys will be conducted in accordance with the USFWS guidelines (USFWS 1989) and approved by the BLM and USFWS and will be conducted on a site-specific basis, depending on the areas proposed for disturbance in a given year as specified in the annual report.

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Map E-2. Potential black-footed ferret habitat, (i.e. white-tailed prairie dog colonies and complexes) in relation to the Desolation Flats Project Area.

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2.2.3.2 Bald Eagle

The inventory and monitoring protocol for the bald eagle will be as described for raptor species (Section 2.2.1).

2.2.3.3 Colorado Pikeminnow, Bonytail, Humpback Chub, and Razorback Sucker

There are four endangered fish species that inhabit areas within the Colorado River system. These four species are downstream residents of the Green River, located within the Colorado River system. If there are any proposed projects that will lead to water depletions (consumption) in the Colorado River system, then formal consultation with the USFWS will occur to reduce impacts to these species.

2.2.3.4 Mountain Plover

The Desolation Flats Project Area was mapped in June 2000 to determine if suitable mountain plover habitat existed (Map E-3). There was suitable habitat identified and individual projects will be assessed to determine if suitable mountain plover habitat (i.e., areas with flat topography and vegetation less than four inches high) exists within ¼-mile of each project site. Mountain plover surveys will be completed each field season to identify occupied habitat within the DFPA. Projects that are located in occupied mountain plover habitat, and include well pads, access roads, reserve pits, and ponds >40 acres in size, will have additional stipulations attached (see Addendum E-2). The Mountain Plover Survey Guidelines (USFWS 2002) will be followed for large scale/long term projects and short-term, linear projects. The guidelines identify surveys required to determine the presence and absence of mountain plover as well as density of nesting plovers. A copy of these guidelines will be attached to the Biological Assessment (BA).

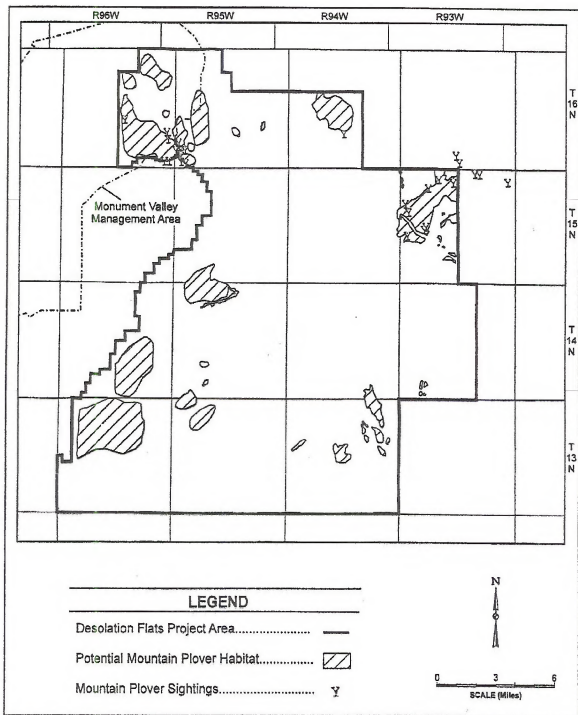
2.2.3.5 Yellow-billed Cuckoo

The Yellow-billed cuckoo inhabits areas that contain open woodlands, stream-side willow, and alder groves. These birds are located west of the Continental Divide. There are not many riparian systems located within the DFPA; therefore, the chance of having these birds within the project area is minimal. Site-specific surveys will be conducted in association with all APD/ROW application field reviews.

2.2.4 BLM Wyoming State Director's Sensitive Species

Many wildlife and plant species are experiencing population declines; therefore, the Wyoming BLM has developed a sensitive species list to better manage these species and their habitats. The goal is to ensure that any actions on public lands consider the overall welfare of these species and do not contribute to their decline. The BLM policy on these species is implemented 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. This list is meant to be dynamic, which means it could change as new information for species is accumulated (USDI-BLM 2001). The entire BLM Wyoming State Director's Sensitive Species List and BLM Instruction Memorandum No. WY-2001-040, dated April 9, 2001, are attached in Addendum E-3.

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Map E-3. Areas identified as potential mountain plover habitat and mountain plover Sightings on and proximal to the Desolation Flats Project Area.

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Surveys for BLM Wyoming Sensitive Species (sensitive species) will be conducted by the BLM or a BLM-approved Operator-financed biologist in areas of potential habitat. Table E-4 describes the species that are considered sensitive species by the BLM and either are known to occur, or have the potential to occur, within the DFPA. The surveys for these species may be implemented in conjunction with surveys for other species or as components of the APD/ROW application.

In addition, in areas where four well locations are developed (or in the case where more than four wells are drilled) the entire section plus a one mile buffer, as well as selected undeveloped comparison areas, will be surveyed annually during spring and summer by the BLM and/or BLM-approved Operator-financed biologists for selected sensitive species (see Table E-2). The Review Team may revise the distance of the survey area based on biological requirements and the number of surveys required for each species. If any sensitive species are observed, the observations will be noted on the appropriate data forms (see Addendum E-1). In addition, when and 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., BLM, USFWS) identifies a potential concern regarding any of these species, additional inventory and monitoring may be implemented as specified in annual reports (USDI-BLM 2000).

2.2.4.1 Greater Sage-grouse

Baseline data of greater sage-grouse lek locations, (both aerial and ground searches), were collected throughout the DFPA and 2-mile buffer in April of 2000 (Map E-4). In general, greater sage-grouse lek inventories will be conducted on the DFPA and a 2-mile buffer to determine lek locations every five years; however, the Review Team and/or BLM may recommend that monitoring may occur on an annual basis, or earlier than every five years (see Table E-1). Inventories will be conducted by the BLM during March and April every fifth year of this plan, or as deemed necessary by the Review Team. Surveys may be conducted aerially, which will include Operator-provided financial assistance for aircraft rental, or on the ground, as deemed appropriate by the BLM; aerial surveys will be used only to determine lek locations. In areas with four well locations per section, aerial inventories will be conducted annually on affected sections, a 2-mile buffer of disturbance areas, and selected undeveloped comparison areas (see Table E-2).

Selected leks within 2 miles of existing and proposed disturbance areas will be monitored annually by the BLM in coordination with the WGFD between March 1 and May 15, to determine lek attendance such that all leks on these areas are monitored at least once every three years (see Table E-1). Data collected during these surveys will be provided on Greater Sage-Grouse Lek Records or other suitable forms (see Addendum E-1) (USDI-BLM 2000). Map E-4 shows the greater sage-grouse leks that have been identified within the DFPA and a two-mile buffer; these leks include both known active and inactive leks.

Greater sage-grouse winter habitat surveys within the DFPA will be conducted when weather conditions permit to determine the use of these areas and/or any changes that may have occurred to this habitat within the project area (see Table E-1). Winter habitat surveys can only be completed during specific weather conditions, where there is adequate snow cover to determine actual winter use areas. In years when this snow cover is not available, then surveys should not be completed. Map E-4 shows known winter greater sage-grouse habitat that was identified during the 2001/2002 winter time period.

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Table E-4: BLM Wyoming State Director's Sensitive Species Documented or Potentially Occurring on or in the Vicinity of the Desolation Flats Project Area, 2002 (RFO = Rawlins Field Office, RSFO = Rock Springs Field Office).

Species	Scientific Name	RFO	RSFO	Habitat
Birds				
Greater Sage-Grouse	<i>Centrocercus urophasianus</i>	X	X	Basin-prairie shrub, mountain foothill shrub
Peregrine Falcon	<i>Falco peregrinus</i>	X	X	Tall cliffs
Northern Goshawk	<i>Accipiter gentilis</i>	X	X	Conifer and deciduous forests
Ferruginous Hawk	<i>Buteo regalis</i>	X	X	Basin-prairie shrub, grassland, rock outcrops
Western Burrowing Owl	<i>Athene cunicularia</i>	X	X	Grasslands, basin-prairie shrub
Loggerhead Shrike	<i>Lanius ludovicianus</i>	X	X	Basin-prairie shrub, mountain-foothill shrub
Sage Thrasher	<i>Oreoscoptes montanus</i>	X	X	Basin-prairie shrub, mountain-foothill shrub
Sage Sparrow	<i>Amphispiza bilineata</i>	X	X	Basin-prairie shrub, mountain-foothill shrub
Brewer's Sparrow	<i>Spizella breweri</i>	X	X	Basin-prairie shrub
Columbian sharp-tailed grouse	<i>Tympanuchus phasianellus columbianus</i>	X		Grasslands
Mammals				
White-tailed Prairie Dog	<i>Cynomys leucurus</i>	X	X	Basin-prairie shrub, grasslands
Dwarf Shrew	<i>Sorex nanus</i>	X	X	Mountain foothill shrub, grasslands
Swift Fox	<i>Vulpes velox</i>	X	X	Grasslands
Pygmy Rabbit	<i>Brachylagus idahoensis</i>		X	Basin-prairie and riparian shrub
Wyoming Pocket Gopher	<i>Thomomys talpae</i>	X	X	Meadows with loose soil
Long-eared Myotis	<i>Myotis evotis</i>	X	X	Conifer and deciduous forests, caves and mines
Fringed Myotis	<i>Myotis thysanodes</i>	X	X	Conifer forests, woodland-chapparral, caves and mines
Townsend's Big-Eared Bat	<i>Corynorhinus townsendii</i>	X	X	Forests, basin-prairie shrub, caves and mines
Spotted Bat	<i>Euderma maculatum</i>		X	Cliffs over perennial water, basin-prairie shrub
Amphibians				
Northern Leopard Frog	<i>Rana pipiens</i>	X	X	Beaver ponds, permanent water in plains and foothills
Great Basin Spadefoot	<i>Spea intermontana</i>	X	X	Spring seeps, permanent and temporary waters

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Table E-4: Continued.

Species	Scientific Name	RFO	RSFO	Habitat
Reptiles				
Midget Faded Rattlesnake	<i>Crotalus viridis concolor</i>		X	Mountain foothills shrub, rock outcrop
Fish				
Leatherside Chub	<i>Gila copei</i>		X	Bear, Snake, and Green River drainages, clear, cool, streams and pools
Roundtail Chub	<i>Gila robusta</i>	X	X	Colorado River drainage, mostly large rivers, also streams and lakes
Bluehead Sucker	<i>Catostomus discobolus</i>	X	X	Bear, Snake, and Green River drainages, all waters.
Flannelmouth Sucker	<i>Catostomus latipinnis</i>	X	X	Colorado River drainage, large rivers, streams, and lakes
Colorado River Cutthroat Trout	<i>Oncorhynchus clarki pleuriticus</i>	X	X	Colorado River drainage, clear mountain streams
Plants				
Nelson's Milkvetch	<i>Astragalus nelsonianus</i> - or - <i>stragalus pectinatus</i> var. <i>platyphyllus</i>	X	X	Alkaline clay flats, shale bluffs and gullies, pebbly slopes, and volcanic cinders in sparsely vegetated sagebrush, juniper, & cushion plant communities at 5,200-7,600
Wyoming Tansymustard	<i>Descurainia torulosa</i>		X	Sparsely vegetated sandy slopes at base of cliffs of volcanic breccia or sandstone 8,300-10,000
Large-fruited Bladderpod	<i>Lesquerella macrocarpa</i>		X	Gypsum-clay hills & benches, clay flats, & barren hills 7,200-7,700
Stemless Beardtongue	<i>Penstemon acaulis</i> var. <i>acaulis</i>		X	Cushion plant or Black sage grassland communities on semi-barren rocky ridges, knolls, & slopes at 5,900-8,200
Mystery Wormwood	<i>Artemisia biennis</i> var. <i>diffusa</i>		X	Clay flats and playas 6,500
Cedar Rim Thistle	<i>Cirsium aridum</i>	X	X	Barren, chalky hills, gravelly slopes, & fine textured, sandy-shaley draws, 6,700-7,200
Owne's Thistle	<i>Cirsium ownbeyi</i>		X	Sparsely vegetated shaley slopes in sage & juniper communities 6,440-8,400
Green River Greenthread	<i>Thelesperma caespitosum</i>		X	White shale slopes & ridges of Green River Formation 6,300
Uinta Greenthread	<i>Thelesperma pubescens</i>		X	Sparsely vegetated benches & ridges on coarse, cobbly soils of Bishop Conglomerate
Cedar Mountain Easter Daisy	<i>Townsendia microcephala</i>		X	Rocky slopes of Bishop Conglomerate
Gibben's Beardtongue	<i>Penstemon gibbensii</i>	X		Sparsely vegetated shale or sandy-clay slopes 5,500-7,700

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2.2.4.2 Ferruginous Hawks, Peregrine Falcon, and Burrowing Owl

The inventory and monitoring protocol for these species is described in the raptor section (see Section 2.2.1).

2.2.5 Other Inventory and Monitoring Measures

Additional inventory and monitoring measures may be applied as specified in annual reports.

2.2.6 General Wildlife

BLM staff will be responsible for keeping records of selected wildlife species observed during the course of their activities on the DFPA and interested Operator personnel may also provide data on wildlife observations, and are encouraged to do so. The information provided will include observations of wildlife species, their numbers, location, activity, and other pertinent data as applicable and identified on the General Wildlife Observation Data Sheet presented in Addendum E-1 of this plan (USDI-BLM 2000).

2.3 PROTECTION MEASURES

The wildlife protection measures proposed herein have been developed from past measures identified for oil and gas developments in Wyoming (USDI-BLM 2000). Additional measures may be included and/or existing measures may be modified in any given year as allowable and as deemed appropriate by BLM in consultation with Operators and other interested parties, and these measures will be specified in annual reports. It is assumed that as the wildlife issues within the DFPA are further described and impacts identified, some protection measures will be removed, whereas others may be added. Protection measures will be implemented by Operators with assistance from and/or in consultation with the BLM. In addition, these measures may be modified on a site-specific basis as deemed appropriate by the BLM after completion of APD and ROW application field reviews.

The principle protection measures for most wildlife species will be avoidance of sensitive/crucial habitats (e.g. big game crucial winter range, raptor nests, greater sage-grouse leks, etc.), where possible. However, numerous species- and project-specific measures may be implemented. Additionally, general wildlife protection measures (see Table E-5) will likely benefit the majority of wildlife species found on and adjacent to the DFPA.

2.3.1 Raptors

The primary protection measure for raptor species on the DFPA 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 a repeated human presence will not be constructed within 825

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feet of active raptor nests, except ferruginous hawk, where the restriction will be 1,200 feet. The seasonal buffer distance and exclusion dates may vary, depending on factors, such as nest activity status, species, prey availability, natural topographic barriers, and line-of-sight distances. Actual nest buffers for each raptor nest will be established in annual reports.

Operators will notify the BLM immediately if raptors are found nesting on or within 1,200 feet of project facilities, and Operators will assist the BLM as necessary in erecting artificial nesting structures (ANS's), as appropriate. The use of ANS's will be considered as a last resort for raptor protection. 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. Required corresponding permits will be obtained from the WGFD 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 on or adjacent to the DFPA as determined from decreased raptor productivity or nesting or documented nest abandonment or failure, ANS's may be constructed at a rate of one to two ANS's for one impacted nest, or existing degraded raptor nests may be upgraded/reinforced to minimize potential impacts. The BLM wildlife biologist will determine the number of required 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, and these 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. Operators will be responsible for the annual maintenance of ANS's throughout the LOP. 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. All ANS's on public lands will become the property of the BLM upon completion of the project.

In cases where existing project features (e.g., well locations) are located within the nest buffers of active raptor nests, no maintenance activities requiring a work-over rig, unless an exception has been approved, will be allowed during critical periods (i.e., approximately early March through mid-June). The exact dates of exclusion will be determined by the BLM and will likely vary between nests and from year to year, depending on the species present and variations in weather, nesting chronology, and other factors.

No above-ground power line construction is expected with the proposed 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.

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Table E-5: Summary of General APDIROW Application Stage Survey/Protection Measures, Desolation Flats Project Area, Sweetwater and Carbon Counties, Wyoming, 2002.

Protection Measure	Dates	Responsible Entity
APD-stage general raptor nest analysis within 0.75 to 1.0 mile of proposed disturbance.	Year-long	BLM, Operators
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)	Operators, BLM
APD-stage general raptor nest avoidance within 825 feet of active nests (1,200 feet for active ferruginous hawk nest).	Year-long (Controlled Surface Use [CSU]) generally excluding surface disturbance.	Operators, BLM
APD-stage sensitive species surveys (within 0.25 - 0.5 miles of proposed disturbance sites).	As necessary	BLM or Operators
APD-stage TE P&C habitat avoidance.	As necessary.	Operators, BLM
APD-stage prairie dog colony mapping and burrow density determination.	As necessary.	Operators, BLM
Black-footed ferret habitat (i.e., prairie dog colony) avoidance.	As necessary.	Operators, BLM
Black-footed ferret surveys where suitable habitat must be disturbed.	Where required, in appropriate season and no more than one-year prior to disturbance.	BLM, Operator-financed USFWS-approved biologist
APD-stage mountain plover surveys (within 0.25 mile of proposed project)	As necessary between April and July.	BLM, Operator-financed BLM-approved biologist
Mountain plover nest/brood avoidance.	April 10 - July 10	Operators, BLM
APD-stage western burrowing owl surveys (within 0.5 mile of proposed disturbance sites).	As necessary during June-August	BLM, Operator-financed BLM-approved biologist
Western burrowing owl nest avoidance.	As necessary.	Operators, BLM

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Table E-5: Continued.

Protection Measure	Dates	Responsible Entity
APD-stage greater sage-grouse lek surveys on suitable habitats within 2.0 miles of proposed disturbance sites.	March 1 - mid-May.	Operators, BLM
APD-stage greater sage-grouse lek avoidance on areas within 2.0 miles of a lek.	March 1 - June 30.	Operators, BLM
APD-stage greater sage-grouse lek avoidance on areas within 0.25 mile of a lek.	Year-long.	Operators, BLM
APD-stage greater sage-grouse nest avoidance.	As necessary.	Operators, BLM
APD-stage greater sage-grouse winter habitat avoidance.	As necessary, in appropriate season December-February with adequate snow cover.	Operators, BLM
APD-stage general wildlife avoidance/protection	As necessary.	Operators, BLM, USFWS, WGFD
Big game crucial winter range avoidance.	November 15-April 30.	Operators, BLM

In the event that winter concentration habitat(s) are identified, then construction, drilling, and other activities disruptive to wintering raptors are prohibited during the period of November 15 to April 30 for the protection of winter concentration areas. At this point, winter concentration areas of bald eagles have not been identified; however, this stipulation will apply in the event that an area is identified (USDI-BLM 2000).

2.3.2 Big Game Species

No surface disturbing activities will occur within big game crucial winter range on the DFPA during critical winter periods (November 15 - April 30). 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 crucial winter ranges as designated by the BLM to facilitate exit of big game animals from snow-plowed roads. Additional habitat protection/improvement measures may

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also be applied in any given year as directed by the BLM, in consultation with operators and other agencies, and specified in annual wildlife reports.

Increased human access within the DFPA may lead to increased poaching of big game animals. Potential increases in poaching may be reduced through employee and contractor awareness/education regarding wildlife laws. If violations are discovered on the DFPA Operators will immediately notify the WGFD, and if the violation is committed by an employee or contractor, said employee or contractor will be disciplined and may be dismissed by the Operator and/or prosecuted by the WGFD and/or USFWS (USDI-BLM 2000).

2.3.3 Threatened, Endangered, Proposed, and Candidate Species

USFWS consultation and coordination will be conducted for all protection activities relating to TEP&C 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) will be followed.

2.3.3.1 Black-footed Ferret

In general, all prairie dog colonies on the DFPA will be avoided, where practical. If prairie dog colonies of sufficient size and burrow density for black-footed ferrets are scheduled to be disturbed, then black-footed ferret surveys of those colonies will be conducted pursuant to BLM and/or USFWS decisions made during informal consultations. Survey protocol will adhere to USFWS guidelines as established by the USFWS (1989) in consultation with the BLM, and will be conducted by the BLM or a USFWS-qualified, BLM-approved biologist, a maximum of one year in advance of the proposed disturbance. Reports identifying survey methods and results will be prepared and submitted to the BLM in accordance with Section 7 of the Endangered Species Act of 1973, as amended, and the Interagency Cooperation Regulations. Surveys will be financed by Operators.

If black-footed ferrets are found on the DFPA, the BLM will be notified immediately and consultation with the USFWS will be initiated to develop strategies that ensure no adverse effects to the species occur. At this point, all activities will be stopped and before ground-disturbing activities are re-initiated in black-footed ferret habitat, authorization to proceed must be received from the BLM, in consultation with the USFWS (USDI-BLM 2000).

2.3.3.2 Bald Eagle

No surface disturbing activities are permitted between February 1 and July 31 within 1 mile of bald eagle nests (see section 2.3.1). Although there are not any identified bald eagle nests located within the DFPA, or a 1-mile buffer, the timing stipulation applies to all raptor nests and in the event that a bald eagle nest is identified in the project area, then it would be protected.

2.3.3.3 Colorado Pikeminnow, Bonytail, Humpback Chub, and Razorback Sucker

If any proposed development will lead to water depletions (consumption) in the Colorado River system, then formal consultation with the USFWS will occur to reduce impacts to these species.

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2.3.3.4 Mountain Plover

Mountain plover habitats (e.g., cushion plant communities, playa lakes, flat areas with vegetation <4 inches in height) will be avoided where practical, and where these habitats will be disturbed, reclamation will utilize procedures designed to reestablish suitable plover habitat. No surface disturbing activities will be conducted within suitable mountain plover habitat on the DFPA during the breeding and nesting periods between April 10 and July 10. Additional protection measures listed in Addendum E-2 will be attached to individual APD's and ROW's, for those projects that include well pads, access roads, and reserve pits that occur in occupied habitat areas.

Exceptions to construct during the timing stipulation period may be granted provided that the *Mountain Plover Survey Guidelines U.S. Fish and Wildlife Service March 2002* are followed. If an active mountain plover nest is observed within survey areas, planned development activities will be delayed at least 37 days or one week post-hatching. If a brood of flightless chicks is discovered, planned activities will be delayed at least seven days.

2.3.3.5 Yellow-billed Cuckoo

There have not been any yellow-billed cuckoos inventoried and/or monitored within the DFPA at this time. The species basically inhabits riparian zones west of the Continental Divide, and, apart from Sand Creek during high flows, there are not any perennial streams located within the DFPA. It is highly unlikely that this species is present within this project area; however, if information shows that the birds may be present then the Review Team may make recommendations to the BLM, and/or the BLM may identify potential mitigation that may be required to protect this species. Standard operating procedures prohibit the construction of well sites, access roads, and pipelines within 500 feet of surface water and/or riparian areas. This would protect any existing yellow-billed cuckoo habitat.

2.3.4 BLM Wyoming State Director's Sensitive Species

The BLM's management authority for sensitive species is not as specifically structured as for proposed, listed, threatened, or endangered species. The management mandate is less regulatory, and more administrative and generic for sensitive species, than for proposed or listed species in the sense that the BLM is NOT required to:

1. Participate in the development of formal recovery plans or critical habitat designations for sensitive species, although the BLM can participate in conservation plans/agreements.
2. Enter into ESA Section 7 consultation in Federal actions, although the BLM can request technical assistance from the USFWS, or other entities.
3. Be concerned with the "take" provisions of biological opinions, or the prohibition of Section 9 of the ESA.

The BLM's posture toward management of sensitive species will be more collaborative and derived, and less directive than for proposed or listed species. The management of these species should be viewed as an opportunity to practice proactive conservation; however, the management of these species should not be onerous or a "show-stopper" of other legitimate, multiple use activities (USDI-BLM, 2001).

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If, during surveys of areas where proposed projects are identified, nests or other crucial habitat for any sensitive species identified in Table E-4 are found, avoidance of these features will be accomplished in consultation and coordination with the BLM and USFWS. Construction activities in these areas will be curtailed until there is concurrence between the BLM and USFWS on what activities can be authorized. Activities will, in most cases, 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, WGF, USFWS) identifies a potential for impacts to any sensitive species, additional measures may be implemented as specified in annual reports.

2.3.4.1 Greater Sage-grouse

An 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 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 are prohibited during the period of November 15 to April 30 for the protection of winter concentration areas (USDI-BLM 2000).

2.3.4.2 Ferruginous Hawk, Peregrine Falcon, and Burrowing Owl

The protection protocol generally will be as described for raptors (see Section 2.3.1). Additional measures will be applied on a species- or site-specific basis, as deemed appropriate by the USFWS and/or BLM and specified in conditions of approval for individual APD's/ROW's. 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.

2.3.5 General Wildlife

Unless otherwise indicated, the following protection measures will be applied for all wildlife species. Additional measures primarily designed to minimize impacts to other DFPA 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 area wildlife. Additional actions may be applied in any given year to further minimize potential impacts to wildlife. These actions will be specified in annual reports.

All roads on and adjacent to the DFPA that are required for the proposed project will be appropriately constructed, improved, maintained, and signed to minimize potential wildlife/vehicle collisions and facilitate wildlife (most notably big game) movement through the DFPA. Appropriate speed limits will be adhered to on all DFPA roads, and Operators will advise employees and contractors regarding these speed limits.

To protect important habitat in areas with sagebrush greater than three feet tall, projects will be placed to avoid this habitat where possible. Additional non-species specific wildlife mitigation includes the following:

1. Reserve, work-over, and flare pits and other locations potentially hazardous to wildlife will be adequately protected by netting and/or fencing as directed by the BLM to prohibit wildlife access.

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2. No surface water or shallow ground water in connection with surface water will be utilized for the proposed project.
3. If dead or injured raptors, big game, migratory birds, or unusual wildlife are observed on the DFPA, Operator personnel will contact the appropriate BLM and WGFD offices. Under no circumstances will dead or injured wildlife be approached or handled by Operator personnel.
4. Operators will implement policies designed to control poaching and littering and will notify all employees (contract and company) that conviction of a major violation could result in disciplinary action. Contractors will be informed that any intentional game law violation or littering within the DFPA could result in dismissal.

Additional project- and site-specific measures may be added in future years as specified in annual reports.

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3.0 LITERATURE CITED

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**ADDENDUM E-1
EXAMPLE DATA SUMMARY TABLES AND FORMS**

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RAPTOR NEST DESCRIPTION

DFPA

Species _____ Nest ID _____

Legal Location: T _____ N: R _____ W Sec _____ 1/4 of _____ 1/4 of _____ 1/4

GPS Coordinate: E _____ N _____ (UTM NAD 27)

Nest:

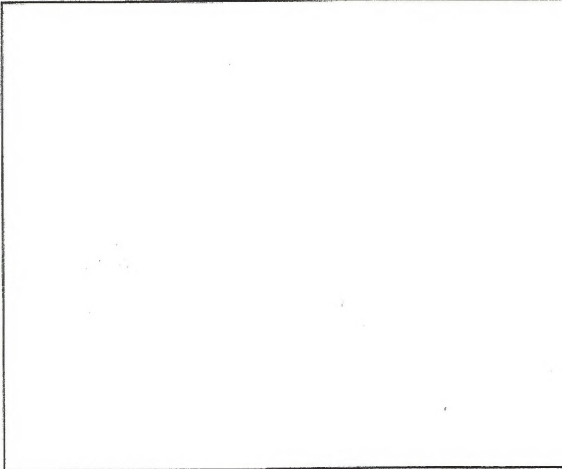
Substrate _____ Aspect of Substrate/Nest _____

Height of Substrate _____ Height of Nest Above Ground _____

Elevation _____

Habitat Description/Comments _____

USGS Quad



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Black-Footed Ferret Nocturnal Survey

DFPA

Project _____ Survey No. _____ of _____
 Observers _____ Date _____ 20____
 Survey Method _____ Prairie Dog Town Number(s) _____
 Legal Location: Township _____ N Range _____ W Sec(s) _____
 Prairie Dog Species _____ Start _____ End _____
 Length of Survey Route (miles) _____ Time _____
 Area Searched (acres) _____ Temperature _____
 No. of Runs _____ Length of Run (hrs) _____ Wind _____
 USGS Quad(s) _____ % Cloud Cover _____

Ferret Observations: (Include detailed location/GPS coordinates for each)

Ferret Sighting _____
 Ferret Sign _____
 Sign Collected _____
 Unidentified Green Eye-Shine _____
 Photos Taken/Comments _____

<u>Potential Prey Species</u>	<u>Number Observed (circle each run)</u>	<u>Other Sign</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

<u>Other Predator Species</u>	<u>Number Observed (circle each run)</u>	<u>Other Sign</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

<u>Other Wildlife Species</u>	<u>Number Observed (circle each run)</u>	<u>Other Sign</u>
_____	_____	_____
_____	_____	_____

Daylight Burrow Inspection: Time: _____ - _____ Area Searched (acres) _____
 Location Searched _____ No. of Burrows Inspected: _____
 Comments: _____

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SAGE GROUSE LEK DESCRIPTION DFPA

Lek ID _____

Legal Location: T _____ N : R _____ W Sec _____ 1/4 of _____ 1/4 of _____ 1/4

GPS Coordinate: E _____ N _____ (UTM NAD 27)

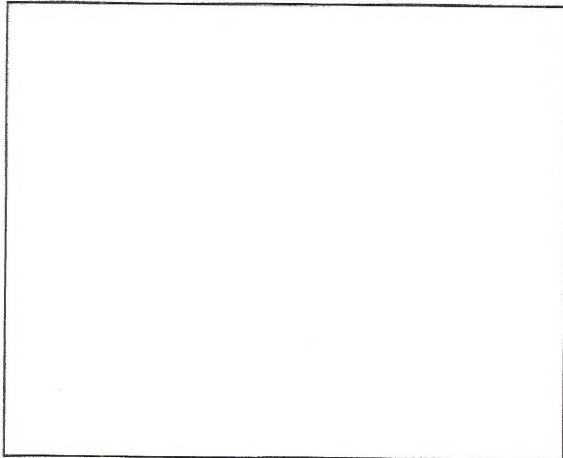
Site Description:

Habitat Type _____ Slope _____

Topography _____ Elevation _____

Comments _____

USGS Quad



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ADDENDUM E-2
MOUNTAIN PLOVER ADDITIONAL STIPULATIONS

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ADDENDUM E-2

Some of the following mountain plover protection measures may be implemented if mountain plover "occupied habitat areas" are disturbed:

1. To protect the identified mountain plover occupied habitat area, the proposed activity would not be allowed as proposed. An alternative such as moving the facility, directional drilling, piping and storage of condensate off the identified mountain plover occupied habitat area to a centralized facility, or other technique for the minimization of ground disturbance and habitat degradation would be required.
2. To protect the identified mountain plover occupied habitat area, the proposed facility would be moved ½ mile from the identified occupied habitat area.
3. To protect the identified mountain plover occupied habitat area and because mountain plover adults and broods may forage along roads during the night, traffic speed and traffic volume would be limited during night-time hours from April 10 to July 10.
4. Within ½ mile of the identified mountain plover occupied habitat area, speed limits would be posted at 25 mph on resource roads and 35 mph on local roads during the brood rearing period (June 1 - July 10).
5. The access road would be realigned to avoid the identified mountain plover occupied habitat area.
6. To protect the identified mountain plover occupied habitat area, traffic would be minimized from June 1 - July 10 by car-pooling and organizing work activities to minimize trips on roads within ½ mile of the mountain plover occupied habitat area.
7. To protect the identified mountain plover occupied habitat area, work schedules and shift changes would be modified from June 1 - July 10 to avoid the periods of activity from ½ hour after sunset to ½ hour before sunrise.
8. To protect the identified mountain plover occupied habitat area, fences, storage tanks, and other elevated structures would be either constructed as low as possible and/or would incorporate perch-inhibitors into their design.
9. Road-killed animals would be promptly removed from areas within ½ mile of the identified mountain plover occupied habitat area.
10. To protect the identified mountain plover occupied habitat area, seed mixes and application rates for reclamation would be designed to produce stands of sparse, low-growing vegetation suitable for plover nesting.
11. To minimize destruction of nests and disturbance to breeding mountain plovers, no reclamation activities or other ground-disturbing activities would occur from April 10 - July 10 unless surveys consistent with the Plover Guidelines or other FWS approved method find that no plovers are nesting in the area.

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12. A plugged and abandoned well within ½ mile of the identified mountain plover occupied habitat area would be identified with a marker 4 feet tall with a perch inhibitor on the top of the marker.

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ADDENDUM E-3

**WYOMING BLM STATE DIRECTOR'S SENSITIVE SPECIES LIST AND
INSTRUCTION MEMORANDUM**

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BLM Wyoming Sensitive Species Policy and List

April 9, 2001

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

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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

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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.

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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)**

April, 2001

Species Common Name	Scientific Name	Habitat	Designation and Ranking of others: WY Natural History Program, Forest Service (FS) Regions 2 and 4, Wyoming Game and Fish (WYGS), BLM status and others?	Occurrence by BLM Field Office ¹										
				WYO	CYD	RFO	RSFO	LFO	CTO	DFO	NFO	KFO	PFO	
MAMMALS														
Shrew, Dwarf	<i>Sorex nanus</i>	Mountain foothill shrub, grasslands	G4S2S1, FSR2, NSS3, UT	X	X	X	X	X	X	X			X	X
Myrtle, Long-eared	<i>Myotis evotis</i>	Canyons and deciduous forests, caves and mines	G4S51B, S11N, NSS2, ID, OR/WA, AZ	X	X	X	X	X	X	X	X	X	X	X
Myotis, Fringed	<i>Myotis blythianus</i>	Conifer forests, woodlands-chaparral, caves and mine	G5S11B, S11N, FSR2, TBNG, NSS2, ID, UT, MT, OR/WA, AZ			X	X		X	X	X			
Ilat, Spotted	<i>Eutamias maculatus</i>	C 1/10s ever potential woods, basin-grass shrub	G4S11B, S27N, FSR2, FSR4, NSS2, ID, CO, UT, MT, OR/WA, AZ	X	X		X	X	X	X				
Ilat, Townsend's Big-eared	<i>Corynorhinus townsendii</i>	Forests, basin-grass shrub, caves and mine	G4S11B, S21N, FSR2, TBNG, FSR4, NSS2, ID, CO, UT, MT, OR/WA	X	X	X	X	X	X	X				
Rabbit, Pygmy	<i>Brachylagus idahoensis</i>	Basin-grass and riparian shrub	G4S2, NSS3, ID, MT, OR/WA, RUCN LR(n)				X						X	X
Prairie Dog, White-tailed	<i>Cynomys ludovicianus</i>	Basin-grass shrub, grasslands	G4S2S3, NSS3, MT	X	X	X	X	X	X	X			X	X
Pocket Gopher, Wyoming	<i>Thomomys talpoides</i>	Meadows with loose soil	G2/S1S2, NSS4, FSR2			X	X							
Pocket Gopher, Idaho	<i>Thomomys talpoides</i>	Shallow stony soils	G4S27, NSS3, RUCN-LR(n)				X						X	X
Fox, Swift	<i>Vulpes velox</i>	Grasslands	Removed from Federal Candidate list 01/03/01	X	X	X	X	X	X	X	X	X		
BIRDS														

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 (WGS), BLM status and others ¹	Occurrence by BLM Field Office ²										
				WFO	CYFO	RFO	RSFO	LFO	CFD	HFO	NFO	KFO	FTO	
Ibis, White-faced	<i>Plegadis chlois</i>	Marshes, wet meadows	G5/S1B, S2N, FSR2, TBNG, NSS3, UT, MT, CO, AZ	X	X	X	X	X	X	X	X	X	X	X
Swan, Trumpeter	<i>Cygnus buccinator</i>	Lakes, ponds, rivers	G4/S1B, S2N, FSR2, TBNG, FSR4, NSS2, ID, MT	X	X	X	X	X	X	X	X	X	X	X
Goshawk, Northern	<i>Accipiter gentilis</i>	Conifer and deciduous forests	G5/S2B, S0N, FSR2, TBNG, FSR4, NSS4, ID, CO, UT, MT	X	X	X	X	X	X	X	X	X	X	X
Hawk, Ferruginous	<i>Buteo regalis</i>	Basin-prairie shrub, grassland, rock outcrops	G4/S3B, S3N, FSR2, TBNG, NSS3, ID, CO, MT	X	X	X	X	X	X	X	X	X	X	X
Falcon, Peregrine	<i>Falco peregrinus</i>	Tall cliffs	G4/T3/S1B, S2N, FSR2, TBNG, NSS3, UT	X	X	X	X	X	X	X			X	X
Sage-grouse, Greater	<i>Crotophaga sulphurata</i>	Basin-prairie shrub, mountain- foothill shrub	G5/S3, TBNG, ID, CO, UT	X	X	X	X	N	X	X	X	X	X	X
Grouse, Columbian Sharp- tailed	<i>Tympanuchus phasianus columbianus</i>	Grasslands	G4/T3/S1, FSR2, FSR4, ID, CO, UT, MT			X								
Cuckoo, Long- billed	<i>Nannulus americanus</i>	Grasslands, plains, foothills, wet meadows	G5/S3B, S2N, FSR2, TBNG, NSS3, ID, CO, UT, MT	X	X	X	X	X	X	X	X	X	X	X
Cuckoo, Yellow- billed	<i>Coccyus americanus</i>	Open woodlands, riparian willow and alder groves	G5/S2B, S2N, FSR2, TBNG, NSS2, UT, ID, Petroleum	X	X	X	X	X	X	X	X	X	X	X
Owl, Barnowing	<i>Athene noctularis</i>	Grasslands, basin-prairie shrub	G4/S3B, S2N, FSR2, TBNG, NSS4, ID, MT, AZ	X	X	X	X	X	X	X	X	X	X	X
Thrush, Sage	<i>Oreoscoptes montanus</i>	Basin-prairie shrub, mountain- foothill shrub	G5/S3B, S2N, P1F Priority	X	X	X	X	X	X	X	X	X	X	X
Shrike, Loggerhead	<i>Lanius lucidicinctus</i>	Basin-prairie shrub, mountain- foothill shrub	G5/S4B, S2N, FSR2, TBNG, ID, MT, AZ	X	X	X	X	X	X	X	X	X	X	X
Sparrow, Brewer's	<i>Spizella breweri</i>	Basin-prairie shrub	G5/S3B, S2N, TBNG, P1F Priority, ID	X	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 (WYGF), BLM states and others ¹	Occurrence by BLM Field Office ²										
				WFO	CYFO	RFO	RSFO	LFO	CFO	BFO	NFO	KFO	PEO	
Sparrow, Sage	<i>Amphispiza bifasciata</i>	Basin-prairie shrub, mountain- foothill shrub	G3/S3B, SZN, PIF Priority, ID, MT	X	X	X	X	X	X	X	X	X	X	X
Sparrow, Baird's	<i>Ammodramus bairdi</i>	Grasslands, woody fields	G4/S1B, SZN, FSR2, TBNG, MT	X	X	X		X	X	X	X			
FISH														
Chub, Roundtail	<i>Gila robusta</i>	CO River drainage, mostly large rivers, also streams and lakes	G3G/S27, NSS1, CO, UT			X	X						X	X
Chub, Leatheride	<i>Gila cypei</i>	Bear, Snake and Green drainages, clear, cool streams and pools	G3G4/S2, NSS1, ID, UT				X						X	X
Sucker, Blothead	<i>Catostomus dactyloides</i>	Bear, Snake and Green drainages, all waters	G4/S23, NSS9, CO, UT			X	X						X	X
Sucker, Jumminmouth	<i>Catostomus fasciatus</i>	CO River drainage, large rivers, streams and lakes	G3G4/S3, NSS1, CO, UT			X	X						X	X
Trout, Yellowstone Cutthroat	<i>Oncorhynchus clarki bouvieri</i>	Yellowstone drainage, small mountain streams and large rivers	G4T/S1, FSR2, NSS3, ID, MT	X	X			X		X				X
Trout, Colorado River Cutthroat	<i>Oncorhynchus clarki pleuriticus</i>	CO River drainage, clear mountain streams	G4T2/S2, FSR2, FSR4, NSS2, CU, UT, Petitioned			X	X						X	X
Trout, Bonneville Cutthroat	<i>Oncorhynchus clarki utah</i>	Bear R. drainage, clear mountain streams	G4T2/S1S2, NSS2, FSR4, ID, UT, Petitioned										X	
Trout, Fine- spined Snake River Cutthroat	<i>Oncorhynchus clarki zpp</i>	Snake R. drainage, clear, fast water	G4T1T2/S1, NSS4, FSR4, Petitioned										X	X
REPTILES														
Rattlesnake, Midget Faded	<i>Crotalus viridis concolor</i>	Mountain foothills shrub, rock outcrop	G5T3/S1S2, CO				X							
AMPHIBIANS														
Frog, Northern Leopard	<i>Rana pipiens</i>	Beaver ponds, permanent water in plains and foothills	G5/S3, FSR3, TBNG, NSS4, CU, ID, MT	X	X	X	X	X	X	X	X	X	X	X
Spadefoot, Great Basin	<i>Spea intermontana</i>	Spring seeps, permanent and temporary waters	G5/S1, NSS4, CO			X	X	X					X	

Species Common Name	Scientific Name	Habitat	Designations and Ranking of status: WY National Heritage Program, Forest Service (FS) Regions 2 and 4; Wyoming Game and Fish (NSG), BLM status and others?	Occurrence by BLM Field Office ²										
				WFO	CYFO	RFO	RSFO	LFO	CFO	HRFO	NFO	KFO	PPFO	
Toad, Boreal (Northern Rocky Mountains population)	<i>Rana boreas boreas</i>	Pond margins, wet meadows, riparian areas	G4F4S2, NSS2, FSR2, FSR4, UT, 3D		X	X	X	X					X	X
Frog, Spotted	<i>Rana pretiosa (hololeucis)</i>	Ponds, sloughs, small streams	G4S2S3, FSR2, FSR4, NSS4, ID, UT, MT		X		X	X		X			X	X
PLANTS														
Meadow Pussytoes	<i>Antennaria arcuata</i>	Moist, hummocky meadows, seeps or springs surrounded by sage/grasslands 4,950-7,900'	G2S2				X	X						X
Laraine Columbine	<i>Aquilegia forsterensis</i>	Crevices of granite boulders & cliffs 6,400-8,000'	G2/S2, FSR2			X			?					
Small Rock Cress	<i>Arabis pusilla</i>	Cracks/crevices in sparsely vegetated granite/pegmatite outcrops within sage/grasslands 8,200-9,100'	G1/S1 Resurvey from Federal Candidate list 10/25/99				X							
Mystery Wormwood	<i>Artemisia biennis var. diffusa</i>	Clay flats & playas 6,500'	G5T1/S1						r					
Porter's Sagebrush	<i>Artemisia porterii</i>	Sparsely vegetated badlands of ashy or tuffaceous mudstone & clay slopes 5,200-6,500'	G2S2					X	X	X				
Dobson Milkvech	<i>Astragalus gibbiflorus var. purpureus</i>	Barren shale, badlands, limestone, & redbed slopes & ridges 6,900- 8,800'	G5T2/S2					X						
Hoytville Milkvech	<i>Astragalus jeffersonii var. arcticus</i>	Sparsely vegetated stony ridges & barren red clay slopes 4,900-5,900'	G3T1/S1	X										
Nelson's Milkvech	<i>Astragalus suffocatus - or - Astragalus pedunculatus var. plumbyellus</i>	Alkaline clay flats, shale bluffs and gullies, rocky slopes, and volcanic cinders in sparsely vegetated sagebrush, juniper, & cushion plant communities at 5200-7600'	G2S2, CO			X	X	X	X					
Tschida's Milkvech	<i>Astragalus saccatus var. treleasei</i>	Sparsely vegetated sagebrush communities on shale or limestone outcrops & barren clay slopes at 6500-8200'	G5T2/S1										X	X

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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 (WGS), BLM states and others ¹	Occurrence by BLM Field Office ²											
				WFO	CYFO	RFO	RSFO	LFO	CFO	BFO	NW3	KFO	PEU		
Prairie Milkvech	<i>Astragalus pseudohispidus</i>	Cushion plant communities on sandy, clay soils mixed with shale on summits & slopes of white shale hills 6,800-7,200'	G1/S1				X								
Cedar Rim Thistle	<i>Cirsium aridum</i>	Barren, rocky hills, gravelly slopes, & fine textured, sandy- shaly dunes 6,700-7,200'	G2Q/S2			X	X	X							X
Owsbey's Thistle	<i>Cirsium owsbeyi</i>	Sparsely vegetated shaly slopes in sage & juniper communities 6,400- 5,400'	G3/S2				X								
Many-stemmed Spider-flower	<i>Chourea multiflora</i>	Semi-arid, open saline banks of shallow ponds & lakes with haloph msh & bebrush 5,900'	G2G3/S1						X						
Owl Creek Miner's Candle	<i>Cryptantha insuberosa</i>	Sandy-gravelly slopes & desert ridges on sandstones of the Winds River Formation 4,700-6,000'	G1/S1					X							
Liver's Wafer- Parasit	<i>Cynopterus evetii</i>	Coarse volcanic soils or sandstone outcrops dominated by cushion plants or sparse shrublands in openings within Rocky Mtn juniper or Limber pine woodlands at 5,500- 10,900'	G2G3/S2/S3	?	X										
Williams' Wafer- Parasit	<i>Cynopterus williamsii</i>	Open ridgtops & upper slopes with exposed limestone outcrops or rockshales 6,800-8,300'	G3/S3	X					X	X					
Wyoming Tansymistad	<i>Dactyloctenium torulosa</i>	Sparsely vegetated sandy slopes at base of cliffs of volcanic breccia or sandstone 8,300-10,000'	G1/S1				X								
Weber's Scarab- Cilia	<i>Ipomopsis aggregata</i> sp. <i>weberi</i>	Openings in coniferous forests & scrub oak woodlands 4,500-9,600'	G5T12Q/S1, FSR2			X									
Entire-Leaved Peppergress	<i>Lepidium integrifolium</i> var. <i>integrifolium</i>	WY poplms occur in sparsely vegetated and seasonally wet clay flats, grasswood communities on clay hummocks, and moist alkaline meadows at 6,200-6,770'	G2T1/S1											X	

Species Common Name	Scientific Name	Habitat	Designation and Ranking of species: WY Natural Heritage Program, Forest Service (FS) Region 2 and 4, Wyoming Game and Fish (WYG), BLM states and others ¹	Occurrence by BLM Field Office ²										
				WFO	CFTO	RFO	BSFO	LEO	CFO	WFO	NWU	KTO	PFO	
Sidesaddle Bladderpod	<i>Lesquerella urens</i> var. <i>griffithii</i>	Dry, open rock outcrops of gravel, shale, or limestone & barren, silica schistiferous, mudslides 4,200-4,300'	G1/S1										X	
Fremont Bladderpod	<i>Lesquerella fremontii</i>	Rocky limestone slopes & ridges 7,800-9,800'	G2/S2					X						
Large-fruited Bladderpod	<i>Lesquerella macrocarpa</i>	Gypsum-clay hills & benches, clay flats, & barren hills 7,200-7,700'	G2/S2				X						X	X
Western Bladderpod	<i>Lesquerella multiceps</i>	Dry, gravelly limestone ridges & slopes in sparse grasslands or cushion plant communities at 8,300-8,600'	G3/S1										?	
Frustrate Bladderpod	<i>Lesquerella pratensis</i>	Cushion plant or sparse sage grassland communities on slopes and fans of whitish to reddish or gray limsy clays & soft sandstones with a surface layer of fine gravel at elevations of 7,200-7,700'	G3/S1										X	
Absaroka Beardtongue	<i>Pentstemon absarokensis</i>	Sparsely vegetated openings on steep slopes of loose volcanic rubble or outcrops of dry andesitic volcanic rock at 5,920-10,800'	G2/S2		X									
Sierrita Beardtongue	<i>Pentstemon occultus</i> var. <i>occultus</i>	Cushion plant or black sage grassland communities on semi- barren rocky ridges, knolls, & slopes at 5,900-8,200'	G1/S1				X							
Cary Beardtongue	<i>Pentstemon caryi</i>	Calcareous rock outcrops & rocky soil w/in sage, juniper, Doug-fir, & lumber pine communities 5,200- 8,500'	G1/S2, FSR2	X	X					X				
Gibbens ³ Beardtongue	<i>Pentstemon gibbensii</i>	Sparsely vegetated shale or sandy- clay slopes 5,300-7,700'	G4/S1			X								
Beaver Rim Phlox	<i>Phlox progenit</i>	Sparsely vegetated slopes on sandstone, siltstone, or limestone substrates 6,000-7,400'	G2/S2				X	X					X	X
Tufted Twinpod	<i>Physaria cruciformis</i>	Sparsely vegetated shale slopes & ridges 6,500-7,000'	G2/S2				X						X	X

APPENDIX E: WILDLIFE MONITORING PLAN

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 (WYG), BLM states and others ¹	Occurrence by BLM Field Office ²											
				WFO	CYFO	RFO	RSFO	LFO	CFO	BFO	NFO	KFO	PFQ		
Duck's Twispod	<i>Physaria thurii</i>	Dry, calcareous-silty soils on slopes & ridges w/mountain mahogany & subshrubs 4,500-7,200'	G1/S1											X	
Rocky Mountain Twispod	<i>Physaria sylvianiana</i> var. <i>arborescens</i>	Sparsely vegetated rocky slopes of limestone, sandstone or clay 5,600-8,300'	G1T2/S2	X				X							
Persistent Sepal Yellowcress	<i>Rorippa calycina</i>	Riverbanks & shorelines, usu on sandy soils near high-1PO line	G3/S2S3	X	X	X		X							
Shoshonea	<i>Shoshonea pubescens</i>	Shallow, stony calcareous soils of exposed limestone outcrops, ridgestops, & talus slopes 5,900-9,200'	G2G3/S2		X			?							
Pale Blue-eyed Grass	<i>Styriachnium pulchrum</i>	Wet meadows, stream banks, roadside ditches, & irrigated meadows 7,000-7,900'	G2G3/S2S3			X									
Laramie False Sagebrush	<i>Sphaeromeria simplex</i>	Cushion plant communities on rocky limestone ridges & gentle slopes 7,500-8,600'	G2/S2			X			X						
Green River Greenhead	<i>Thelesperma capillatum</i>	White shale slopes & ridges of Green River Formation 4,300'	G1/S1				X								
Utah Greenhead	<i>Thelesperma pubescens</i>	Sparsely vegetated benches & ridges on coarse, cobbly soils of Bishop Conglomerate 8,200-8,900'	G1/S1				X								
Cedar Mtn. Brassic Daisy	<i>Townsendia microcephala</i>	Rocky slopes of Bishop Conglomerate 8,500'	G1/S1				X								
Barnaby's Clover	<i>Trifolium barnabyi</i>	Ledges, crevices, & seams on reddish-orange Nugget Sandstone outcrops 5,600-6,700'	G1/S1					X							
TOTALS			78 species statewide	28	29	37	48	37	28	26	18	37	34		

I Rankings**Heritage Program**

WYNO 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 range-wide status of a species.
- T Threatened rank: Rank refers to the range-wide 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 6-50 occurrences) or because of factors (demography) 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 Domestically 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 rarity: A state rank assigned indicating the eliteness of a migratory species during the breeding season (used mostly for migratory birds and bats)
- N Nonbreeding rarity: A state rank modifier indicating the status of a migratory species during the non-breeding season (used mostly for migratory birds and bats)
- ZH or ZB Taxa that are not of significant concern in Wyoming during breeding (ZH) or non breeding (ZB) 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.
- 7 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 species 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 no population 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 populations trends are thought to be stable.

Forest Service

Region 2 - Rocky Mountain Region

Region 4 - Intermountain Region

TSNG - Thunder Basin National Grassland

Other BLM states

AZ Arizona
 CO Colorado
 ID Idaho
 MT Montana
 ORWA Oregon/Washington
 UT Utah

IUCN - International Union for Conservation of Nature, Redlist 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

Permitted- Species which has been petitioned for listing under the Endangered Species Act

3 Occurrence by BLM Field Office

WFO Wetland

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 Private Land Ownership

S - Indicates occurrence within BLM Field Office area on State Land Ownership

F - Indicates occurrence within BLM Field Office area on other Federal Land Ownership

? - Indicates likely occurrence within BLM Field Office area



APPENDIX F

**FORMAL AND INFORMAL CONSULTATION FOR THE
DESOLATION FLATS PROJECT**





United States Department of the Interior

FISH AND WILDLIFE SERVICE


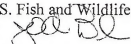
Ecological Services
4000 Airport Parkway
Cheyenne, Wyoming 82001

FM	<input checked="" type="checkbox"/>	FMFO	<input type="checkbox"/>
AFM-SC	<input checked="" type="checkbox"/>	RIDC	<input type="checkbox"/>
AFM-RES	<input checked="" type="checkbox"/>	P.L.RES	<input type="checkbox"/>
AFM-M&L	<input checked="" type="checkbox"/>	LEO	<input type="checkbox"/>
ADMIN	<input type="checkbox"/>	M/E	<input type="checkbox"/>
APR 1 2004			
IRM	<input checked="" type="checkbox"/>	TRNG	<input type="checkbox"/>
NEPA	<input type="checkbox"/>	BUDG	<input type="checkbox"/>
NRS	<input type="checkbox"/>	PAS	<input type="checkbox"/>
March 26, 2004			

In Reply Refer To:
ES-61411/W.02/WY8087

Memorandum

To: Kurt Kotter, Field Manager, Bureau of Land Management, Rawlins Field Office, Rawlins, Wyoming

From:  Brian T. Kelly, Field Supervisor, U.S. Fish and Wildlife Service, Wyoming Field Office, Cheyenne, Wyoming 

Subject: Formal and Informal Consultation for the Desolation Flats Natural Gas Project

Thank you for your letter of February 24, 2004, regarding the proposed Desolation Flats natural gas project located in T13-16N, R93-96W, in Sweetwater County, Wyoming. The project includes 385 natural gas wells and associated facilities in an area where 63 gas wells currently exist. You have requested concurrence for your determination of effects to listed and proposed species from this project pursuant to the Endangered Species Act of 1973, as amended (Act), 16 U.S.C. 1531 *et seq.* The U.S. Fish and Wildlife Service (Service) is providing you with concurrence and comments based on the information you have provided in your letter as well as the biological assessment (BA) included in the *Draft Environmental Impact Statement for the Desolation Flats Natural Gas Field Development Project* (April 2003).

You have stated that two white-tailed prairie dog (*Cynomys leucurus*) complexes have been mapped within the Desolation Flats project area. The complexes total nearly 10,000 acres and may provide habitat for black-footed ferrets (*Mustela nigripes*). As you know, because of recent efforts by the Service, the Wyoming Game and Fish Department and other agencies, several areas where prairie dogs occur in Wyoming have been "block cleared" from survey requirements. Please refer to our attached letter for clarification on this matter.

At this time, prairie dog towns and complexes within the Desolation Flats project area have not been "block cleared" and may warrant surveys pursuant to the *Black-Footed Ferret Survey Guidelines* (April 1989). The Service concurs with your "may affect, but not likely to adversely affect" determination for the black-footed ferret based on your commitment to conduct surveys prior to disturbance. Should a ferret or their sign be observed you have stated that all project related activities would be modified to avoid the respective town or complex and the Service would be notified immediately.

You have stated that the Desolation Flats project area does not provide suitable habitat for Canada lynx (*Lynx canadensis*). However, your letter also states that the project "may affect, but is not likely to adversely affect" the lynx. To clarify your effects determination we contacted Mary Read, wildlife biologist, of your office on March 26, 2004. Ms. Read confirmed that no suitable habitat occurred within, or near the project area. Upon reviewing the potential effects to Canada lynx she believed that there would be "no effect" to the species from this project. The Service's concurrence for a "no effect" determination is not required. However, we appreciate the information the Bureau of Land Management (Bureau) has provided and their extensive review of the species status and potential effects from this project.

You have stated that the Desolation Flats project area does not provide nesting or roosting habitat for the bald eagle (*Haliaeetus leucocephalus*). However, you have indicated that bald eagles may occasionally fly over the project area. Additionally, due to vehicular traffic on project roads, there may be an increase in wildlife-vehicle collisions, perhaps resulting in carrion that may attract bald eagles to feed. The Service concurs with your "may affect, but not likely to adversely affect" determination based on (1) your commitment to implement training for regular project area drivers that will encourage decreased speeds and other measures to avoid collisions with eagles, and (2) encourage immediate removal of carcasses from the right of way. These measures will reduce the bald eagles presence within the project area and minimize potential effects.

Your letter states that the permittee will be allowed to obtain water, for dust abatement, from wells that are not hydrologically connected to the Colorado River System. However, you further state that a third party contractor could mistakenly obtain water from a location that is indeed hydrologically connected to the system. Therefore you have requested formal consultation for your determination of effects to the four endangered fishes of the Colorado River system from water depletions from this project. In accordance with section 7 (a)(2) of the Act, the Service has reviewed the information you have provided regarding the effects. We understand that the proposed action will cause an average annual depletion of 2.30 acre-feet.

A Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program) was initiated on January 22, 1988. The Recovery program was intended to be the reasonable and prudent alternative to avoid jeopardy to the endangered fish by depletions from the Upper Colorado River.

In order to further define and clarify the process in the Recovery Program, a section 7 agreement was implemented on October 15, 1993, by the Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (Plan), which identifies actions currently, believed to be required to recover the endangered fish in the most expeditious manner in the Upper Colorado River Basin.

A part of the Recovery Program was the requirement that if a project was going to result in a depletion, a depletion fee would be paid to help support the Recovery Program. On July 5, 1994, the Service issued a biological opinion determining that the fee for depletions of 100 acre-feet or less would no longer be required. This was based on the premise that the Recovery Program has made sufficient progress to be considered the reasonable and prudent alternative avoiding the

likelihood of jeopardy to the endangered fishes and avoiding destruction or adverse modification of their critical habitat by depletions of 100 acre-feet or less. Therefore, **the depletion fee for this project is waived.**

Permits or other documents authorizing specific projects, which result in depletions, should state that the Bureau of Land Management (Bureau) retains discretionary authority over each project for the purpose of endangered species consultation. If the Recovery Program is unable to implement the Plan in a timely manner, reinitiation of section 7 consultation may be required so that a new reasonable and prudent alternative can be developed by the Service.

This concludes consultation pursuant to the regulations implementing the Act, 50 C.F.R. §402.14 and §402.13. This project should be re-analyzed if new information reveals effects of the action that may affect listed or proposed 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 or proposed 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.

To further the conservation of the bald eagle we recommend that the Bureau contact the Service's Wyoming Field Office at (307) 772-2374 and the Service's Law Enforcement office at (307) 261-6365 in the event that a bald eagle is found injured or dead. We further recommend that any and all electrical power lines be constructed to meet the standards of the Avian Power Line Interaction Committee (APLIC 1996) to protect migratory birds, including eagles.

To further the conservation of prairie dog ecosystems we recommend that the Bureau minimize disturbance within prairie dog towns to protect the many species that depend on these unique areas such as burrowing owls, mountain plovers, black-footed ferrets, ferruginous hawks and the prairie dog themselves.

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.

Enclosures (1)

cc: WGFD, Statewide Habitat Protection Coordinator, Cheyenne (V. Stelter)
WGFD, Non-Game Coordinator, Lander (B. Oakleaf)

References

Avian Power Line Interaction Committee (APLIC). 1996. Suggested Practices for Raptor Protection on Power Lines - The State of the Art in 1996. Edison Electric Institute and the Raptor Research Foundation. Washington, D.C.

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Record of decision,
environmental impact

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