



U.S. Department of the Interior
Bureau of Land Management
Casper Field Office

March 2005



Environmental Assessment for the Cave Gulch Infill Development Project, Natrona County, Wyoming

WY-060-EA05-17





United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Casper Field Office
2987 Prospector Drive
Casper, Wyoming 82604-2968

1790

MAR 18 2005

Dear Reader:

RE: Cave Gulch-Bullfrog-Waltman Infill Natural Gas Project

Enclosed for your review and comment is the Environmental Assessment (EA) for the Cave Gulch Infill Development Project (CGIDP), Natrona County, Wyoming (WY-060-EA05-17). The project area is located in Natrona County, approximately 50 miles west of Casper, Wyoming, and is situated north of the town of Waltman.

Bill Barrett Corporation, Chevron USA Inc., Pogo Producing Company, and Prima Energy Corporation have notified the Casper Field Office (CFO), Bureau of Land Management (BLM), of their intent to continue natural gas exploration and development activities within the boundaries of the Cave Gulch, Bullfrog, and Waltman Fields in western Natrona County, Wyoming. The CFO prepared the *Cave Gulch-Bullfrog-Waltman Natural Gas Development Project Draft Environmental Impact Statement* (Cave Gulch EIS) in 1997 pursuant to the *National Environmental Policy Act of 1969* (NEPA) to analyze the impacts of exploration and development of natural gas within the Cave Gulch-Bullfrog-Waltman project area (Cave Gulch EIS area). The BLM subsequently issued a Final EIS and Record of Decision for the project that approved the drilling of a maximum of 160 wells from 107 new well pads and 24 enlarged existing well pads within the overall Cave Gulch EIS area. The level of surface disturbance originally analyzed in the Cave Gulch EIS has now been reached; however, additional drilling will be required to fully develop known hydrocarbon reserves within the analysis area. To satisfy the requirements of the National Environmental Policy Act, this EA was prepared to analyze potential impacts associated with additional exploration and development of natural gas within the Cave Gulch, Bullfrog, and Waltman Fields.

The Cave Gulch EIS area encompassed approximately 25,093 acres. The CGIDP area for this environmental assessment (EA) would include an additional 1,920 acres (Sections 34, 35, and 36 in Township 36 North [T36N], Range 87 West [R87W]) adjacent to the southwest corner of the original Cave Gulch EIS area, for a total project area of 27,013 acres. The Operators now propose to drill up to 154 additional wells from 110 individual well pads within the CGIDP area over a period of 10 years. Approximately 116 of these wells would be drilled to the Fort Union and Lance Formations, with the majority of the remaining wells drilled to the slightly deeper Cody and Mesaverde Formations.

Additional exploration and development will result in the construction of new roads, well pads, pipelines and water disposal facilities. No additional natural gas compression facilities will be required.

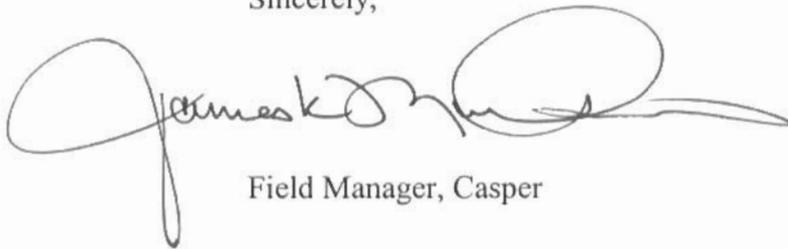
The thirty-day comment period for this EA ends on April 22, 2005. You may submit written comments to Joe Meyer, Project Manager, Bureau of Management, Casper Field Office, 2987 Prospector Drive, Casper, Wyoming, 82604-2986. You may also submit electronic comments to casper_wymail@blm.gov. Please refer to the Cave Gulch Infill Development Project in your comments.

Comments, including names, e-mail addresses, and street addresses of the respondents, will be available for public review and disclosure at the above address during regular business hours (7:45 a.m. to 4:30 p.m.), Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish to withhold your name, e-mail address, or street address from public review or from disclosure under the Freedom of Information Act, you must state this plainly at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

This EA is not the decision document. A decision record detailing the Bureau of Land Management's decision will be prepared and distributed following the end of the thirty-day comment period. The decision on the proposed infill development project will be based upon the analysis in the EA and on public comments. The decision is anticipated to be issued sometime after April 22, 2005.

If you have questions concerning this proposal or if you need additional information, please contact Joe Meyer at the above e-mail address, street address, or by phone at (307) 261-7641.

Sincerely,

A handwritten signature in black ink, appearing to read "James K. Meyer". The signature is fluid and cursive, with a large loop at the beginning and a long horizontal stroke at the end.

Field Manager, Casper

**ENVIRONMENTAL ASSESSMENT FOR
THE CAVE GULCH INFILL DEVELOPMENT PROJECT,
NATRONA COUNTY, WYOMING**

Prepared for

**Bureau of Land Management
Casper Field Office**

By

**Anderson Environmental Consulting
Casper, Wyoming**

and

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Laramie, Wyoming
MAI Project 42556**

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LIST OF ABBREVIATIONS/ACRONYMS USED IN THIS DOCUMENT

°F Degrees	Fahrenheit	HAPs	Hazardous Air Pollutant
µg	Micrograms	hr	Hour(s)
µg/m ³	Micrograms per cubic meter	HUC	Hydrologic Unit Code
AACL	Acceptable Ambient Concentration Level	IDLH	Immediately dangerous to life or health
AAM	Annual arithmetic mean	ID Team	Interdisciplinary Team
ACEC	Area of Critical Environmental Concern	IWAQM	Interagency Workgroup on Air Quality Monitoring
acre-ft	Acre-foot/feet	KCl	Sodium chloride
ANC	Acid-neutralizing capacity	lbs	Pounds
ANS	Artificial nesting structure	LOP	Life-of-project
APD	Application for Permit to Drill	MBBO	Million barrels of oil
AUM	Animal unit month	MEI	Maximally Exposed Individual
BACT	Best Available Central Technology	mi	Mile(s)
BBC	Bill Barrett Corporation	MLE	Most Likely Exposure
BBS	Breeding birds survey	MLA	<i>Mineral Leasing Act</i>
bbl	Barrel(s)	MMBTU	Million British Thermal Units
BLM	Bureau of Land Management	mmscf	Million standard cubic feet
BMP	Best Management Practice	mph	Miles per hour
BNSF	Burlington Northern and Santa Fe Railroad	MSDS	Material Safety Data Sheets
BTU	British thermal unit	NAAQS	National Ambient Air Quality Standards
Byway	South Big Horn/Red Wall Scenic Byway	NEPA	<i>National Environmental Policy Act of 1969</i>
Cave Gulch EIS	<i>Cave Gulch-Bullfrog-Waltman Natural Gas Development Project Draft Environmental Impact Statement</i>	NHPA	<i>National Historic Preservation Act of 1966</i>
Cave Gulch EIS Area	Cave Gulch-Bullfrog-Waltman project area	NO ₂	Nitrogen dioxide
Cave Gulch ROD	Cave Gulch-Bullfrog-Waltman Natural Gas Development Project Record of Decision	NOS	Notice of Staking
CEQ	Council on Environmental Quality	NO _x	Nitrogen oxides
CERCLA	<i>Comprehensive Environmental Response, Compensation, and Liability Act of 1980</i>	NPDES	National Pollutant Discharge Elimination System
CIAA	Cumulative Impact Assessment Area	NRCS	Natural Resource Conservation Service
CFO	Casper Field Office	NRHP	National Register of Historic Places
C.F.R.	<i>Code of Federal Regulations</i>	NWI	National Wetlands Inventory
CGIDP	Cave Gulch Infill Development Project	O ₃	Ozone
CGU	Cave Gulch Unit	Operators	Bill Barrett Corporation, Chevron USA Inc., Pogo Producing Company, and Prima Energy Corporation
CO	Carbon monoxide	OSHA	Occupational Safety and Health Administration
COA	Condition of Approval	PIF	Partners in Flight
COE	U.S. Army Corps of Engineers	P.L.	Public Law
DR	Decision Record	PM _{2.5}	Particulate matter less than 2.5 microns in diameter
EA	Environmental assessment	PM ₁₀	Particulate matter less than 2.5 microns in diameter
EIS	Environmental impact statement	POGO	Pogo Producing Company
EO	<i>Executive Order</i>	R86W	Range 86 West
EPA	Environmental Protection Agency	RCRA	<i>Resource Conservation and Recovery Act</i>
FLPMA	<i>Federal Land Policy and Management Act of 1976</i>	REL	Reference Exposure Level
FONSI	Finding of No Significant Impact	RFC	Reference Concentration for Chronic Inhalation
ft	Foot/feet	RMP	Resource Management Plan
GIS	Geographic Information System	ROD	Record of Decision
GRAA	Greater Cave Gulch Raptor Analysis Area	ROW	Right-of-way
GPS	Global Positioning System	SARA	<i>Superfund Amendments and Reauthorization Act of 1986</i>

LIST OF ABBREVIATIONS/ACRONYMS USED IN THIS DOCUMENT (Continued)

SHPO	State Historic Preservation Office	WAQSR	Wyoming Air Quality Standards and Regulations
SHWD	Solid and Hazardous Waste Division	WEST	Western EcoSystems Technology, Inc.
SO ₂	Sulfur dioxide	WDEQ	Wyoming Department of Environmental Quality
SPCCP	Spill Prevention, Control, and Countermeasure Plan	WDEQ/AQD	Wyoming Department of Environmental Quality/ Air Quality Division
T36N	Township 36 North	WDEQ/LQD	Wyoming Department of Environmental Quality/ Land Quality Division
TCF	Trillion cubic feet	WDEQ/SHWD	Wyoming Department of Environmental Quality/Solid and Hazardous Waste Division
TCLP	Toxicity characteristics leaching procedure	WDEQ/WQD	Wyoming Department of Environmental Quality/ Water Quality Division
TCP	Traditional Cultural Property	WGFD	Wyoming Game and Fish Department
TDS	Total dissolved solids	WNDD	Wyoming Natural Diversity Database
TEPC	Threatened, endangered, proposed, and candidate	WOGCC	Wyoming Oil and Gas Conservation Commission
TPH	Total petroleum hydrocarbons	WRMG	Wyoming Reservoir Management Group
tpy	Tons per year	WTDF	Water Treatment and Disposal Facility
UIC	Underground Injection Control	WUS	Waters of the U.S.
U.S.C.	<i>United States Code</i>		
USDOC	U.S. Department of Commerce		
USFS	U.S. Forest Service		
USFWS	U.S. Fish and Wildlife Service		
USGS	U.S. Geological Service		
VOC	Volatile organic compound		
VRM	Visual Resource Management		
WAAQS	Wyoming Ambient Air Quality Standards		

1.0 PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

Bill Barrett Corporation, Chevron USA Inc., Pogo Producing Company, and Prima Energy Corporation (the Operators) have notified the Casper Field Office (CFO), Bureau of Land Management (BLM), of their intent to continue natural gas exploration and development activities within the boundaries of the Cave Gulch, Bullfrog, and Waltman Fields in western Natrona County, Wyoming, and areas directly adjacent thereto (Figure 1.1), hereinafter referred to as the Cave Gulch Infill Development Project (CGIDP). The CFO prepared the *Cave Gulch-Bullfrog-Waltman Natural Gas Development Project Draft Environmental Impact Statement* (Cave Gulch EIS) (BLM 1997a) pursuant to the *National Environmental Policy Act of 1969* (NEPA) to analyze the impacts of additional exploration and development within the Cave Gulch-Bullfrog-Waltman project area (Cave Gulch EIS area). The BLM subsequently issued a Final EIS (BLM 1997b) and Record of Decision (Cave Gulch ROD) (BLM 1997c) for the project that approved the drilling of a maximum of 160 wells from 107 new well pads and 24 enlarged existing well pads within the overall Cave Gulch EIS area. The level of surface disturbance originally analyzed in the Cave Gulch EIS has now been reached; however, additional drilling will be required to fully develop known hydrocarbon reserves within the analysis area.

The Cave Gulch EIS area encompassed approximately 25,093 acres (see Figure 1.1). The CGIDP area for this environmental assessment (EA) would include an additional 1,920 acres (Sections 34, 35, and 36 in Township 36 North [T36N], Range 87 West [R87W]) adjacent to the southwest corner of the original Cave Gulch EIS area (see Figure 1.1), for a total project area of 27,013 acres. The Operators now propose to drill up to 154 additional wells from 110 individual well pads within the CGIDP area over a 10-year period. Approximately 116 of these wells would be drilled to the Fort Union and Lance formations, with the majority of the remaining wells drilled to the slightly deeper Cody and Mesaverde formations. There is some potential for commercial production from the much-deeper Muddy Formation; however, it is unlikely that any substantial number of wells would be drilled to the Muddy Formation at this time. Much of the additional infill drilling would occur in a “core” area centered in Sections 29, 30, 31, and 32, T37N, R86W (see Figure 1.1) where well spacing would vary from 10 to 20 acres. (Well spacing refers to the density of wells that can be drilled in a given area. Ten-acre spacing means that a well can be drilled every 10 acres, or 64 wells in a 640-acre section. The density does not refer to the surface location where the well is drilled but to the location of the borehole at total depth.) Directional drilling activities would occur in the core area to the extent practicable to reduce surface disturbance.

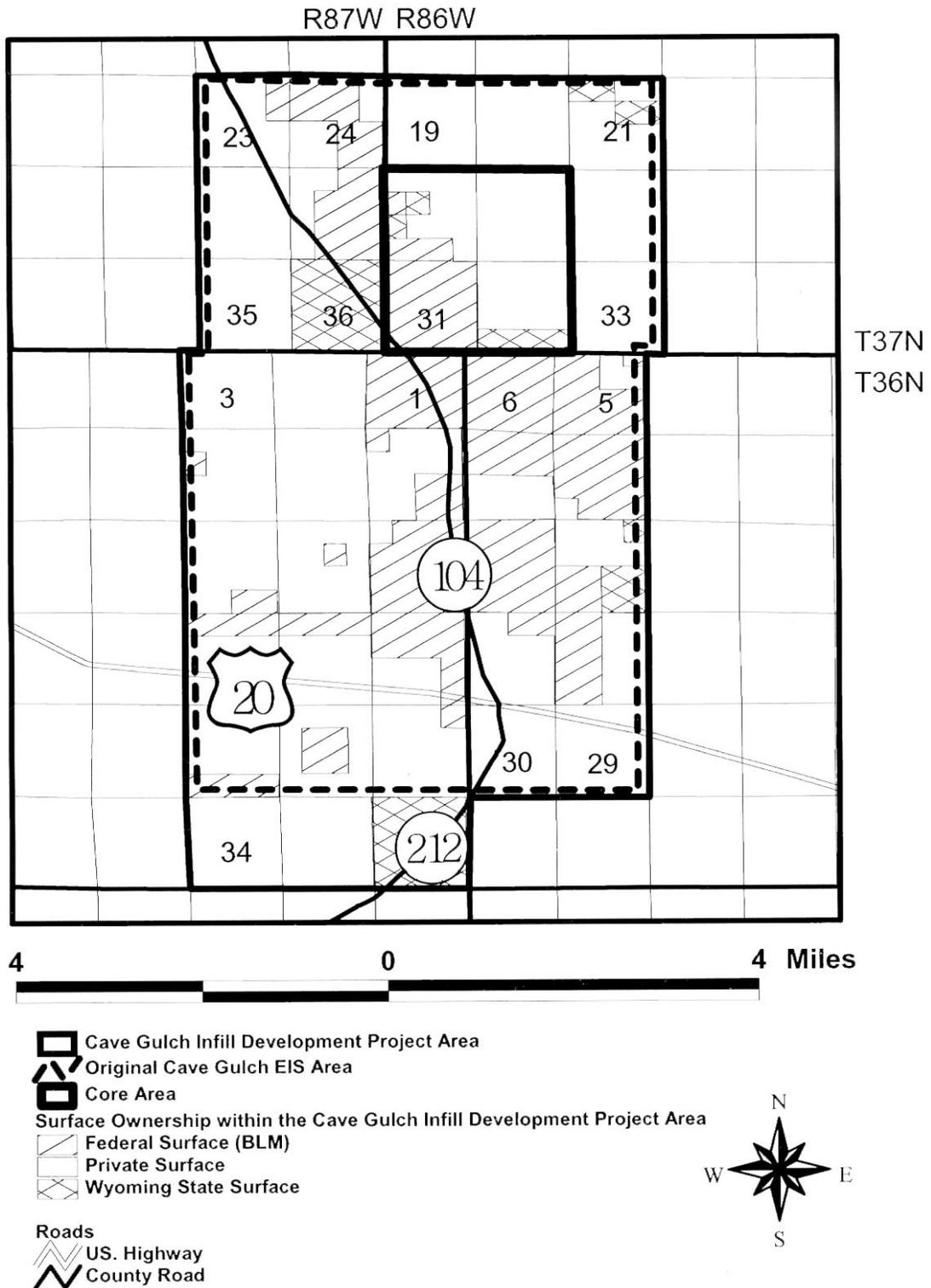


Figure 1.1 The Project Location and Surface Ownership Within the CGIDP Area.

As of January 1, 2004 (the baseline date decided upon at the start of EA preparation), the Operators have permitted 108 of the 160 wells authorized by the Cave Gulch ROD, 98 of which have been drilled. Drilling these 98 wells has resulted in project-related surface disturbance (i.e., well pads, roads, pipelines, etc.) of approximately 789 acres. Continued exploration and development activity within that area will be allowed under the terms and conditions of the Cave Gulch ROD until such time as the maximum number of authorized wells is reached. However, any additional exploration and/or development (drilling) activity within the Cave Gulch EIS area will only be allowed from existing well pads using directional drilling techniques--no new surface disturbance will be allowed pending a additional environmental analysis.

The CGIDP would maximize recovery of natural gas resources within the CGIDP area. BLM's Wyoming Reservoir Management Group (WRMG) has determined that the structural geology of the area is such that most of the individual sandstone bodies in the Lower Fort Union and Lance formations containing natural gas are less than 10 acres in size, and the incremental reserves are large enough to warrant the additional infill-wells proposed herein (WRMG 2004).

The CGIDP would authorize the efficient recovery of federally owned natural gas by the Operators pursuant to their rights under existing oil and gas leases issued by the BLM, thereby preventing the waste of these hydrocarbon reserves. National mineral leasing policies and the regulations by which they are enforced recognize the statutory right of lease holders to develop federal mineral resources in order to meet continuing national needs and economic demands as long as undue and unnecessary environmental degradation is not incurred.

As previously discussed, 108 wells in the Cave Gulch EIS area have been permitted by the Operators. Of these 108 permitted wells, 79 are producing gas wells, eight gas wells are shut-in, 10 wells have been spudded, and one well was drilled and completed as a water injection well. Ten of the permitted wells had not been drilled as of January 1, 2004 (Wyoming Oil and Gas Conservation Commission [WOGCC] 2004a).

Additional exploration and development within the CGIDP area under the Proposed Action would include the following.

- Construction of a maximum of 110 well pads disturbing approximately 398 acres. Of the 398 acres of total disturbance, an estimated 140 acres would be long-term for the life-of-project (LOP) and 258 acres would be short-term (less than 5 years).
 - Construction of approximately 26.5 miles (mi) of new road to provide access to the additional well locations proposed by the Operators. The Operators estimate that there would be approximately 145 acres of total disturbance associated with access roads, 90 acres of which would be LOP disturbance.
 - Installation of approximately 26.5 mi of new buried natural gas and produced water pipelines to gather and transport gas and produced water from those wells approved in this EA to compression (gas) and disposal (water) facilities. These pipelines would be constructed in common corridors directly adjacent to the proposed access roads. Assuming a 30-ft wide disturbed right-of-way (ROW) adjacent to the access road ROW, this would result in approximately 96 acres total surface disturbance, all of which would be reclaimed shortly after disturbance.
 - Construction of up to 16.4 mi of pipeline to transport produced water from existing wells to the Cave Gulch Unit #4 Water Treatment and Disposal Facility. These pipelines would be constructed in common corridors with existing access roads. Assuming a 30-ft wide disturbed ROW adjacent to the access road ROW, this would result in approximately 60 acres of total disturbance, all of which would be reclaimed shortly after disturbance.
 - Development of up to four additional water disposal (injection) wells within the CGIDP area to provide for subsurface disposal of produced water. Total surface disturbance associated with drilling these injection wells would be approximately 13 acres, 5 acres of which would be LOP disturbance. Construction of access roads and water disposal pipelines in conjunction with these injection wells would result in additional disturbance of 33 and 22 acres, respectively, approximately 21 acres of which would be LOP disturbance.
 - Abandonment and reclamation of wells, well pads, access roads, gas collection pipelines, water disposal pipelines, and other associated facilities as appropriate.
-

This infield development project incorporates the Cave Gulch EIS and Cave Gulch ROD (BLM 1997a, 1997b, 1997c) by reference and expands upon those documents as necessary to provide guidance for the implementation of additional development within the CGIDP area. Through interdisciplinary evaluation and review, consideration of reasonable alternatives, and public participation, this EA will serve as follows:

- to determine the significance of environmental impacts associated with the Proposed Action and alternatives;
- to assist in the decision-making process;
- to identify and develop appropriate mitigation measures to minimize the environmental impacts from the Proposed Action and alternatives; and
- to determine the need to prepare an EIS.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

As indicated above, the Operators propose to drill 154 additional oil/gas wells from a maximum of 110 new well pads within the CGIDP area over a 10-year period to allow for the efficient recovery of natural gas reserves within the CGIDP area. This activity would be in addition to the 160 wells on 107 new well pads and 24 enlarged existing well pads previously approved in the Cave Gulch ROD.

The development of federal oil and gas leases is an integral part of the BLM oil and gas leasing program under the authority of the *Mineral Leasing Act of 1920* (MLA) as amended (30 *United States Code* [U.S.C.] 181, *et seq*), the *Federal Land Policy and Management Act of 1976* (FLPMA) (*Public Law* [P.L.] 94-579), the *Federal Onshore Oil and Gas Royalty Management Act of 1982* (30 U.S.C. 1701, *et seq*), and the *Federal Onshore Oil and Gas Leasing Reform Act of 1987* (43 *Code of Federal Regulations* [C.F.R.] Part 3100). The BLM's oil and gas leasing program is intended to encourage the development of domestic oil and gas reserves, thereby reducing national dependence on foreign energy supplies.

1.3 NEPA COMPLIANCE

This EA was prepared pursuant to the following rules and regulations:

- NEPA, as amended;
 - subsequent regulations adopted by the Council on Environmental Quality (CEQ) found in 40 C.F.R. Part 1500-1508; and
-

- applicable BLM rules, regulations, and policies regarding implementation of NEPA and compliance with CEQ regulations.

This EA is a public document that analyzes the potential impacts on the human environment that may result from implementation of the Proposed Action and alternatives. However, this EA is not a decision document; rather, it provides documentation of the process used to evaluate the potential impacts of the Proposed Action and alternatives on the human environment.

Decisions regarding implementation of the Proposed Action or project alternatives will be fully documented in a *Decision Record* (DR) that will be prepared and issued by the BLM and will apply only to those lands and resources for which the BLM has specific management responsibility. Furthermore, this EA is designed to provide the BLM with both documented evidence and a level of evaluation sufficient to allow for the preparation of a DR that supports a determination that either:

- the potential impacts from the Proposed Action (or project alternatives) to the human environment are not significant, thereby allowing the BLM to prepare a Finding of No Significant Impact (FONSI) and the Operators to implement the Proposed Action; or
- the potential impacts from the Proposed Action (or project alternatives) to the human environment are significant and require the BLM to prepare an EIS should the Operators wish to pursue the project.

Various aspects of the CGIDP are regulated by other federal, state, and/or local agencies. This EA is not intended to eliminate the need for the Operators to pursue permit(s) or approval(s) from these regulatory authorities. Information that can assist these agencies in determining whether to approve or disapprove the issuance of the specific permits or approvals may be found in this EA. However, this EA is not intended to provide all of the information that may be required by other federal, state, or local regulatory agencies.

This EA considers direct, indirect, residual, and cumulative impacts of the Proposed Action and the No Action Alternative. Evaluations presented in this EA are restricted to the potential environmental impacts associated with additional development of the federal leases in the CGIDP area, including the effects of well pad and access road construction, additional drilling activities, production testing, disposal of produced water, production and maintenance operations, site abandonment, and final reclamation. These analyses include the direct, indirect, and residual impacts of construction and drilling activities within the

CGIDP area as well as the cumulative impacts of the Proposed Action on the human environment. In addition, this EA includes the following:

- a determination as to whether the Proposed Action is in conformance with BLM policies, regulations, and approved land management direction pertaining to oil and gas exploration and development activities;
- a determination as to whether the Proposed Action is compatible with other resources and permitted land uses in the analysis area;
- a determination as to whether locations exist for the proposed facilities that would be environmentally acceptable and would meet the needs of other resource management activities; and
- methods to mitigate surface resource impacts while honoring the leaseholder's rights.

A tiered approach was used to prepare this EA, and much of the information contained in the Cave Gulch EIS (available online at <http://www.wy.blm.gov/nepa/cfodocs/cavegulch97/index.htm>) has been incorporated into this document by reference, particularly in Chapter 2.0 (Proposed Action) and Chapter 3.0 (Affected Environment), where there have been no major changes in the information originally presented in the original Cave Gulch EIS document.

1.4 GENERAL LOCATION AND LANDOWNERSHIP

The CGIDP area includes approximately 27,013 acres of mixed federal, state, and private surface. Of this total, approximately 7,391 acres (27.4%) are owned by the federal government (administered by the BLM), 1,875 acres (6.9%) are owned by the State of Wyoming, and 17,747 acres (65.7%) are owned by private individuals (Table 1.1). Mineral ownership is 75.1% federal, 5.3% State of Wyoming, and 19.6% private (Table 1.2 and Figure 1.2).

1.5 AUTHORIZING ACTIONS AND RELATIONSHIP TO STATUTES AND REGULATIONS OR OTHER PLANS

Section 1.6 of the Cave Gulch EIS contains a discussion of federal, state, and county authorizing actions (permits/approvals) and their relationship to statutes, regulations, and/or other planning documents. All activities proposed by the Operators would be conducted in full compliance with the terms and conditions contained in the applicable federal leases, applicable Onshore Oil and Gas Orders, 43 C.F.R. Part 2800

Table 1.1 Surface Ownership Within the CGIDP Area.

Surface Ownership	Acres	Percent of Total
Federal (BLM)	7,391	27.4
State of Wyoming (State)	1,875	6.9
Private (Fee)	17,747	65.7
Total	27,013	100.0

Table 1.2 Mineral Ownership Within the CGIDP Area.

Mineral Ownership	Acres	Percent of Total
Federal (BLM)	20,287	75.1
State of Wyoming (State)	1,426	5.3
Private (Fee)	5,300	19.6
Total	27,013	100.0

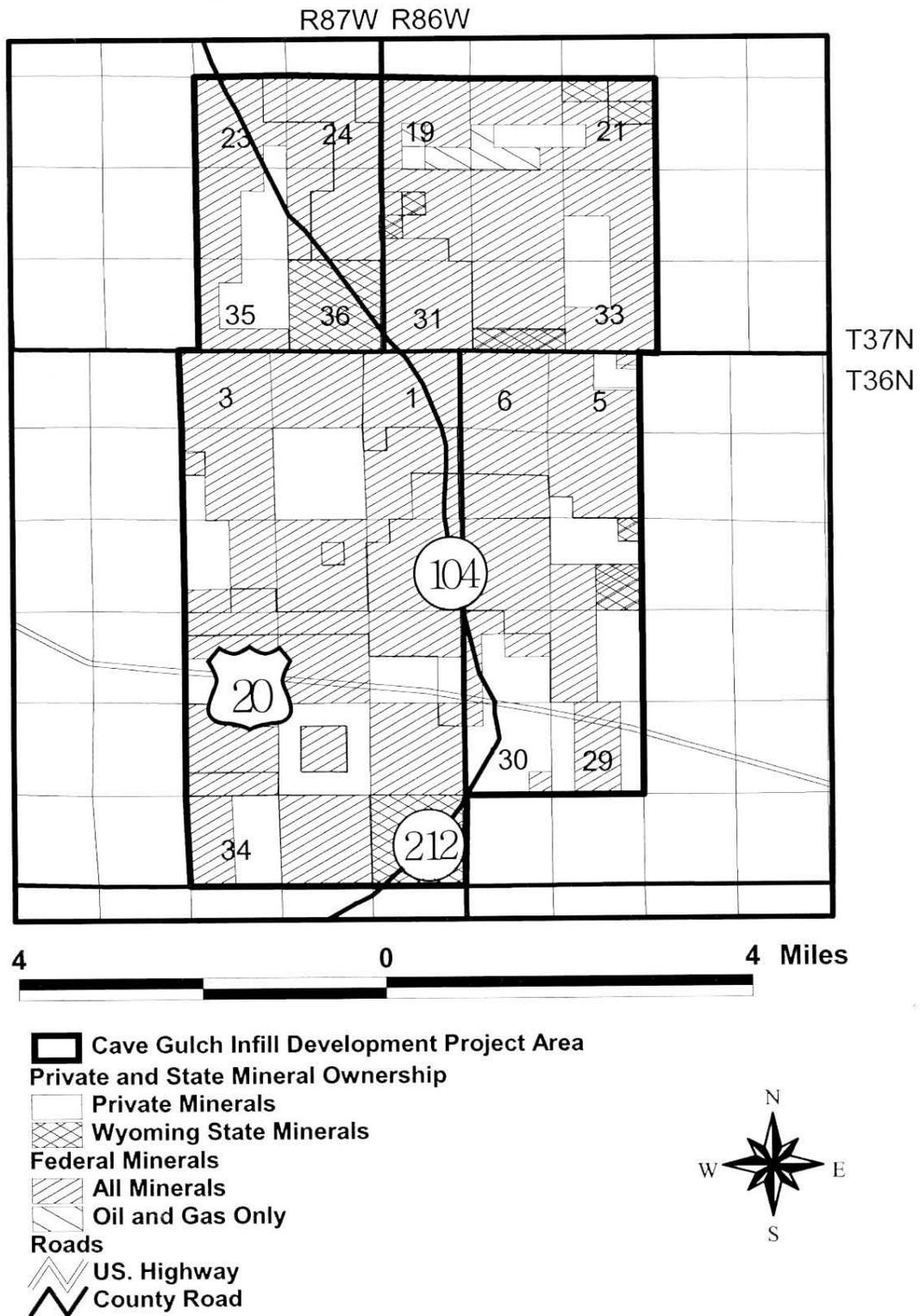


Figure 1.2 Mineral Ownership Within the CGIDP Area.

(rights-of-way), and 43 C.F.R. Part 3100--specifically subpart 3162, *Requirements for Operating Rights, Owners and Operators*.

1.6 CONFORMANCE WITH EXISTING LAND MANAGEMENT PLANS

The CGIDP is in conformance with management objectives provided in the *Platte River Resource Area Resource Management Plan Environmental Impact Statement and Record of Decision* (RMP) (BLM 1985a) and approved amendments, subject to implementation of applicant-committed environmental protection measures outlined in Chapter 2 and mitigation measures identified in Chapter 4 of this EA.

The specific planning decision that applies to federal oil and gas leases within the CGIDP area is Oil and Gas Planning Decision M-1, which states, in part, “BLM administered lands will remain open to oil and gas leasing and exploration.” This leasing decision is subject to “the provisions contained in referenced mitigation guidelines, developed to standardize the wording used by BLM in Wyoming.”

The RMP contains no specific decisions applicable to the Proposed Action. Resource management prescriptions applicable to ROWs in general are found in RMU 14: Remaining Platte River Resource Area, which states, in part, “for smaller right-of-way facilities, placement will be adjacent to existing facilities or disturbances. Cross-country right-of-way placement will be allowed only when placement in a designated corridor or adjacent to an existing facility is not practical or feasible.”

The Proposed Action is consistent with local planning and zoning.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

As a result of drilling activities within the original Cave Gulch EIS area following issuance of the Cave Gulch ROD, the Operators have now determined that additional exploration and drilling activity is warranted within a revised project area to fully develop the natural gas resources contained therein. The Operators' Proposed Action for the CGIDP includes the continued development of natural gas resources at increased well densities within a modified project area that includes the Cave Gulch EIS area and an additional 1,920 acres to the southwest of the original EIS project area (see Figure 1.1). Additional exploration and development activities within the CGIDP area would begin this spring and continue for approximately 10 years, with the majority of the proposed exploration and development activity expected to occur within the first 5 years following project approval.

Well densities would vary across the CGIDP area, with wells generally being developed on both 40-acre and 20-acre spacing and 10-acre spacing in the core area. Ten-acre spacing (the grouping of closely spaced wells) has been determined to be both viable and necessary for the efficient production of the natural gas resource in the core area (WRMG 2004). Various associated facilities (roads, pipelines, etc.) would also be constructed in conjunction with the continued development of the natural gas resource in the CGIDP area as previously described in the Cave Gulch EIS (BLM 1997a).

2.2 PROPOSED ACTION

2.2.1 Introduction

Under the Proposed Action, the Operators would drill 154 new wells from 110 well pads. They estimate that 87 wells would be drilled at a density of one well per 40 acres, 26 wells would be drilled at a density of one well per 20 acres, and 41 wells would be drilled at a density of one well per 10 acres. The Operators would directionally drill three of the wells proposed at a density of one well per 20 acres and all of the wells proposed at a density of one well per 10 acres. Additional directional drilling will be considered to reduce surface impacts based on continued success of development drilling, the future success of wells drilled at increased depths and/or higher densities, technological advances that allow for the efficient development of marginal reserves, and future economic considerations. The infrastructure to

support these additional wells is largely in place due to the level of exploration and development that has already occurred in the CGIDP area after the Cave Gulch ROD was issued.

The Proposed Action would begin after the BLM issues the DR for the EA. As indicated above, most drilling would occur during the first 5 years, but some drilling activity would probably occur thereafter. Up to four drilling rigs may be active in the CG IDP area at any one time. The Operators expect production from the field to continue for 30 to 40 years.

2.2.2 Preconstruction Planning and Design Measures

Detailed information concerning actions regarding preconstruction planning and design measures that would be implemented by the Operators are presented in Section 2.2.2.11 of the Cave Gulch EIS.

2.2.3 Transportation and Workforce Requirements

Activities and/or requirements associated with transportation and workforce requirements would be similar to those discussed in Section 2.2.2.1 and 2.2.2.5, respectively, of the Cave Gulch EIS.

2.2.4 Access Roads

Primary access to the CGIDP area would be provided by U.S. Highway 20-26, which crosses the southern part of the CGIDP area, and Natrona County Roads 104 and 212, which run north/south through the CGIDP area (see Figure 1.1). Previous exploration and development activities within the CGIDP area have resulted in a road network that should be adequate for access into and within the CGIDP area. Consequently, extensive additional road construction would not be required. However, construction of a collector road system would be required in the 1,920-acre addition where limited exploration and development activity has occurred to date.

New road construction associated with additional exploration and development within the overall project area would average approximately 1,270 ft (0.24 mi) of new road per well location based upon measurements of previous road construction activity within the overall CGIDP area. Road construction associated with 20-acre density wells would be less because these wells would infill existing development where roads have already been constructed in conjunction with wells previously drilled by the Operators on 40-acre well densities. However, a few more new roads would be required for access to those wells proposed on 40-acre

densities, as these wells would be located on the outside of the core area where previous exploration and development activities have been somewhat limited. The 10-acre density wells would be directionally drilled from pre-existing well pads, so no new road construction would be necessary.

Considering a total disturbed ROW width that does not exceed 45 ft, 139,700 ft of new access road construction would result in approximately 145 acres of total (short-term) surface disturbance. As indicated above, no new road construction would be required for wells drilled on 10-acre well densities. Whenever possible, access roads would be designed and constructed to disturb less than the 45-ft ROW, as long as traffic and safety concerns could be satisfied. The existing access roads would be maintained as necessary to accommodate appropriate year-round traffic and to prevent unnecessary erosion.

The types of roads that would be constructed to each well pad would be based on the specific use of the road, relative location to other roads, soil types, and topography. Roads would be constructed in accordance with BLM Manual Section 9113 (BLM 1985b) and/or to the standards outlined in the joint BLM/USFS publication *Surface Operating Standards for Oil and Gas Exploration and Development* (BLM and USFS 1989) and would be designed by a professional engineer as directed by the BLM. Road graveling would be accomplished within 60 days after well completion or as soon as practical. Surfacing and base course materials would be obtained from previously authorized sources within the general area.

2.2.5 Well Pad Design and Construction

The traditional single-well well pad design previously utilized in the Cave Gulch EIS area for drilling operations to the Fort Union/Lance formations would continue to be the predominant pad design used for the Proposed Action (Figure 2.1). Well pads would be constructed from native materials located at the site and would typically occupy a level area of approximately 2.0 acres (350 x 250 ft). With the areas of cut and fill and soil stockpiling, the total area disturbed for well pad construction would average approximately 3.2 acres per well pad, depending upon the severity of the topography at the site. The Operators would utilize a twin (or dual) well pad design in the core area of the CGIDP (Sections 29, 30, 31, and 32 of T37N, R86W). The dual well pad design would be utilized for drilling operations where a second directional well would be drilled from the same well pad along with the initial (vertical) well. Wells pads constructed to accommodate dual wells would occupy a level area of approximately 2.3 acres (400 x 250 ft) or 3.5 acres per well pad once areas of cut, fill, and soil stockpiling are included. Well pads

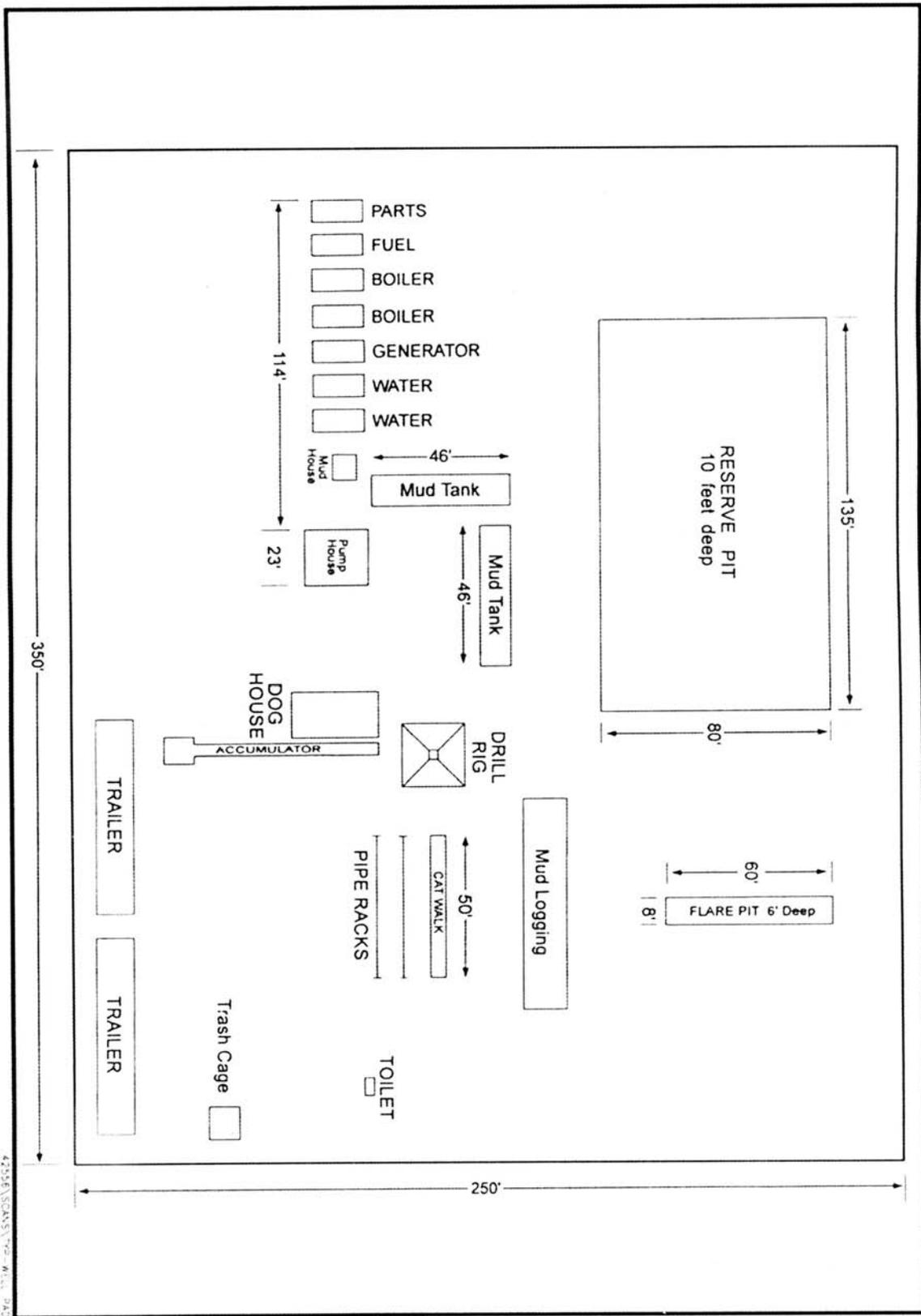


Figure 2.1 Typical Drawing of a Single-well Pad.

constructed to accommodate a single deep well would occupy a level area of approximately 5.7 acres (500 x 500 ft) or 8.7 acres once areas of cut, fill, and soil stockpiling are included. The actual size of these well pads would depend primarily upon the availability of specific drilling rigs at any particular time, terrain limitations at each individual drill site location, and the total depth to which the well would be drilled.

Section 2.2.2.2 of the Cave Gulch EIS contains a description of the major components of each individual single well pad and the techniques to be used in their design and construction. The major components of the twin well pads would be the same as proposed for the single well pads with the possible addition of a second set of production facilities (oil tank, produced water tank, production pack, and meter run) and a second well head assembly located approximately 15 ft from the first (initial) well bore.

2.2.6 Drilling Operations

The Operators plan to have from one to four drilling rigs in service at any given time within the CGIDP area. Please refer to Section 2.2.2.3 of the Cave Gulch EIS for a more detailed description of proposed drilling operations in the CGIDP.

The primary geologic formations to be tested in the CGIDP area include the Lower Fort Union and Lance formations, with productive potential found in certain deeper horizons as well. The drilling depths for gas wells drilled into the Lance Formation is approximately 9,800 ft and would require approximately 20 drilling days for vertical drilling operations barring major drilling complications. The Lower Fort Union Formation, at a depth of approximately 5,000 ft, is considerably shallower than the Lance Formation and would require approximately 7 days for vertical drilling operations. Deeper wells would require more drilling time--estimated at approximately 35 days to penetrate the Mesaverde Formation and approximately 240 days to penetrate the Muddy Formation.

2.2.6.1 Water-Based Drilling Fluids System

The Operators would utilize the same basic drilling fluids system identified in the Cave Gulch EIS. Average water requirements would equal approximately 462,000 gallons (1.3 acre-ft) per well, or approximately 200 acre-ft for the 154 wells. Fresh water would be obtained from one of several commercial water wells in the area:

- a commercial water well and reservoir owned by Mel's Water Service and located in the NE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 30, T36N, R86W (State of Wyoming Permit #UW-47628);
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- a commercial water well and reservoir owned by Mike/Pat Grose and located in the NW¹/₄NW¹/₄ of Section 19, T36N, R86W (State of Wyoming Permit #UW-107014); and
- a commercial water well and reservoir owned by Andy and Genda VanPatten and located in the NE¹/₄SW¹/₄ of Section 30, T36N, R86W (State of Wyoming Permit #UW-104817).

Water used in drilling operations would be contained in an earthen reserve pit constructed on each location and would serve as the base medium for the drilling mud system. The reserve pit would be fenced on the three non-working sides during drilling, with the fourth side of the pit fenced to protect wildlife and livestock immediately following removal of the drilling rig. Fencing would be installed in accordance with guidelines contained in *Surface Operating Standards for Oil and Gas Exploration and Development* (BLM and USFS 1989) and would be maintained until the reserve pit has been backfilled. Netting (1-inch mesh) would be placed over reserve pits containing hydrocarbons or other substances potentially toxic to wildlife in compliance with *BLM Information Bulletin Number WY-93-054*.

No water would be diverted from the North Platte River or any of its tributaries for use in construction, drilling, cementing, completion, hydrostatic testing, or dust abatement operations within the CGIDP area.

2.2.6.2 Oil-Based Drilling Fluids System

Drilling operations currently proposed by Pogo Producing Company (POGO) in Section 23, T36N, R87W, would utilize an oil-based mud system for drilling operations from the base of the surface casing (≈1,000 ft) to total depth. The oil-based mud system would consist primarily of no. 2 diesel fuel, which would reduce the potential for hole sloughing while drilling through water-sensitive formations. The oil-based mud and drilled cuttings would be circulated out of the hole during drilling operations and centrifuged to remove excess fluids. The semi-dry cuttings would then be placed in a separate lined pit for treatment and disposal upon completion of drilling operations. Drilling fluids utilized in the oil-based mud system would be contained on location in steel tanks specifically designed for that purpose. These fluids would be recycled during drilling operations by separating the drilled cuttings from the oil-based fluids. The cuttings would be deposited in a separate lined cuttings (reserve) pit for treatment, and the fluids would be recycled into the mud system (steel tanks) for use in drilling operations. A plastic/vinyl liner would be placed underneath all steel tanks designed for the storage and/or mixing of the oil-based drilling fluid system.

Upon cessation of drilling and completion operations, POGO would utilize the solidification technique developed and marketed by Soli-Bond, Inc. for processing and disposing of the oil-contaminated drill cuttings. The Soli-Bond processing technique would render the drill cuttings into an inert solid mass that would be buried in the cuttings pit and covered with a minimum of 3 ft of overburden.

The other Operators may also elect to utilize an oil-invert mud system in certain circumstances and would utilize similar solidification techniques for cuttings treatment and pit closure. While the solidification techniques utilized may not be those specifically developed and marketed by Soli-Bond, Inc., the end result would be the same.

2.2.6.3 Casing and Cementing Operations

Surface casing equal to 10% of the total vertical depth of the well would typically be set and cemented back to the surface on each proposed well to isolate all near-surface fresh water aquifers. Upon reaching total depth, the well would be evaluated and production casing would be set and cemented as warranted by electric logs and/or hydrocarbon shows. Cement would be circulated to a minimum of 300 ft above the top of the shallower geologic horizons of the Fort Union Formation, thereby effectively isolating all geologic formations encountered downhole in compliance with BLM *Onshore Oil and Gas Order Number 2* (43 C.F.R. 3160). This cementing procedure would eliminate any possibility for fluid communication between potential hydrocarbon-bearing zones and any near-surface fresh water aquifers that may be encountered downhole.

2.2.7 Well Completion and Testing Operations

Once a well has been drilled and cased, a workover unit would be moved on-site and completion operations would begin. Completion operations would typically require an average of 3 to 5 days per well location and would include cleaning out the well bore with water containing a 3% solution of potassium chloride (KCl), pressure testing, and perforating the potentially productive formations downhole to allow the flow of hydrocarbons to the surface.

After the casing has been perforated, production tubing would be run and specific zones within the targeted formation would be fractured. A normal “frac” of each potentially productive zone would include a mixture of approximately 1,500 barrels (bbl) of fresh water (mixed with KCl to obtain an overall 3% solution) and 100,000 to 150,000 pounds (lbs) of sand that is pumped down the casing under extreme pressure and forced

through the perforations into the formation. As the formation is fractured, the resultant spaces are filled with sand to prop them open, which facilitates the flow of gas into the well bore and subsequently to the surface.

Upon completion of the frac job, the well would be flowed back to the surface in an attempt to recover as much of the frac fluid as possible and to clean excess sand from the perforations prior to setting production equipment and placing the well on line. All fluids utilized in the completion procedure would be captured either in the reserve pit or in test tanks on the well location and ultimately disposed of in strict accordance with Wyoming Department of Environmental Quality (WDEQ) rules and regulations. Gases produced in association with completion and testing would be diverted to the flare pit. Approximately 30 days of well testing are typically required to recover frac fluids, to clean out the perforations, and to obtain an accurate flow test of the well. Completion operations typically take 3 to 4 weeks for shallow wells (Fort Union/Lance Formation) and 8 to 9 weeks for deeper wells (Mesaverde/Muddy Formation).

After production facilities are installed, reclamation would be initiated as soon as practicable on those portions of the well location not needed for production. Reclamation would occur on the unneeded (non-working) areas of existing well pads and access road/pipeline ROWs. Approximately 30 to 40% of the original well pad would be required for ongoing production operations, whereas the remaining 60 to 70% would be reclaimed by backfilling, recontouring, and reseeding as specified in the approved Application for Permit to Drill (APD) and Appendix A. Reclamation of the well location would be accomplished within a maximum of 2 years following the termination of drilling and completion operations (in the case of productive wells) or well abandonment (in the case of newly drilled dry holes). Approximately 38% of the disturbance associated with road building would be reclaimed shortly after disturbance.

Reclamation of the reserve pit would be accomplished when the pit is no longer required for completion and/or testing operations. Prior to backfilling the pit, all free-standing water would be allowed to evaporate through natural means to the greatest extent possible; however, in some instances the pit contents may be mixed with suitable solid materials and the pit backfilled, as approved by either the BLM or WOGCC. Prior to the mixing of reserve pit contents with approved stabilizing materials, the contents of the reserve pit would be tested for total petroleum hydrocarbons (TPH) and toxicity characteristics leaching procedure (TCLP) constituents, and appropriate closure permits would be obtained from the WOGCC and/or WDEQ. If necessary, reserve pit contents would be removed and disposed of at an approved disposal facility in a manner commensurate with all relevant county, state, and federal regulations and stipulations.

2.2.8 Production Operations

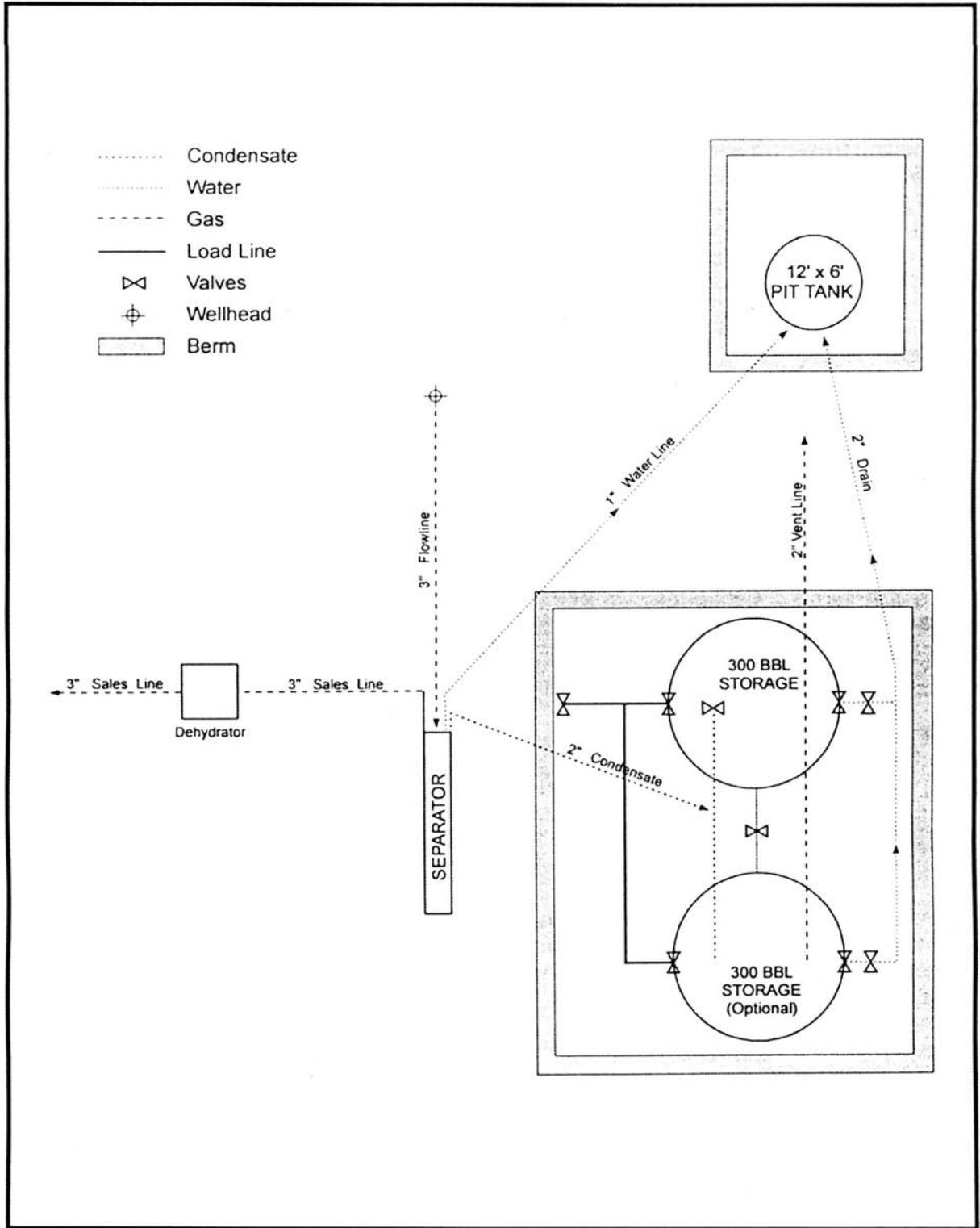
CGIDP wells would be expected to produce varying quantities of natural gas and oil (condensate) with minor quantities of water. Production equipment at each well would generally include a “Christmas tree” (valve assembly) at the well head, a separator where entrained liquid hydrocarbons (condensate or oil) would be separated from the gas stream, and tanks for the storage of both produced water and liquid hydrocarbons. Once the liquids have been separated from the gas stream, the “dry” gas would be metered on location for allocation purposes prior to being released to the gas gathering system for delivery to existing compressor facilities within the CGIDP area. The Operators do not anticipate the need for any additional compression beyond the levels originally analyzed in the Cave Gulch EIS.

Production operations would occur on a year-round basis. Routine maintenance operations on project-related roads would typically occur during the late spring, summer, and early fall. Winter maintenance generally would be limited to snow removal necessary to facilitate access to producing wells and associated facilities.

All aboveground structures on a well location for 6 months or longer, such as pumping units and tank batteries, would be painted one of the standard environmental colors recommended by the Rocky Mountain Five-State Interagency Committee, as specified in the approved APD. Environmental colors will be chosen that best mitigate visual impacts. The color specified for aboveground structures may vary in different geographic portions of the project area. The only exception to this would be for structures subject to safety considerations, which would be painted the color specified by regulation. The Operators would submit a schematic diagram showing the proposed production facility layout to the BLM for approval prior to commencing installation operations on lands subject to federal jurisdiction. A typical production facility layout is presented in Figure 2.2.

2.2.9 Gas Gathering System

Gas gathering system “corridors” have already been established in the CGIDP area and should be sufficient for the transportation of additional natural gas produced in conjunction with the Proposed Action. Buried pipelines would be installed to facilitate the collection and transportation of natural gas from each individual producing well to a connection with the existing gas gathering system, and these pipelines would be buried to a depth of approximately 6 ft below the natural ground surface. Pipeline diameters would range from 3 to 10 inches based primarily on gas production rates at each respective well.



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Figure 2.2 Typical Production Layout for a Single-well Pad.

Development activities at a 20-acre well density would require significantly less pipeline construction than would development at a 40-acre well density because most of these infill wells would be located in areas where an existing gas gathering system already exists. Pipelines would be installed directly adjacent to existing access roads within the CGIDP area to the extent practicable and would require a disturbed ROW width of 30 ft. Where installation is adjacent to an existing road, the Operators would use the existing access road as a staging area for pipe assembly and installation.

Fresh water for use in hydrostatic testing of pipelines would be obtained from those local sources identified in Section 2.2.6.1. Upon completion of hydrostatic testing activities, the water would be pumped into tanks and transported over existing roads to drilling locations within the CGIDP area for use in ongoing drilling operations. Should the recovered water not be needed for use in drilling operations, it would be discharged to the surface on undisturbed lands having vegetative cover or into an established drainage channel in a manner that would not cause accelerated erosion. Any surface discharge of hydrostatic test water would be conducted in full compliance with WDEQ rules and regulations.

Please refer to Section 2.2.2.4 of the Cave Gulch EIS for a more detailed discussion of pipeline construction and testing techniques.

2.2.10 Produced Water Disposal

As is the current practice, methods used for the future disposal of water produced in association with the natural gas and separated from the gas at the well location would be accomplished through a combination of discharge to the surface under existing/proposed National Pollutant Discharge Elimination System (NPDES) permits issued by the WDEQ and by underground injection under existing/proposed Underground Injection Control (UIC) Permits issued by the WOGCC. Produced water that does not meet the water quality criteria for surface discharge established by the WDEQ would be routed through buried pipelines to existing and proposed injection wells for subsurface disposal. The necessary permits for existing disposal facilities in the CGIDP area have been obtained from the appropriate regulatory agencies. Permits for any new discharge/disposal facilities proposed herein would be acquired as necessary prior to construction and use. Depending on the quantity and quality of produced water available at any given time, some of the produced water could be used in conjunction with drilling, completion, and hydrostatic testing operations within the CGIDP area.

2.2.10.1 Additional Water Injection Wells

There are currently three permitted water injection wells within the CGIDP area:

- South Branch Federal #1: NW¼NW¼ (Lot 7) of Section 5, T36N, R86W, operated by Bill Barrett Corporation;
- South Branch Federal #2-5 SWDW: NE¼SE¼ (Lot 10) of Section 5, T36N, R86W, operated by Bill Barrett Corporation; and
- Waltman Unit #15: SW¼SW¼ of Section 7, T36N, R86W, operated by Chevron USA Inc.

Due to the limited capacity of these existing injection wells and considering the distance of both the 1,920-acre extension and the southern portions of the Waltman Field from the core area of the CGIDP area, as well as varied nature of the oil/gas operators involved in the Proposed Action, it is possible that additional water injection wells and water disposal/treatment facilities may be required in these areas. There are no plans for the installation of additional injection wells or water treatment/disposal facilities outside of the core area of the CGIDP; however, provision has been made below for additional water injection wells/disposal facilities should they be required at some point within the foreseeable future. In this regard, up to four additional produced water injection wells and associated pipelines could be required for the disposal of the additional produced water that would be generated by the additional wells under the Proposed Action.

These injection wells would be similar in design to those currently operating within the CGIDP area. To the extent possible or practical, the Operators would attempt to use existing well bores (either existing wells [non-commercial] or previously plugged and abandoned wells) for conversion to injection wells. The ability of the Operators to utilize pre-existing well bores for conversion to injection wells would depend upon the proximity of the existing well bore to the produced water source, the depth of the well, the condition of the existing casing downhole, and the characteristics of the target formation including its ability to meet the UIC requirements for disposal operations therein. Installation, abandonment, and reclamation procedures for these injection wells would be similar to those included in the Cave Gulch ROD and are included in this EA by reference. The Operators would comply with applicant-committed practices, mitigation measures, and monitoring activities as specified in Appendix A, Section III, of the Cave Gulch ROD.

Assuming that pre-existing well bores would be used for conversion to injection, approximately 1.12 acres of LOP surface disturbance would be associated with each individual water injection well. Surface disturbance associated with well re-entry and completion activities would be calculated based upon a single well pad design as defined in Section 2.2.5. In most cases these injection wells would be located at the periphery of the existing well field and would typically require the construction/reconstruction of approximately 7,920 ft (1.5 mi) of access road per well. Using the disturbance parameters outlined in Sections 2.2.4 and 2.2.9, installation of approximately 31,680 ft (6.0 mi) of access road and produced water pipeline to these four injection wells would result in total surface disturbance of approximately 55 acres (33 acres and 22 acres respectively). The produced water pipelines would be installed in a common corridor with the access road to each proposed injection well. LOP surface disturbance associated with access road construction would be approximately 21 acres. Water disposal pipelines within the well field would be installed adjacent to existing access roads and would not result in any additional LOP surface disturbance.

2.2.10.2 Produced Water Gathering System

The Operators propose to install a produced water gathering system within the CGIDP area for the transportation of water produced primarily from wells in the core area to the Cave Gulch Unit (CGU) #4 water treatment and disposal facility (WTDF). The proposed water gathering system would consist of a main “trunk” pipeline designed to gather the combined water produced from wells in/adjacent to the core area and to transport the produced water to the CGU #4 WTDF. Lateral lines would be installed from individual wells (or groups of wells) and would tie into the main trunk line. The trunk line would consist of 10- to 12-inch polyethylene pipe, and the lateral lines would consist of 3- to 6-inch polyethylene pipe. These lines would be buried at a maximum depth of 6 ft to prevent freezing and would parallel existing/proposed roads and/or natural gas pipelines within the field to the greatest extent possible. In the case of new wells drilled and completed within the CGIDP area, water disposal lines would be buried in the same ROW that is required for installation of the gas gathering system. In the case of existing wells, the water lines would be installed in existing ROW corridors (access road and/or pipeline) to minimize surface disturbance. Although these lines would be installed in existing previously disturbed ROWs, it is assumed that these existing ROWs have already been reclaimed to some extent and that the installation of these lines would be considered as surface disturbance for the purposes of this analysis. Therefore, the installation of approximately 86,360 ft (16.4 mi) of water gathering line (including both main trunk and lateral lines) connecting approximately 68 existing wells to the CGU #4 WTDF would result in approximately 60 acres of surface disturbance. The installation of water gathering lines for the 154 wells

in the Proposed Action would not result in any additional surface disturbance because the produced water lines would be installed in common ROWs with the gas gathering lines.

2.2.10.3 Proposed Cave Gulch Unit #4 Water Treatment and Disposal Facility

The Operators propose installation of a replacement WTDF adjacent to the CGU #4 well location (SW¹/₄SW¹/₄ of Section 29, T37N, R86W) for treatment and disposal of water produced from both existing and proposed wells in the core area of the CGIDP area. The CGU #4 WTDF would replace an existing facility located on the Bullfrog Unit #1-6-36-86 abandoned well location (NE¹/₄NW¹/₄ of Section 6, T36N, R86W). The existing Bullfrog facility would continue to be used for the treatment and disposal of water produced from wells within the core area of the CGIDP area until such time as the proposed CGU #4 WTDF has been installed and is operational. At that time, the facilities on the Bullfrog Unit #1-6-36-86 well location would be dismantled and the existing well location would be reclaimed in accordance with reclamation guidelines presented in Appendix A of this EA.

The CGU #4 water treatment and disposal facility would require approximately 3 acres and would generally consist of the following components:

- a 60 x 30 ft building housing pumps and filters for the transfer of water from the tank battery to subsurface disposal;
- a tank battery consisting of approximately fifteen 400-bbl tanks designed to hold both water and skimmed oil (condensate); and
- an unlined evaporation pond constructed for the surface discharge of produced water.

The existing water transfer and treatment facility located on the Cave Gulch Unit #4 would be dismantled and the disturbed area reclaimed in accordance with reclamation guidelines presented in Appendix A of this EA and Appendix A of the Cave Gulch ROD. The new facility would be constructed directly adjacent to the CGU #4 well location and would be operational within 12 to 18 months following BLM approval.

The proposed tank battery would occupy an area approximately 86 x 54 ft and would be surrounded by a concrete containment dike. Water received by the facility would initially be routed through “skim” tanks designed to remove any remaining liquid hydrocarbons prior to disposal. The liquid hydrocarbons skimmed from the produced water would be routed to separate oil storage tanks for sales, and the water would be routed to water storage tanks for disposal. Disposal methods would be determined by water

quality, which varies throughout the CGIDP area. Water that meets the quality criteria established by the WDEQ in the approved NPDES permit it would be discharged to the surface through a wetland to be constructed adjacent to the CGU #4 WTDF. Any produced water that does not meet the NPDES criteria for discharge would be injected into the subsurface in accordance with an approved UIC permit issued by the WOGCC.

The evaporation pond (constructed wetland) would be installed downstream/downslope from the proposed CGU #4 WTDF and would involve the construction of an earthen evaporation/percolation pond (wetland) approximately 200 x 75 ft. To facilitate the development of a constructed wetland, the pit would not be lined but would be fenced “sheep-tight” to preclude livestock use according to standard BLM fencing guidelines. Water would be piped from the evaporation pond (constructed wetland) into a livestock/wildlife watering tank to be installed below the constructed wetland and thence to Cave Gulch Draw (or an ephemeral tributary thereof) for discharge.

As part of the CGU #4 WTDF, BBC would install a three-phase power line to allow for the incorporation of a control system that would monitor the quality of water being collected and allow it to be discharged to either the proposed evaporation pond (constructed wetland) or re-injected as appropriate. The proposed power line would tie into an existing power supply at an as-yet-undetermined location and would follow existing ROW corridors from the proposed tie-in point to the CGU #4 WTDF. The proposed power line would be constructed in accordance with *Suggested Practices for Raptor Protection on Powerlines: the State of the Art in 1996* (Avian Power Line Interaction Committee 1996) and would result in a minimal amount of additional surface disturbance.

2.2.11 Ancillary Facilities

Section 2.2.8 of the Cave Gulch EIS contains information concerning the need for ancillary facilities within the overall project area. Many of the major ancillary facilities (liquids plant, centralized compressor facility, etc.) discussed in the Cave Gulch EIS have since been installed. Therefore, there is no need for the installation of additional major ancillary facilities in the CGIDP area. Production equipment required on-site for the routine production of individual wells is discussed in Section 2.2.8 of this document. Additional facilities that may be required in conjunction with the Proposed Action that are not discussed elsewhere in this document would include, but are not limited to: 1) gas metering stations, 2) pipeline pigging facilities, and 3) cathodic protection facilities. The number and exact location of such

ancillary facilities are not known at this time, but most would be installed within the boundaries of existing disturbance.

2.2.12 Abandonment and Reclamation

The Operator would obtain the necessary authorization(s) from the appropriate regulatory agencies (BLM and/or WOGCC) to plug and abandon the well as it becomes commercially non-productive (estimated 20- to 40-year production life). All aboveground facilities would be removed from the location, the well bore would be physically plugged with cement, and both the abandoned access road and well location would be reclaimed as described in Appendix A. Pipelines would be purged of combustible materials, any aboveground features would be removed, and the line would be retired in place.

2.2.13 Summary of Surface Disturbance Within the CGIDP Area

Based upon information presented in Section 2.2.5, total surface disturbance associated with single Lower Fort Union/Lance Formation well pads would average approximately 3.2 acres per well and total surface disturbance associated with dual well pads would average approximately 3.5 acres per well. These disturbance figures may fluctuate slightly based upon a combination of topography, operator preferences, specific well requirements, etc., and are presented solely as averages for the purpose of estimating overall surface disturbance in the CGIDP area. As indicated above, the Operators propose to drill 87 wells on a 40-acre well density. Assuming that approximately 80 of these wells will be drilled to the shallower Lower Fort Union/Lance/Mesaverde Formation using the 3.2-acre single well pad design, and up to seven of the wells would be drilled to the deeper Muddy Formation using the 8.7-acre well pad design. The remaining 23 well pads would be constructed utilizing the 3.5-acre twin or dual well pad design. A total of approximately 398 acres of surface disturbance would occur from construction of the 110 well pads.

As indicated in Table 2.2, 147,312 ft (27.9 mi) of access road have been constructed to the 116 existing well locations, for an average of 1,270 ft of road per well. Assuming a similar ratio of average new road construction per well pad for the CGIDP, approximately 139,700 ft (26.5 mi) of new road construction would be expected in association with additional exploration and development activities in the CGIDP area. Considering a total disturbed ROW width of 45 ft, construction of the 139,700 ft of new access road would result in an additional 144 acres of short-term surface disturbance, 90 acres of which would be LOP disturbance.

An additional 139,700 ft (26.5 mi) of gas/water pipelines would be installed in a common ROW in conjunction with the 110 well pads. Based on a total disturbed ROW width of 30 ft, this pipeline construction would disturb an additional 96 acres, all of which would be reclaimed shortly after disturbance.

Installation of a produced water gathering system to service the 68 existing well pads within the core area of the CGIDP would result in the short-term disturbance of an additional 60 acres. The 86,360 ft (16.4 mi) of produced water gathering line would be installed in existing (previously disturbed) ROW corridors, many of which have been reclaimed since initial disturbance.

Table 2.1 provides a compilation of the projected total and LOP surface disturbance associated with the Proposed Action.

Measurements of existing surface disturbance within the CGIDP area using Global Positioning System (GPS) technology were obtained by the Operators in 2003 and subsequently transferred into a Geographic Information System (GIS) database for interpretation. Table 2.2 provides the results of the disturbance inventory and analysis.

Table 2.1 Projected Surface Disturbance Associated with the CGIDP.

Facility	Measurement Disturbance		(acres)	
	Basis Number	Number	Total	LOP ¹
Single Well Pads ²	3.2 acres/pad	84	269	95
Dual Well Pads	3.5 acres/pad	23	81	29
Deep Well Pads	8.7 acres/pad	7	61	22
Access Roads ³ 45-ft	ROW	171,380	177	110
Gas/Water Pipelines ⁴	30-ft ROW	171,380	118	0
Water Gathering System	30-ft ROW	86,360	60	0
Total			766	256

¹ LOP disturbance was calculated based upon the assumption that 65% of those areas disturbed during construction of the 114 well pads (including the four injection wells) would be reclaimed for production, 38% of those areas disturbed during road construction would be reclaimed for production, and all pipeline ROWs would be reclaimed after pipe installation. These assumptions are consistent with the data presented in Table 2.2.

² Includes the four proposed water injection wells.

³ Includes the 31,680 ft (6 mi) of projected access road to service the four proposed water injection wells based upon a 45 ft total disturbed ROW width.

⁴ Includes the 31,680 ft (6 mi) of projected water pipeline based upon a 30 ft total disturbed ROW width.

The information presented in Table 2.2 represents existing surface disturbance within the CGIDP area as of January 1, 2004, and provides baseline information concerning surface disturbance associated with oil/gas exploration and development activity within the project area from August 1997 through December 2003. It also includes approximately 115 acres of long-term disturbance that existed before the Cave Gulch ROD was issued in 1997. The Cave Gulch EIS predicted 789 acres of total disturbance, and 394 acres of LOP disturbance. Based on the GPS/GIS measurement data, the Cave Gulch EIS accurately predicted total surface disturbance (at 788.3 acres) but over-predicted LOP disturbance by approximately 283 acres.

2.2.14 Applicant-Committed Environmental Protection Measures

The Operators would implement the project-wide mitigation measures (applicant-committed practices) presented in Section 2.2.2.12 of the Cave Gulch EIS as appropriate to the current proposal in order to minimize impacts to the environment. However, the exclusion area around active raptor nests would be 0.50 mi rather than 0.25 mi. An exception to a particular mitigation measure and/or design feature may be approved by BLM on those lands subject to federal jurisdiction on a case-by-case basis as deemed appropriate. The exception would only be approved after a thorough, site-specific analysis has determined that the resource or land use for which the measure was intended is not present or would not be impacted significantly.

Table 2.2 Existing Surface Disturbance in the CGIDP Area as of January 1, 2004¹

Disturbance Type	Number	Short-Term Disturbance		Long-Term Disturbance	
		Acres	Acres/Well	Acres	Acres/Well
Well Pads	116	488	4.2	154	1.3
Roads ²	27.9 mi	255	2.1	65	0.5
Pipelines ³	23.2 mi	162	1.4	0	0.0
Total		904	7.7	219	1.8

¹ Based on GPS/GIS data provided to BLM by the Operators. Includes 115 acres of long-term disturbance that occurred prior to the issuance of the Cave Gulch ROD.

² Road areas also include gas collection pipelines and water disposal pipelines located adjacent to road corridors.

³ Gas production pipelines not associated with roads and common corridors.

2.3 NO ACTION ALTERNATIVE

CEQ regulations for implementing NEPA require that a No Action Alternative must be considered “even if the agency is under a court order or legislative command to act” (46 *Federal Register* 18026, March 23, 1981). The No Action Alternative provides a benchmark, enabling decision-makers to compare the magnitude of environmental effects of the action alternatives. Under the No Action Alternative, the BLM would deny further natural gas development on federal lands in the CGIDP area as currently proposed by the Operators while continuing existing management and allowing existing land use.

The U.S. Court of Appeals for the District of Columbia in *Sierra Club vs. Peterson* (230 U.S. App. D.C. 352; 717 F.2d 1409, 1411-1414 [D.C. Cir. 1983]) found that “on land leased without a No Surface Occupancy stipulation, the Department cannot deny the permit to drill. ... [O]nce the land is leased the Department no longer has the authority to preclude surface disturbing activity even if the environmental impact of such activity is significant. The Department can only impose ‘mitigation’ measures upon a lessee who pursues surface disturbing exploration and/or drilling activities.” The court goes on to say “Notwithstanding the assurance that a later site-specific environmental analysis will be made, in issuing these leases the Department made an irrevocable commitment to allow some surface disturbing activities, including drilling and road building” (Sierra Club 717 F.2nd at 1414-1415).

For the purpose of analysis in this EA, the No Action Alternative means that the Proposed Action would not be implemented. Existing land uses would continue within the CGIDP area, including drilling additional wells previously authorized by the BLM under the Cave Gulch EIS (BLM 1997a, 1997b, 1997c).

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

The Proposed Action as presented in the Cave Gulch EIS was BLM’s preferred alternative in the Cave Gulch ROD. In addition to the No Action Alternative, the Cave Gulch EIS included two other action alternatives, both of which provided for additional raptor management. Neither of those two alternatives was selected as the preferred alternative by BLM in the subsequent Cave Gulch ROD. Three other alternatives were considered in the Cave Gulch EIS but were eliminated from detailed study. These three alternatives included the following:

- designation of the Cave Gulch EIS area as an Area of Critical Environmental Concern, with no, or limited additional mineral development;
-

- development of gas resources without applying seasonal raptor management restrictions; and
- transportation of liquid hydrocarbons to a processing plant outside the project area.

All of these alternatives, as well as the No Action Alternative, are discussed in Chapter 2 of the Cave Gulch EIS. Based on conditions currently existing in the Cave Gulch EIS area, there is no reason for any of these previously rejected alternatives to be reconsidered in this EA. Therefore, two alternatives were evaluated in detail in this EA--the Proposed Action and the No Action Alternative. The Proposed Action is discussed in Section 2.2 and the No Action Alternative is discussed in Section 2.3. In accordance with 40 C.F.R. 1502.14, other alternatives that were considered but eliminated from detailed analysis are discussed in Sections 2.4.1 and 2.4.2.

2.4.1 Fewer Wells

The Operators considered drilling fewer wells but concluded that the number of wells in the Proposed Action was the smallest number that could reasonably be drilled to recover the known gas reserves in the CGIDP area. If fewer wells were drilled, it is likely that some natural gas reserves would not be recovered, and this would result in the loss/waste of federal resources and would not meet the purpose and need of the project. Therefore, this alternative was eliminated from further consideration.

2.4.2 Increased Directional Drilling

Under this alternative, the Operators would increase the number of multiple (dual) well pads and would decrease the number of single-well well pads as compared to the Proposed Action. This would require a commitment from the Operators to increase the number of wells that would be directionally drilled. Under the Proposed Action, the Operators have committed to directionally drilling 44 wells, including all of the wells proposed to be drilled at a 10 acre per well density and three wells proposed to be drilled at a 20 acres per well density.

Directional drilling is geologically feasible only where required downhole well locations are close enough together to be drilled from a common well pad and where other geologic conditions do not preclude the more technically challenging aspects of the directional drilling operation. Based on previous drilling operations conducted by the Operators within the Cave Gulch EIS area, it is possible to directionally drill wells when the required bottom hole locations are at a density of one well per 10 acres. The Operators

have committed to drilling all forty-one 10-acre density wells using directional drilling methods. Due to the presence of steeply dipping strata, highly fractured rock, and rock formations prone to caving, directionally drilling wells where downhole densities are less than one well per 10 acres is not generally technically feasible. Nonetheless, three directional wells have been proposed at a lower well density within the CGIDP area in the event that the adverse conditions described are not present throughout the project area and in the further event that directional drilling technology should improve. While the amount of directional drilling as currently proposed is considered to be technically feasible, it would not be technically/geologically feasible to increase the number of directional wells beyond the number currently proposed. As a result, this alternative was determined to be technically infeasible and was eliminated from further consideration.

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3.0 AFFECTED ENVIRONMENT

This chapter provides a description of the CGIDP area for those resources addressed in this EA. Additional detailed descriptive information can be found in the Cave Gulch EIS (BLM 1997a). It also summarizes information presented in the Cave Gulch EIS, updates the available information where appropriate, and adds information on the 1,920-acre (three-section) addition to the southwest portion of the CGIDP area.

3.1 LOCATION, SETTING, AND HISTORICAL USE

The CGIDP area is located in northwestern Natrona County in central Wyoming approximately 40 mi west of Casper and 43 mi east of Shoshoni (see Figure 1.1). U.S. Highway 20-26 crosses the southern portion of the CGIDP area, and County Roads 104 and 212 intersect U.S. Highway 20-26 and generally run north/south through the CGIDP area. A Burlington Northern and Santa Fe Railway Company (BNSF) railroad line runs through the northeast corner of the CGIDP area. Approximately 65% of the topography is gently rolling hills dissected by small ephemeral drainage channels. The remaining 35%--located between County Road 104 and the BNSF railroad line--consists of steeply sloping hills and badland areas. Elevations range from 5,840 to 6,400 ft above mean sea level.

The CGIDP area is in the Missouri River drainage basin and straddles the divide between the headwater tributaries of the Powder River (the eastern portion of the area) and the Big Horn River (the western portion of the CGIDP area) (Blackstone 1988). The area lies along the western edge of the Casper Arch, south of the Big Horn Mountains, north of the Granite Mountains, and between the Wind River Basin and Powder River Basin physiographic provinces (Knight 1994).

Climate is typical of high deserts in the intermountain west (Knight 1994). Record high and low temperatures at the Powder River weather station (approximately 7 mi east of the CGIDP area) are 103°F and -42°F, respectively, with an average of approximately 33 days/year above 90°F. Winter nighttime temperatures fall to 0°F or below about 26 nights/year on average, and approximately 195 days/year have minimum temperatures at or below 32°F. An average of 100 frost-free days/year occurs in the western portion of Natrona County. Average annual precipitation is approximately 12 inches, and the prevailing winds are from the southwest with an average annual wind speed of approximately 13 mph (Martner 1986; Curtis and Grimes 2004).

Historically, the CGIDP area has been used for oil and gas development, livestock grazing, wildlife habitat, and recreational hunting. It also provides rotation or year-round grazing for cattle; however, stocking rates are low primarily due to sparse vegetation (Soil Conservation Service 1988; BLM 1997a). Based on a survey of the Cave Gulch EIS area in December 2003, oil and gas-related activity has resulted in approximately 905 acres of surface disturbance, including 219 acres of LOP disturbance (see Table 2.2).

3.2 CRITICAL ELEMENTS OF THE HUMAN ENVIRONMENT

Critical elements of the human environment as defined by the BLM (1988, 1999), their status in the CGIDP area, and their potential to be affected by the Proposed Action are presented in Table 3.1. BLM resource specialists have determined that six of the 14 critical elements of the human environment are not present in the CGIDP area or are not affected by the Proposed Action, and they are not discussed further in this EA. Eight critical elements (air quality; cultural resources; invasive species; Native American religious concerns; threatened and endangered species; wastes [hazardous and solid]; water quality; and wetlands/riparian areas) are present, may be affected by the Proposed Action, and are analyzed in detail in this EA.

Based on comments received during the public scoping period that ended on June 7, 2004, as well as additional information concerning the CGIDP area, BLM resource specialists determined that this EA should also analyze potential impacts to the following resources: geology, geologic hazards, and minerals; soils; vegetation; wildlife; BLM-sensitive species; land use, including livestock grazing and recreation; socioeconomics; health, safety, and transportation; and visual resources.

3.3 PHYSICAL RESOURCES

3.3.1 Air Quality

The following information concerning air quality in the CGIDP area was taken from Section 3.3 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Information has been updated where appropriate.

Table 3.1 Critical Elements of the Human Environment.¹

Element	Status	Analyzed in Detail in This EA
Air quality	Potentially affected	Yes
Areas of critical environmental concern	Not present	No
Cultural resources	Potentially affected	Yes
Environmental justice related issues	Not present	No
Farmlands (prime or unique)	Not present	No
Floodplains	Not present	No
Invasive, nonnative species (noxious weeds)	Potentially affected	Yes
Native American religious concerns	Potentially affected	Yes
Threatened and endangered species	Potentially affected	Yes
Wastes (hazardous and solid)	Potentially affected	Yes
Water quality	Potentially affected	Yes
Wetlands/riparian areas	Potentially affected	Yes
Wild and scenic rivers	Not present	No
Wilderness (wilderness study areas and wilderness areas)	Not present	No

¹ From the BLM NEPA Handbook H-1790-1 (BLM 1988, 1999).

Ambient air quality data is not available for the CG IDP area; however, air quality is assumed to be in attainment for all Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS). The only air quality emissions within the CGIDP area are those associated with the natural gas development and production facilities described in the Cave Gulch EIS. The WAAQS and NAAQS set upper limits for concentrations of specific air pollutants at all locations where the public has access (Table 3.2) (Wyoming Department of Environmental Quality, Air Quality Division [WDEQ/AQD] 2000a:8). Air quality in the 1,920-acre addition to the southwest portion of the CGIDP area is similar to that described in the Cave Gulch EIS.

3.3.2 Geology, Geologic Hazards, and Minerals

The following information concerning geology, geologic hazards, and minerals in the CGIDP area was taken from Section 3.1 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Information regarding geology and geologic hazards in the 1,920-acre addition has been added.

Table 3.2 Selected National and Wyoming Air Quality Standards.

Air Pollutant	Averaging Time Period	NAAQS ($\mu\text{g}/\text{m}^3$) ¹	WAAQS ($\mu\text{g}/\text{m}^3$) ²	Incremental Increase Above Legal Baseline	
				PSD Class I	PSD Class II
Particulate matter <10 microns in diameter (PM ₁₀)	24-hour	150	150	8	30
	AAM ³ 50		50	4	17
Particulate matter <2.5 microns in diameter (PM _{2.5})	24-hour	65	65	ns ⁴ ns	
	AAM	15	15	ns	ns
Ozone	1-hour	235	235	ns	ns
	8-hour	157	na ⁵ ns		ns
Nitrogen dioxide (NO ₂)	AAM	100	100	2.5	25
Sulfur dioxide (SO ₂)	3-hour	1,300 ⁶ 1,300		25	512
	24-hour	365	260	5	91
	AAM	80	60	2	20
Carbon monoxide (CO)	1-hour	40,000	40,000	ns	ns
	8-hour	10,000	10,000	ns	ns

¹ NAAQS = National Ambient Air Quality Standards (adapted from 40 C.F.R. 50.5-50.12). Primary standard unless otherwise noted. National Primary Standards establish the level of air quality necessary to protect public health from any known or anticipated effects of a pollutant, allowing a margin of safety to protect sensitive members of the population.

² WAAQS = Wyoming Ambient Air Quality Standard (adapted from WDEQ/AQD [2000b]).

³ AAM = annual arithmetic mean.

⁴ ns = no standard.

⁵ na = not applicable.

⁶ Secondary standard. National Secondary Standards establish the level of air quality to protect the public welfare by preventing injury to agricultural crops and livestock deterioration of materials and property and adverse impacts to the environment.

3.3.2.1 Geology and Geologic Hazards

The CGIDP area is located along the western edge of the Casper Arch and adjacent to the eastern edge of the Wind River Basin of Wyoming. The Wind River Basin is characterized by large intermontane structural basins bounded by mountain uplifts that have Precambrian rocks at their core. Subsequent erosion removed many of these mountains, and sediments filled the adjacent basins. These sedimentary deposits are exposed at the surface in the CGIDP area (Knight 1994) and are dominated by residuum mixed with alluvium, slope wash, and bedrock outcrops. No major geologic hazards (landslides, subsidence, or active faults) have been identified, and seismic activity is moderately low. No earthquakes have originated in the CGIDP area (BLM 1997a). Geology/geologic hazards in the three-section area are similar to that found in the rest of the CGIDP area.

3.3.2.2 Minerals

Leaseable Minerals. Natural gas, oil, and coal are the only leaseable minerals that occur in the CGIDP area (BLM 1997a). Natural gas and oil are the primary economic mineral resources within the CGIDP area and vicinity and occur in the Tertiary Wind River and Fort Union Formations and the Cretaceous Lance/Meeteetse, Frontier, Muddy, and Cloverly formations. There have been four oil and gas fields developed within the CGIDP area. Two of these fields (Arminto and Lox) were discovered in 1924 and 1921, respectively, and abandoned in 1924 and 1976, respectively. The Bullfrog field was discovered in 1983, and there has been no recorded production. Fewer than 20 wells have been drilled in these three fields combined (WOGCC 2004). The Waltman field was discovered in 1959, and as of May 2004 the field has produced approximately 1.5 million barrels of oil (MBBO) and 411 billion ft³ of natural gas (BCFG) (WOGCC 2004).

There were approximately 150 oil and natural gas wells within the CGIDP area at the end of 2003, as well as three water injection wells associated with natural gas production. Most of these wells are concentrated in the north-central portion of the CGIDP area (Figure 3.1). At least 90% of the CGIDP area has a high or moderate potential for oil and gas development (Anderson et al. 1990).

Coals within the Wind River Basin, including the CGIDP area, generally do not show the maturation characteristics required for significant coalbed natural gas production. In 1996, the Wind River Basin was estimated to hold 935 trillion cubic feet (TCF) of in-place gas; however, much of this gas was considered technically unrecoverable. Steeply dipping Lance and Meeteetse Formation coal beds in the Waltman area within the Wind River Coal Field may present additional targets for coalbed natural gas development (BLM 2004).

A portion of the CGIDP area overlies the Wind River Coal Field, and coal is found in the Fort Union and Wind River formations; however, there are no active surface or underground coal mines in the CGIDP area or in western Natrona County. The coal is ranked as sub-bituminous, with a heat value of between 7,530 and 8,370 British thermal units [BTU]/pound, and it seldom reaches 3 ft in thickness. This coal has low national importance for the next 20 to 30 years and coal development potential has not been identified in this portion of the Casper Field Office area (BLM 1997a, 2004).

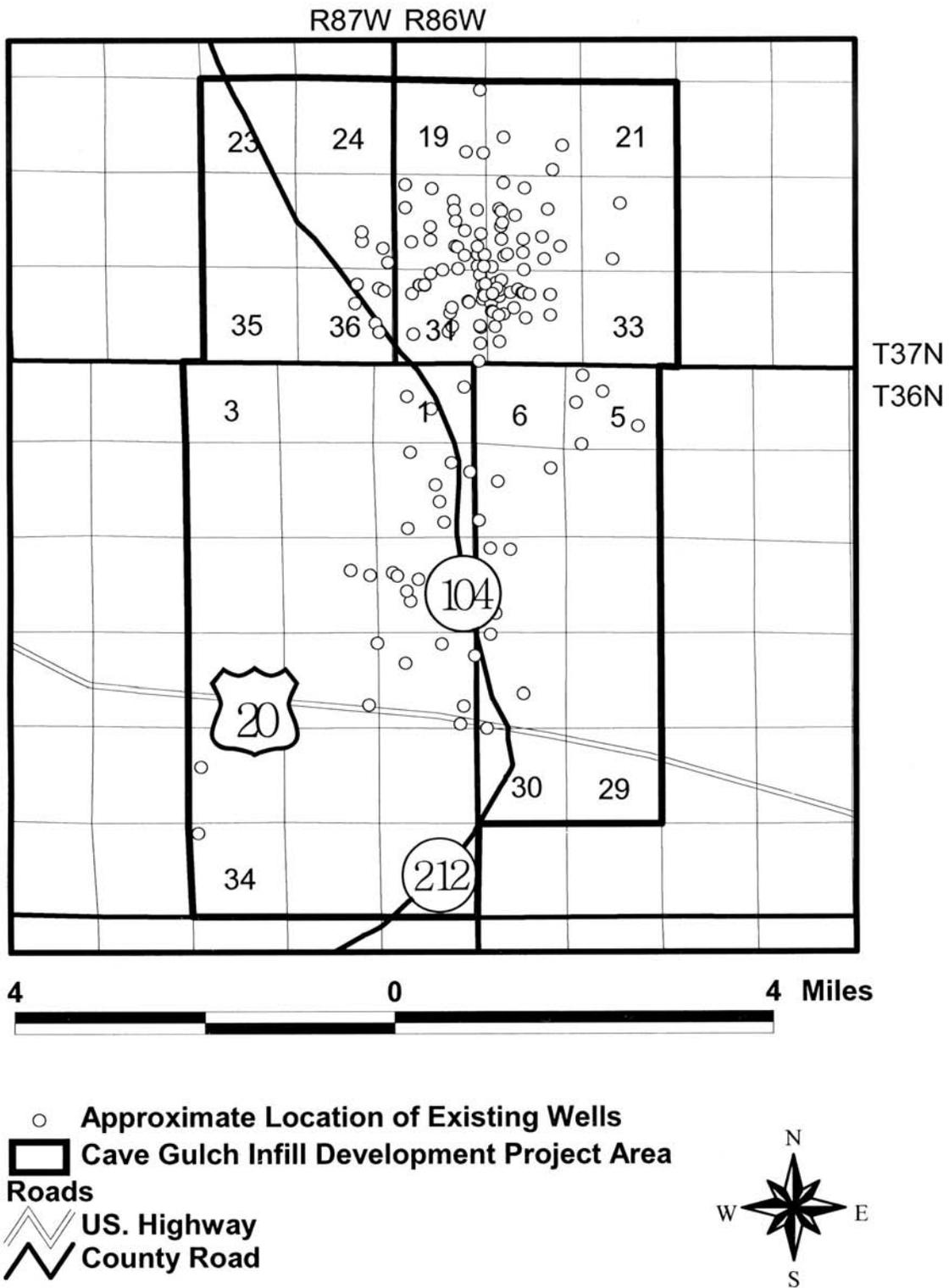


Figure 3.1 Location of Existing Wells Within the CGIDP Area.

Locatable Minerals. There are no active locatable mineral or nonmetallic mineral mines, no economically recoverable deposits, and no leases or claims for locatable minerals within the CGIDP area (BLM 2004).

Salable Minerals. There are no active salable mineral quarries (sand, gravel, granite, etc.) within the CGIDP area; however, several gravel quarries have been developed in the past, and additional reserves are likely present (BLM 2004).

3.3.3 Paleontological Resources

Information concerning paleontological resources was taken from Section 3.1 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Additional information for the 1,920-acre addition has been added.

Numerous important fossil vertebrates have been collected from the Wind River Formation within the CGIDP area, including the remains of fish, crocodiles, turtles, and mammals in the lower portion of the formation. At least eight orders and 14 species of mammals have been identified as a result of limited surveys. Based on a review of the scientific literature and the results of field surveys, there is a high probability that additional fossils of scientific importance could be collected from outcrops of the Wind River Formation in the CGIDP area (Figure 3.2); however, there is a low probability that scientifically important fossils could be collected from the remaining portions of the CGIDP area, including the 1,920-acre addition.

3.3.4 Soil Resources

Information concerning soil resources was taken from Section 3.3 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Additional information for the 1,920-acre addition has been added.

The Natural Resources Conservation Service (NRCS) has prepared an Order III soil survey of Natrona County that includes the entire CGIDP area (NRCS 1997). Soil map units within the CGIDP area are discussed in detail in the Cave Gulch EIS and are incorporated by reference. Soil map units within the additional 1,920-acre area include three soil map units: Hiland, Keyner, and Petrie (NRCS 1997). These

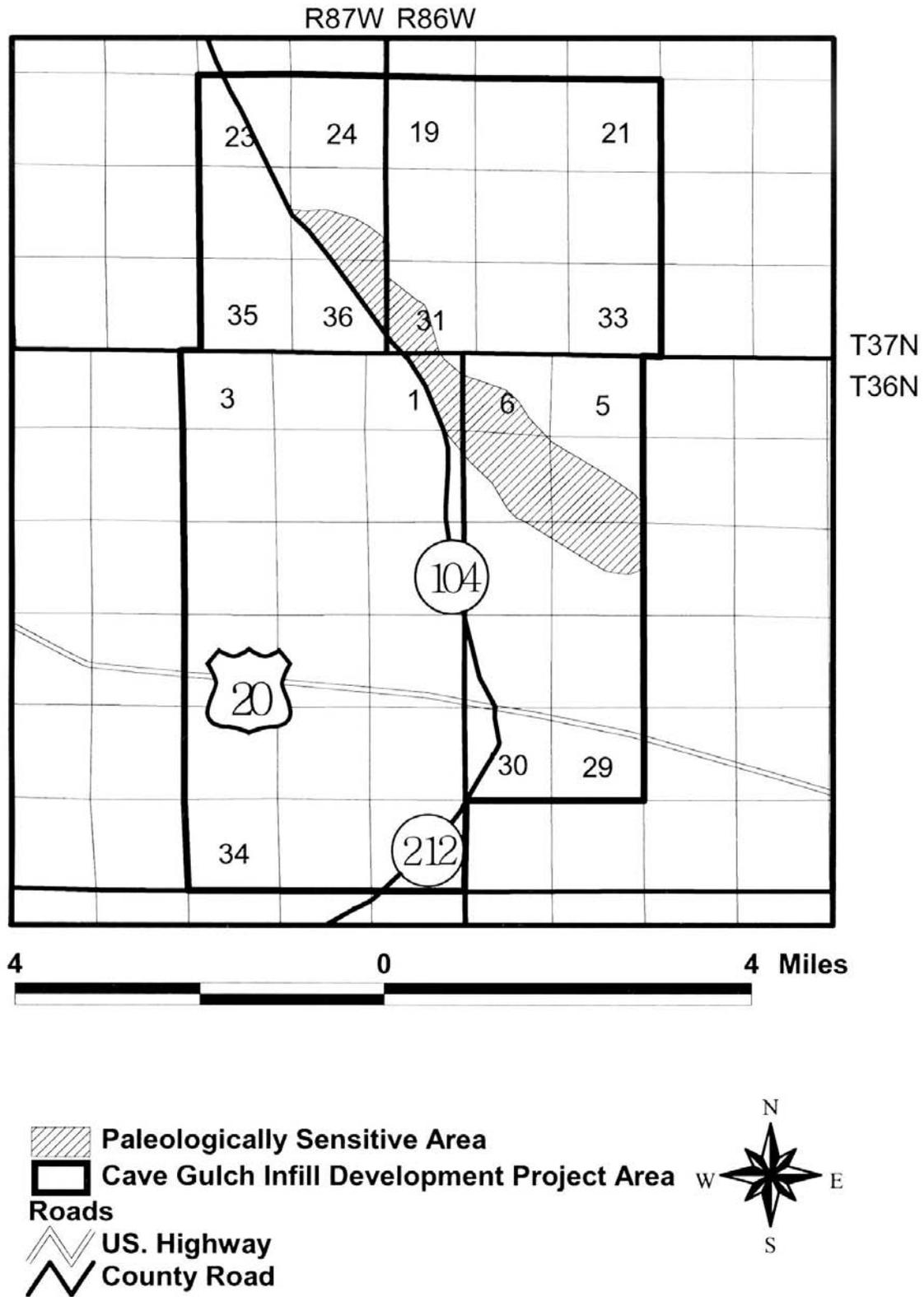


Figure 3.2 Location of Paleontologically Sensitive Area Within the CGIDP Area.

soil map units have been described and included in the Cave Gulch EIS and are incorporated by reference. Depth to bedrock ranges from only a few inches to more than 60 inches. Soil permeability is generally moderate, with some soils having low permeability. No prime farmlands or farmlands of state or local importance occur within the CGIDP area.

Monitoring of disturbed sites in 1999 and 2000 determined that soil conditions were generally stable on most sites. A few sites required additional erosion control measures (Parsons Brinkerhoff 1999; Mullins 2000). Erosion monitoring conducted by BLM in 2003 (the last year for which information is available) determined that 13 of the 15 evaluated sites met erosion control objectives with only minor maintenance required. Two sites were in need of significant remediation work, and the Operators were informed of the situation. The BLM reported that erosion control measures have proven effective in preventing excessive erosion on reclaimed areas and that soil stability was generally good (BLM 2003). The following criteria was used to determine the significance of cumulative impacts to soils in the Cave Gulch EIS (Section 4.3.2 Impact Significance Criteria):

The proposed project would increase the total cumulative soil disturbance within the project area to more than a total of 10 percent of a given watershed intersected by the project area, and/or the watersheds comprising the CIA area.

Based on the BLM's delineation of disturbance in the Cave Gulch EIS area in December 2003, total disturbance in the nine watersheds within the Cave Gulch EIS area ranged from 0% to 9.6% (average of 3.6%). The three watersheds with surface disturbance of 5% or more were Poison Creek (5.7%), Cave Gulch (9.3%), and Waltman Draw (9.6%).

3.3.5 Water Resources

The following information concerning water resources in the CGIDP area was taken from Section 3.4 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Information has been updated where appropriate, and information for the 1,920-acre addition has been added.

3.3.5.1 Surface Water Resources

The CGIDP area, including the 1,920-acre addition, is located at the headwaters of both the Powder River and the Big Horn River (BLM 1997a). Approximately 80% of the project area is located within the Powder River drainage, with the remaining 20% located within the Big Horn River drainage (Figure 3.3).

Both the Powder River and Big Horn River are tributaries of the Yellowstone and Missouri Rivers to the north, with confluences located in Montana.

Approximately 82% of the total linear drainage in the CGIDP area exhibits ephemeral flows--the drainage only carries water in response to a direct precipitation event or snowmelt. The remaining 18% of the drainage channels exhibit intermittent flow, characterized by a nearly continuous flow due to surface runoff and shallow ground-water flows. Some shallow ground water flows are likely sustained by seepage from approximately 27 small impoundments that have been created by diking or damming ephemeral channels. Water levels in these impoundments are not permanent and depend on runoff events. As a result of the continued drought in Wyoming, most of these impoundments do not hold water on a year-round basis.

No surface water quality data are available from the CGIDP area (Wyoming Water Research Data System 2004); however, water quality is expected to be highly variable depending on the nature and intensity of the runoff event and the characteristics of the affected soils. A comparison of water quality from the general area to Wyoming Department of Environmental Quality/Water Quality Division (WDEQ/WQD) water class standards (WDEQ/WQD 2001) indicates that surface water quality would typically meet Class III criteria (livestock class of use) (USGS 2004). All of the drainage channels within the CGIDP area have been designated as having Class 4 surface water quality as defined by the WDEQ/WQD. The Class 4 designation means that these waters cannot support fish (WDEQ/WQD 2001). None of the drainage channels or reservoirs are included in the WDEQ/WQD 2000 303(d) list of water bodies with water quality impairments.

3.3.5.2 Ground Water Resources

Ground-water resources within the CGIDP area include deep and shallow aquifers, as well as confined and unconfined aquifers. Transmissivities and hydraulic conductivities have not been estimated but are likely consistent with values found in other Fort Union and Wind River Formation materials (BLM 1997a). There are no known seeps or springs within the CGIDP area. According to Wyoming State Engineer's Office records, approximately 32 water wells have been drilled in the CGIDP area. One well is 1,250 ft deep; however, most are less than a few hundred feet deep. Static water levels range from 10 to 336 ft below the surface and the wells produce 5 to 35 gallons per minute. Water from these wells has been used for livestock watering, monitoring, irrigation, and domestic purposes (Wyoming State Engineer's Office 2004).

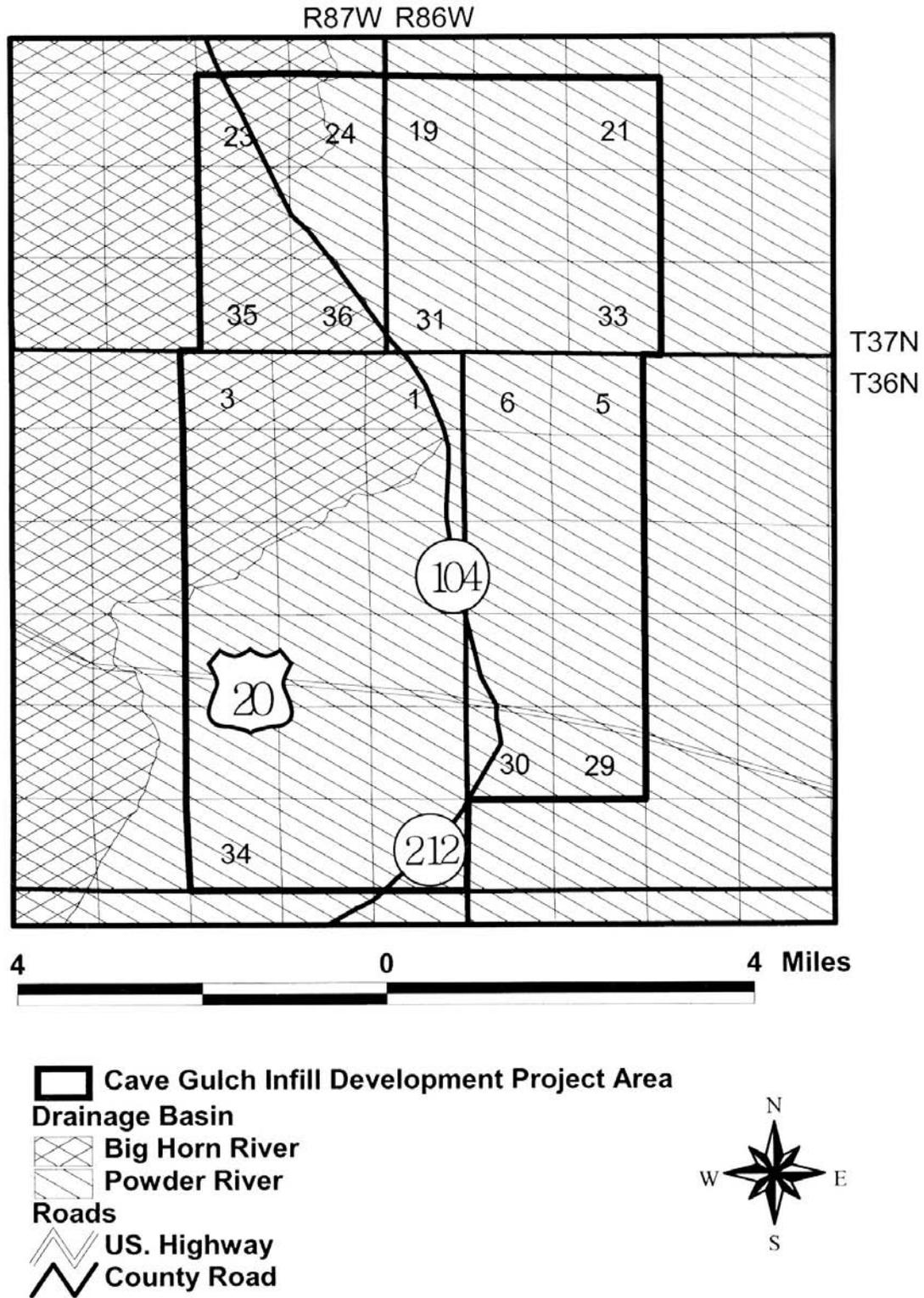


Figure 3.3 Location of Major Drainage Basins Within the CGIDP Area.

There are no site-specific ground water quality data for the CGIDP area. However, groundwater quality is likely highly variable and is related to the depth of the aquifer and the geologic formation (U.S. Geological Service [USGS] 2004).

3.3.5.3 Wetlands Resources

The following information concerning wetlands in the CGIDP area was taken from Section 3.5 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Information has been updated where appropriate, and information for the 1,920-acre addition has been added.

No formal jurisdictional wetland delineations have been conducted in the CGIDP area. However, National Wetland Inventory (NWI) maps produced by the U.S. Fish and Wildlife Service (USFWS) show potential wetlands along numerous drainage channels and reservoirs. The NWI maps indicate that there are less than 300 acres (approximately 1.1% of the CGIDP area) of potential wetlands in the CGIDP area (BLM 1997a).

3.4 BIOLOGICAL RESOURCES

3.4.1 Vegetation (including Invasive Non-native Species)

The following information concerning vegetation in the CGIDP area was taken from Section 3.5 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Information has been updated where appropriate, and information for the 1,920-acre addition has been added.

The CGIDP area includes primarily three vegetation types: 1) mixed desert scrub, 2) badlands, and 3) alkali bottom lands. Approximately 87% of the CGIDP area is composed of mixed desert scrub associated with the rolling hills located throughout most of the CGIDP area. Approximately 12% of the overall project area is composed of badland vegetation type associated primarily with steep slopes and badland areas located in an area generally east of Natrona County Road 104 and south/southwest of the BNSF railroad tracks. The alkali bottom lands vegetation type covers approximately 1% of the CGIDP area in scattered bottomlands and saline depressions. Most of the vegetation within the 1,920-acre project addition is mixed desert scrub with small areas of alkali bottomlands.

No comprehensive site-specific surveys have been conducted to determine the presence of noxious or invasive non-native species within the CG IDP area; however, Canadian thistle (*Cirsium arvense*), musk thistle (*Carduus nutans*), cheatgrass (*Bromus tectorum*), Russian knapweed (*Acroptilon repens*), and halogeton (*Halogeton glomeratus*) have been documented on previously disturbed areas within the CGIDP area (BLM 2003). It is also possible that Japanese brome, hoary cress, and saltcedar occur.

3.4.2 Wildlife Resources

The following information concerning wildlife resources in the CGIDP area was taken from Section 3.7 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Information has been updated where appropriate, and information for the 1,920-acre addition has been added.

3.4.2.1 Big Game

Pronghorn antelope and mule deer are the two big game species found in the CGIDP area, including the 1,920-acre project addition.

Pronghorn Antelope. Although pronghorn antelope are not abundant in the CGIDP area, but portions of four herd units do occur--Beaver Rim (632), Badwater (634), Rattlesnake (745), and North Natrona (746). Less than 1.5% of the total area of any herd unit is included in the CGIDP area, and approximately 0.5% of the combined acreage of the four herd units is included. The entire CGIDP area is either yearlong or winter/yearlong range, and no crucial winter range occurs. The closest crucial winter or crucial winter/yearlong range is approximately 0.5 mi to the northwest. At the end of 2003, the North Natrona herd unit had a population 11% above the Wyoming Game and Fish Department (WGFD) population objective, whereas the three other herd units (Beaver Rim, Badwater, and Rattlesnake) had populations that were below WGFD population objectives (-9% , -6%, and -6%, respectively). Drought continues to be one of the primary factors depressing pronghorn antelope populations (WGFD 2004).

Mule Deer. Mule deer are not abundant in the CGIDP area. Portions of four herd units occur there--Southwest Bighorns (208), Beaver Rim (648), Rattlesnake (758), and North Natrona (759). Less than 1.5% of the total area of any herd unit is included in the CGIDP area, and approximately 0.6% of the combined acreage of the four herd units is included. Approximately 50% of the CGIDP area is either yearlong or winter/yearlong range and the remaining 50% of the project area is designated as "out" (areas that do not contain enough animals or important habitat for the species). No crucial winter range occurs

in the CGIDP area--the closest crucial winter or crucial winter/yearlong range is approximately 5 mi to the north. At the end of 2003, two of the herd units (Rattlesnake and North Natrona) had populations below WGFD population objectives (-35% and -48%, respectively). The Southwest Bighorns and Beaver Rim herd units are not addressed because they do not provide any useable habitat in the CGIDP area. Drought continues to be one of the primary factors depressing mule deer populations (WGFD 2004).

3.4.2.2 Other Mammals

Other mammal species known to occur or to potentially occur in the CGIDP area include coyote, badger, deer mouse, least chipmunk, Wyoming ground squirrel, white-tailed jackrabbit, and desert cottontail (WGFD 1999; BLM 1997a). Prairie dog colonies may exist in the extreme northern portion of CGIDP area; however, to date no mapping has been completed. There are no prairie dog colonies within the CGIDP area south of the BNSF railroad.

3.4.2.3 Raptors

Section 3.7.2.3 of the draft Cave Gulch EIS (BLM 1997a) contains a comprehensive discussion of raptors and historic raptor nesting activity within the Cave Gulch EIS area and the Greater Cave Gulch Raptor Analysis Area (GRAA).

Appendix B of the Cave Gulch ROD--the Raptor Management and Monitoring Plan--called for the following monitoring to be conducted.

- Monitoring of raptor nesting activity in the Cave Gulch EIS area and the GRAA. (The GRAA is a 273-m² area surrounding the Cave Gulch EIS area.) These surveys were completed from 1996 through 1998 by private consultants. BLM contracted with WGFD to monitor the GRAA in 1999; however, the survey was less intensive than the 1996-1998 surveys.
 - Annual monitoring of the 14 artificial nesting structures (ANS) mandated in Section 2.2.1 of Appendix B of the Cave Gulch ROD. The Operators were responsible for monitoring the ANS sites from 1998 through 2000, with BLM assuming monitoring responsibilities subsequent to 2000. Monitoring by private consultants occurred in 1998, 1999, and 2004.
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- Annual prey -base survey s conducted by the Operators during September from 1997 through 2000. Surveys were completed in 1997 and 1998.
 - Reports were to be submitted to BLM by December 1 of each survey year documenting the results of monitoring and survey activities. Reports were submitted for the monitoring conducted by private contractors.
 - Following completion of the surveys in 2000, the BLM in coordination with the USFWS and the WGFD were to evaluate the effectiveness of raptor mitigation, with the evaluation completed no later than June 1, 2001. This evaluation was never performed by BLM.

As indicated above, compliance with raptor monitoring in the GRAA has been somewhat sporadic since issuance of the Cave Gulch ROD. Nest monitoring and prey -base surveys were conducted through the years 1999 and 1998, respectively. No comprehensive inventories were conducted in 1999 and 2000. BLM contracted with the WGFD for fixed-wing aircraft raptor nesting inventories throughout the CFO area for 2001 and 2002. However, these aerial inventories involved flying linear transects spaced at 0.5-mi intervals and did not specifically target raptor nests previously identified within either the Cave Gulch EIS area or the GRAA. No comprehensive written report was provided to BLM documenting the results of these inventories as they pertained to raptor nesting activity in the Cave Gulch EIS area or the GRAA specifically.

Comprehensive inventories of nesting activity within the Cave Gulch EIS area, but not the GRAA, were conducted in 2003 and 2004. Raptor nesting activity was not observed in the Cave Gulch EIS area in 2003, and in 2004 one nest was occupied by a pair of golden eagles; however, nesting success was not determined.

In accordance with the mitigation contained in Appendix B of the Cave Gulch ROD, the Cave Gulch EIS Operators installed 14 ANSs in areas east-northeast of the Cave Gulch EIS area prior to the 1998 breeding/nesting season. Monitoring determined that one ANS was occupied by a pair of ferruginous hawks in 1998, and three chicks were produced. In 1999, two ANSs were occupied by ferruginous hawks. Nesting activity at these ANS sites was not monitored again until 2004, at which time five of the 14 ANSs were active, as follows.

- One ANS (ANS #7) was occupied by a pair of ferruginous hawks and produced at least one chick.
-

- One ANS (ANS #15) was occupied by a pair of golden eagles and two chicks were observed in the nest.
- One ANS (ANS #18) was occupied by a pair of ferruginous hawks and three chicks observed in the nest.
- One ANS (ANS #39) was occupied by pair of ferruginous hawks and produced at least one chick.
- One ANS (ANS #43) was occupied by pair of ferruginous hawks and produced at least one chick.

3.4.2.4 Upland Game Birds

Mourning dove and greater sage-grouse are the only upland game birds that occur in the CGIDP area, including the three-section addition. Greater sage-grouse is a BLM-sensitive species and background information is presented in Section 3.4.3.3 of this EA. Mourning doves are found in the CGIDP area during the summer months in sagebrush-grass, mountain brush, and riparian habitats.

3.4.2.5 Migratory and Non-Migratory Birds

Bird species distribution as reported in *The Atlas of Birds, Mammals, Reptiles and Amphibians in Wyoming* (WGFD 1999) includes a compilation of observations mapped by latitude and longitude, with Wyoming divided into 28 regions. These regions are based upon a one degree separation of both latitude and longitude. The CGIDP falls with Wyoming Distribution Areas (latilongs) 11 and 18 as defined by WGFD (1999). Avian distribution data for the Partners in Flight (PIF) priority species potentially occurring within the CGIDP is included in Table 3.3. Only those birds that have been classified by WGFD (1999) as confirmed breeders (nest and/or young observed), with circumstantial evidence of breeding (nest and/or young not located), or that have been observed at any time (season) within the general area (but without any evidence of breeding) are included in the list.

Most of the birds listed in Table 3.3 typically nest either on the ground or in shrubs; therefore, activities associated with the Proposed Action have the potential to destroy individual nests, eggs, and/or young of some of these species. Projected losses are indeterminate as there are no Breeding Bird Survey (BBS) routes located within the immediate vicinity of the CGIDP to provide information on breeding bird densities.

Concerns regarding the decline of both migratory and non-migratory bird populations both locally and on a continental scale have resulted in a nationwide bird conservation planning effort. Management goals and objectives for bird conservation are found in the Land Bird Strategic Plan, Presidential *Executive Order* (EO) 13186 dated January 17, 2001, and the Proposed Memorandum of Understanding associated with the above Presidential EO. Bird Conservation Plans prepared at the state and regional levels also include objectives for bird conservation. As evidenced by EO 13186, there has been national direction to implement actions that incorporate these goals.

3.4.2.6 Amphibians, Reptiles, and Fish

No site-specific surveys have been conducted for amphibians, reptiles, or fish, and based on range and habitat preference relatively few amphibians or reptiles likely occur in the CGIDP area. However, according to the WGFD, it is possible that tiger salamander, northern leopard frog, boreal chorus frog, northern sagebrush lizard, great short-horned lizards, bull snake, intermountain wandering garter snake, and prairie rattlesnake may be found in suitable habitats in the CGIDP area (WGFD 1999). Due to the lack of permanent water bodies or perennial streams, the CGIDP area is not likely to support any fish populations (WGFD 1999; BLM 1997a).

3.4.3 Threatened, Endangered, Proposed, and Candidate Species and BLM-Sensitive Species

The following information concerning threatened, endangered, proposed, and candidate (TEPC) species and BLM-sensitive species was taken from Section 3.7 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Information has been updated where appropriate, and information for the 1,920-acre addition has been added.

The *Endangered Species Act* (16 U.S.C. 1531-1543) protects listed threatened and endangered plant and animal species and their critical habitats. A list of TEPC species that potentially occur in the CGIDP area was provided by the Wyoming State Office of the USFWS (2004a) (Table 3.4). Endangered species are in danger of extinction throughout all or a significant portion of their range. Threatened species are likely to become endangered in the foreseeable future throughout all or a significant portion of their range. Proposed species are those for which the USFWS has published proposed rules in the *Federal Register* for listing of the species, but for which a final rule has not been adopted. No candidate species occur in the area.

Table 3.3 List of Partners In Flight (PIF) Priority Bird Species Potentially Found Within the CGIDP Area.¹

Common Name	Scientific Name	Habitat Type ²	WGFD Distribution ³	
			Area 11	Area 18
Level I Species (Conservation Action)				
Ferruginous Hawk	<i>Buteo regalis</i> SS/SGP		B	B
Greater Sage Grouse	<i>Centrocercus urophasianus</i> SS		B	B
Mountain Plover	<i>Charadrius montanus</i> SS/SGP		B	B
Upland Sandpiper	<i>Bartramia longicauda</i> SGP		N	B
Long-billed Curlew	<i>Numenius Americana</i> SGP		O	B
Burrowing Owl	<i>Athene cunicularia</i>	SGP	O	B
Short-eared Owl	<i>Asio flammeus</i> SGP		O	O
Baird's Sparrow	<i>Ammodramus bairdii</i> SGP		O	N
Brewer's Sparrow	<i>Spizella breweri</i> SS		O	B
Sage Sparrow	<i>Amphispiza belli</i> SS		O	B
McCown's Longspur	<i>Calcarius mccownii</i> SS/SGP		B	B
Level II Species (Monitoring)				
Black-chinned Hummingbird	<i>Archilochus alexandri</i>	SS	O	N
Loggerhead Shrike	<i>Lanius ludovicianus</i> SS		B	B
Sage Thrasher	<i>Oreoscoptes montanus</i> SS		B	B
Vesper Sparrow	<i>Poocetes gramineus</i> SS		B	B
Lark Sparrow	<i>Chondestes grammacus</i> SS		B	B
Lark Bunting	<i>Calamospiza melanocorys</i> SGP		B	B
Grasshopper Sparrow	<i>Ammodramus savannarum</i> SGP		N	O
Dickcissel	<i>Spiza Americana</i>	SGP	N	O
Bobolink	<i>Dolichonyx oryzivorus</i>	SGP	O	O
Level III Species (Local Interest)				
Common Poorwill	<i>Phalaenoptilus nuttallii</i> SS		B	B
Say's Phoebe	<i>Sayornis saya</i> SS		B	B

¹ Source: Wyoming Bird Conservation Plan, Version 2.0 (Nicholoff 2003).

² SS = Shrub-steppe habitat.

SGP = Shortgrass prairie.

³ B = Nest or young dependent upon parent birds observed.

B = Circumstantial evidence of breeding.

O = Species has been observed, but there was no evidence of nesting.

N = Species has not been observed in the area.

3.4.3.1 Federally Listed Animal and Plant Species

Federally listed species identified by the USFWS that may occur in the vicinity of the CGIDP area include the endangered black-footed ferret, the threatened bald eagle, and the threatened Ute ladies' tresses, as well as five species found downstream in the North Platte River drainage that could be affected by water depletions (USFWS 2004a) (Table 3.4). A 2003 decision by the USFWS determined that the mountain plover does not warrant protection under the *Endangered Species Act*, and the USFWS recently issued a similar decision on greater sage-grouse and elected not to list the species. Therefore, neither of these species is protected under the *Endangered Species Act*.

In addition to the TEPC species identified by the USFWS, additional TEPC species have been identified by BLM that could potentially occur within the general area including Preble's meadow jumping mouse, Colorado butterfly plant, and blowout penstemon.

Black-footed Ferret (*Mustela nigripes*). The black-footed ferret, an endangered species, was once distributed throughout the high plains of the Rocky Mountain and western Great Plains regions (Clark and Stromberg 1987; Forrest et al. 1985). Prairie dogs are the main food of black-footed ferrets (Sheets et al. 1972), and historically a few black-footed ferrets have been collected away from prairie dog towns (Forrest et al. 1985). The nearest black-footed ferret reintroduction area is located approximately 70 mi southeast of the CGIDP area in the Shirley Basin Black-footed Ferret Reintroduction Area, Carbon County, Wyoming.

The *Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act* (USFWS 1989) defines potential black-footed ferret habitat as any white-tailed prairie dog town or complex greater than 200 acres. As indicated in Section 3.4.2.2, limited numbers of prairie dogs are known to occur in the CGIDP area north of the BNSF railroad; however, these prairie dog towns have not been delineated (BLM 1997a). Although potential black-footed ferret habitat may occur within the CGIDP area, it is located outside any area requiring black-footed ferret surveys (USFWS 2004b). In addition, no recent black-footed ferret observations have been recorded in the vicinity of the CGIDP area (Wyoming Natural Diversity Database [WNDD] 2004); therefore, it is unlikely that any black-footed ferrets would occur in the CGIDP area, and the species is not discussed further in this EA.

Table 3.4 Federally Listed Threatened, Endangered, Proposed, and Candidate Species and Their Potential Occurrence Within the CGIDP Area, 2003.

Common Name	Scientific Name	Federal Status ¹	Potential Occurrence Within the CGIDP Area ²
Mammals			
Black-footed ferret	<i>Mustela nigripes</i>	E	X
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	T X	
Birds			
Bald eagle ³	<i>Haliaeetus leucocephalus</i>	T	O
Interior least tern ⁴	<i>Sterna antillarum</i>	E X	
Piping plover ⁴	<i>Charadrium melodus</i>	T X	
Eskimo curlew ⁴	<i>Numenius borealis</i>	E X	
Fish			
Pallid sturgeon ⁴	<i>Scaphirhynchus albus</i>	E X	
Plants			
Blowout penstemon	<i>Penstemon haydenii</i>		X
Colorado butterfly plant	<i>Gaura neomexicana</i> ⁵	T	X
Ute ladies'-tresses	<i>Spiranthes diluvialis</i>	T	X
Western prairie fringed orchid ⁴	<i>Platanthera praeclara</i>	T	X

¹ Federal status:

E = listed as federally endangered.

T = listed as federally threatened.

² Species occurrence:

O = occasional; this species may occur in the CGIDP Area during specific times of the year and may be locally common when suitable food is available; generally not present for extended periods.

X = unlikely; there has been no recent historical record of the species' occurrence in the CGIDP Area; probability of encountering the species during the Proposed Action is very unlikely.

³ Proposed for removal from federal listing.

⁴ North Platte River Species.

⁵ Subspecies *coloradensis*.

Bald Eagle (*Haliaeetus leucocephalus*). The bald eagle is a threatened species (down-listed from endangered and now proposed for removal from federal listing) that requires cliffs, large trees, or sheltered canyons associated with a concentrated food source (fish or waterfowl concentration areas) for nesting and/or roosting areas. Bald eagles forage over wide areas during the non-nesting season (fall and winter) and scavenge on animal carcasses such as pronghorn, deer, elk, sheep, and cattle (Edwards 1969; Snow 1973; Call 1978; Steenhof 1978; Peterson 1986).

No bald eagle nests or winter roosts are known to occur within the CGIDP area, and the lack of suitable nesting or winter roosting habitat likely precludes such use. The BLM has designated the Jackson Canyon area on the west end of Casper Mountain as an area of critical environmental concern (ACEC) to

protect concentrated bald eagle winter roosting activity therein. The Jackson Canyon ACEC is directly adjacent to the North Platte River and is located approximately 40 mi southeast of the CGIDP area. Survey flights during the early 1980s suggested that more bald eagles were foraging in rangelands than along the rivers and other large water bodies. In this regard, open rangelands throughout east-central Wyoming are probably being used opportunistically by bald eagles for foraging; however, no bald eagles have been observed in the CGIDP area in conjunction with BLM or BLM-approved inventories within the project area.

The BLM has also designated two winter roost areas on Pine Mountain--approximately 13 mi east-southeast of the CGIDP area--and numerous bald eagle concentration areas are located immediately adjacent to the North Platte River approximately 20 mi southeast of Pine Mountain and approximately 40 mi southeast of the CGIDP area. Bald eagles historically were drawn to the Pine Mountain winter roost area because domestic sheep were grazed on the mountain and winter-killed sheep were available for food. The private landowner who currently owns portions of Pine Mountain reported that bald eagles regularly used Pine Mountain as a winter roost when sheep were grazed on the mountain; however, few bald eagles are seen in the area since winter sheep grazing was discontinued (personal communication, February 27, 2004, with John Wing, Pine Mountain landowner).

The WNDD provided no records of bald eagles in the vicinity of the CGIDP area (WNDD 2004).

Ute ladies'-tresses (*Spiranthes diluvialis*). Ute ladies'-tresses, a threatened species, is a perennial orchid that inhabits moist streambanks, wet meadows, and abandoned stream channels at elevations of 1,780 to 6,800 ft (Fertig 2000; Spackman et al. 1997). Where Ute ladies'-tresses occurs in ephemeral drainages, groundwater is typically shallow (within approximately 18 inches of the ground surface) (personal communication, March 16, 2000, with Pat Deibert, USFWS, Cheyenne, Wyoming; personal communication, March 22, 2000, with Walt Fertig, WNDD, Laramie, Wyoming). The plant has been found locally in the North Platte River drainage below Alcova Reservoir and in Cheyenne and Niobrara River drainages in southeastern Wyoming.

Four occurrences of the species have been recorded in Wyoming, with all discoveries made between 1993 and 1997. The closest recorded occurrence of Ute ladies'-tresses to the CGIDP area is in northwestern Converse County approximately 60 mi to the east, and there have been no occurrences recorded in the CGIDP area or anywhere else in Natrona County (Fertig 2000; WNDD 2004). Because the CGIDP does

not occur within the drainages of the North Platte, Cheyenne, or Niobrara rivers, the Proposed Action would not affect Ute ladies'-tresses, and the species is not discussed further in this EA.

Preble's meadow jumping mouse (*Zapus hudsonius preblei*). Preble's meadow jumping mouse, a threatened species, is a potential resident in riparian habitats east of the Laramie Mountains and south of the North Platte River drainages. There are no perennial or intermittent streams with associated riparian habitats within the CGIDP area, and the project area is not within the area of expected occurrence for the Preble's meadow jumping mouse. Therefore, the species is not discussed further in this EA.

Colorado butterfly plant (*Gaura neomexicana* spp. *coloradensis*). This threatened plant species is a potential resident on subirrigated alluvial soils on level or slightly sloping floodplains and drainage bottoms at elevations of 5,000 to 6,400 ft. Colonies are often found in low depressions or along bends in wide meandering stream channels. Known populations of this species are restricted to approximately 1,700 acres of habitat in Laramie County, Wyoming, western Kimball County, Nebraska, and Weld County, Colorado, within the drainages of both the North and South Platte rivers. There are no perennial or intermittent streams with associated subirrigated alluvial soils or floodplains within the CGIDP. Furthermore, because the CGIDP is not located within the North Platte River drainage--the expected area of occurrence--impacts to the Colorado butterfly plant are not expected to occur, and the species is not discussed further in this EA.

Blowout penstemon (*Penstemon haydenii*). This endangered plant is a potential resident in "blowouts"--sparsely vegetated depressions in active sand dunes created by wind erosion that typically form on windward sandy slopes where the vegetation has been removed or disturbed. The only known populations of blowout penstemon in Wyoming are found at the eastern end of the Ferris sand dune system at the head of Schoolhouse Creek and the west side of Bradley Peak in Carbon County (BLM 2003). There are no active sand dunes within the CGIDP, and this species is not expected to occur within the project area. As a consequence, this species is not discussed further in this EA.

North Platte River Species. In addition to the species listed above, the USFWS also identified five TEPC species that may occur in the downstream riverine habitats of the North Platte River in Nebraska. These species include the endangered interior least tern (*Sterna antillarum*), the threatened piping plover (*Charadrius melodus*), the endangered pallid sturgeon (*Scaphirhynchus albus*), the endangered Eskimo curlew (*Numenius borealis*), and the threatened Western prairie fringed orchid (*Platanthera praeclara*). These species could be adversely affected by surface water depletions (consumption) in the North Platte

River system resulting from project-related activities. However, the CGIDP area is not located within the North Platte River drainage, and no surface water depletions to the North Platte River system would occur as a result of the CGIDP; therefore, these species are not discussed further in this EA.

3.4.3.2 BLM-Sensitive Animal and Plant Species

BLM-sensitive species are those species that may warrant future designation as proposed species but for which available data are not currently sufficient for USFWS to make such a decision. Based on habitat preference and geographic location, numerous BLM-sensitive species are known to occur or potentially occur within the CGIDP area (Table 3.5). BLM-sensitive animal and plant species potentially occurring in or in the vicinity of the CGIDP area include spotted bat, Townsend's big-eared bat, white-tailed prairie dog, swift fox, ferruginous hawk, greater sage-grouse, burrowing owl, loggerhead shrike, sage thrasher, northern leopard frog, mystery wormwood, and Nelson's milkvetch (WNDD 2004). There may be some overlap of avian species between Table 3.3 and Table 3.5.

Greater Sage-grouse. There are five historic greater sage-grouse (*Centrocercus urophasianus*) leks known to exist within the general area:

- Broad Mesa 1: SE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 16, T35N, R86W;
- Broad Mesa 2: NE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 18, T35N, R86W;
- Notches 1: NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 17, T37N, R85W;
- Notches 3: SE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 12, T37N, R86W; and
- Jackpot: NW $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 26, T38N, R87W.

Strutting activity at the Broad Mesa lek complex is unknown for nine of the past 10 years. The Broad Mesa 1 lek has not been inventoried for activity since 1994. The Broad Mesa 2 lek was discovered in 2000, was active that year, and apparently has not been inventoried since its initial discovery. The Notches lek complex has been active since 2001. The Jackpot lek was active in 1998-1999 and again in 2001-2003. None of the above leks are within 3 mi of the CGIDP area, and there are no other known greater sage-grouse leks within 3 mi of the CGIDP area; however, there is some evidence (droppings) that greater sage-grouse may occasionally utilize some portions of the CGIDP area (BLM 1997a). Potential greater sage-grouse nesting and early brood-rearing habitat (based upon observations of shrub height and densities) is known to exist within portions of the overall CGIDP area including areas south of U.S. Highway 20-26, west of Natrona County Road 104, and north of the BNSF railroad ROW. Portions of

Table 3.5 Wyoming BLM-sensitive Species and Habitat Preference, 2004.

Species			Likely to occur in the CGIDP area ¹
Common Name	Scientific Name	Habitat	
Mammals			
Long-eared Myotis	<i>Myotis evotis</i>	Conifer and deciduous forests, caves and mines	N
Fringed Myotis	<i>Myotis thysanodes</i>	Conifer forests, woodland-chaparral, caves and mine	N
Spotted Bat	<i>Euderma maculatum</i>	Cliffs over perennial water, basin-prairie shrub	Y
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	Forests, basin-prairie shrub, caves and mines	Y
Pygmy Rabbit	<i>Brachylagus idahoensis</i>	Basin-prairie and riparian shrub	Y
White-tailed Prairie Dog	<i>Cynomys leucurus</i>	Basin-prairie shrub, grasslands	N
Wyoming Pocket Gopher	<i>Thomomys clusius</i>	Meadows with loose soil	N
Idaho Pocket Gopher	<i>Thomomys idahoensis</i>	Shallow stony soils	N
Swift Fox	<i>Vulpes velox</i>	Grasslands	Y
Birds			
White-faced Ibis	<i>Plegadis chihi</i>	Marshes, wet meadows	N
Trumpeter Swan	<i>Cygnus buccinator</i>	Lakes, ponds, rivers	N
Northern Goshawk	<i>Accipiter gentilis</i>	Conifer and deciduous forests	N
Ferruginous Hawk	<i>Buteo regalis</i>	Basin-prairie shrub, grassland, rock outcrops	Y
Greater Sage-grouse	<i>Centrocercus urophasianus</i>	Basin-prairie shrub, mountain-foothill shrub	Y
Long-billed Curlew	<i>Numenius americanus</i>	Grasslands, plains, foothills, wet meadows	N
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Open woodlands, streamside willow and alder groves	N
Burrowing Owl	<i>Athene cunicularia</i>	Grasslands, basin-prairie shrub	Y
Sage Thrasher	<i>Oreoscoptes montanus</i>	Basin-prairie shrub, mountain-foothill shrub	Y
Loggerhead Shrike	<i>Lanius ludovicianus</i>	Basin-prairie shrub, mountain-foothill shrub	Y
Brewer's Sparrow	<i>Spizella breweri</i>	Basin-prairie shrub	N
Mountain Plover	<i>Charadrius montanus</i>	Shortgrass, great basin-foothills grassland, and sagebrush-grasslands	Y
Fish			
Roundtail Chub	<i>Gila robusta</i>	Colorado River drainage, mostly large rivers, also streams and lakes	N
Leatherside Chub	<i>Gila copei</i>	Bear, Snake and Green drainages, clear, cool streams and pools	N
Bluehead Sucker	<i>Catostomus discobolus</i>	Bear, Snake and Green drainages, all waters	N
Flannelmouth Sucker	<i>Catostomus latipinnis</i>	Colorado River drainage, large rivers, streams and lakes	N
Colorado River Cutthroat Trout	<i>Oncorhynchus clarki pleuriticus</i>	Colorado River drainage, clear mountain streams	N
Reptiles			
Midget Faded Rattlesnake	<i>Crotalus viridis concolor</i>	Mountain foothills shrub, rock outcrop	N

Table 3.5 (Continued).

Species		Habitat	Likely to occur in the CGIDP area ¹
Common Name	Scientific Name		
Amphibians			
Boreal (Northern Rocky Mountain population) Toad	<i>Bufo boreas boreas</i>	Pond margins, wet meadows, riparian areas	N
Spotted Frog	<i>Rana pretiosa (lutiventris)</i>	Ponds, sloughs, small streams	N
Plants			
Meadow Pussytoes	<i>Antennaria arcuata</i>	Moist, hummocky meadows, seeps or springs surrounded by sage/grasslands 4,950-7,900 ft	N
Small Rock Cress	<i>Arabis pusilla</i>	Cracks/Crevice in sparsely vegetated granite/pegmatite outcrops w/in sage/grasslands 8,000-8,100 ft	N
Mystery Wormwood	<i>Artemisia biennis</i> var. <i>diffusa</i>	Clay flats and playas 6,500 ft	Y
Nelson's Milkvetch	<i>Astragalus nelsonianus</i> -or- <i>Astragalus pectinatus</i> var. <i>platyphyllus</i>	Alkaline clay flats, shale bluffs and gullies, pebbly slopes, and volcanic cinders in sparsely vegetated sagebrush, juniper, and cushion plant communities at 5,200-7,600 ft	Y
Precocious Milkvetch	<i>Astragalus proimanthus</i>	Cushion plant communities on rocky, clay soils mixed with shale on summits and slopes of white shale hills 6,800-7,200 ft	N
Cedar Rim Thistle	<i>Cirsium aridum</i>	Barren, chalky hills, gravelly slopes, and fine textured, sandy-shaley draws 6,700-7,200 ft	N
Ownbey's Thistle	<i>Cirsium ownbeyi</i>	Sparsely vegetated shaley slopes in sage and juniper communities 6,440-8,400 ft	N
Wyoming Tansymustard	<i>Descurainia torulosa</i>	Sparsely vegetated sandy slopes at base of cliffs of volcanic breccia or sandstone 8,300-10,000 ft	N
Large-fruited Bladderpod	<i>Lesquerella macrocarpa</i>	Gypsum-clay hills and benches, clay flats, and barren hills 7,200-7,700 ft	N
Stemless Beardtongue	<i>Penstemon acaulis</i> var. <i>acaulis</i>	Cushion plant or Black sage grassland communities on semi-barren rocky ridges, knolls, and slopes at 5,900-8,200 ft	N
Beaver Rim Phlox	<i>Phlox pungens</i>	Sparsely vegetated slopes on sandstone, siltstone, or limestone substrates 6,000-7,400 ft	N
Tufted Twinpod	<i>Physaria condensata</i>	Sparsely vegetated shale slopes and ridges 6,500-7,000 ft	N
Green River Greenthread	<i>Thelesperma caespitosum</i>	White shale slopes and ridges of Green River Formation 6,300 ft	N
Uinta Greenthread	<i>Thelesperma pubescens</i>	Sparsely vegetated benches and ridges on coarse, cobbly soils of Bishop Conglomerate 8,200-8,900 ft	N
Cedar Mountain Easter Daisy	<i>Townsendia microcephala</i>	Rocky slopes of Bishop Conglomerate 8,500 ft	N

¹ Y = likely to occur in or in the vicinity of the CGIDP area based on habitat and WNDD data (2004).
N = not likely to occur in or in the vicinity of the CGIDP area based on habitat and WNDD data (2004).

the CGIDP area south of the core area (Sections 29- 32, T36N, R86W) and east of Natrona County Road 104 may also contain pockets of suitable nesting habitat for greater sage grouse.

Mountain Plover. Mountain plover inhabit the high dry short-grass plains east of the Rocky Mountains (Dinsmore 1983), as well as the sagebrush grasslands throughout Wyoming (WGFD 1999), and are documented to breed throughout Wyoming, especially in prairie dog colonies (WGFD 1999). Potential mountain plover habitat has been identified in the northeast corner of the CGIDP area (portions of Sections 19-21, T37N, R86N) and mountain plover observations have been documented in the Ralston Flats area north of the CGIDP area in 1997 (BLM 1997a) and again in 2003 and 2004. Successful mountain plover breeding and nesting activity was documented in Section 27, T36N, R87W, in 2004.

Ferruginous Hawk. Approximately 46 ferruginous hawk nests are widely distributed throughout the CGIDP area. Approximately 60% of the nest sites are found in the badlands in the northeastern portion of the area, whereas the remaining 40% are located in the open rolling plains. Monitoring conducted for 5 years between 1994 and 1998 documented that 11 (24%) of the 46 nest sites were active at some time, and one of these nest sites was documented as producing young in 1997 and 1998. The surveys determined that no more than one or two of these nests were ever active in any particular year (Hayden-Wing Associates 1998). A comprehensive examination of the history of raptor nesting within the original Cave Gulch EIS project area suggests that the status of raptor nests varies from year to year depending on prey availability and other factors (BLM 1997a).

3.5 HUMAN RESOURCES

3.5.1 Cultural Resources

The following information concerning cultural resources in the CGIDP area was taken from Section 3.10 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Cultural resource information has been updated where appropriate, and information for the 1,920-acre addition has been added.

Cultural resources are the nonrenewable physical remains of past human activity and are protected under Section 106 of the *National Historic Preservation Act of 1966*, as amended (16 U.S.C. § 470 et seq) and the *Archaeological Resources Protection Act of 1979*, as amended (16 U.S.C. § 470aa et seq). Archaeological investigations in the Powder River and Wind River basins indicate that human activity has

occurred across the landscape over the past 10,000 years, beginning during the Paleo-Indian period and continuing up to the present (Frison 1991; BLM 1997a).

The CGIDP area has “an exceptionally high site density with a potential for sites to be present in any or all of the topographic contexts in the study area” (BLM 1997a). An undetermined number of these sites may be eligible for nomination to the National Register of Historic Places (NRHP). Wyoming State Historic Preservation Office (SHPO) records indicate that approximately 300 cultural resource projects (block and linear inventories or data recovery projects) have been completed within the CGIDP area (including the three-section addition). The majority of these projects were Class III inventories conducted in association with oil and gas development, various product pipelines, telephone lines/cables, and transmission lines. Forty-nine prehistoric and historic sites have been determined to be potentially eligible for the NRHP, and numerous other unevaluated sites are present. Prehistoric sites include open camp sites, lithic scatters, stone circles, and rock art. Historic sites include historic ranches, homesteads, trash dumps, the Chicago & Northwestern Railroad Grade, the Bridger Trail, and the National Park-to-Park Highway/Yellowstone Highway (Rosenberg 2004) (Figure 3.4).

3.5.2 Native American Religious Concerns

In accordance with the *American Indian Religious Freedom Act* and BLM Manual 8160-1 Handbook (BLM 1979), numerous Native American groups including but not limited to Crow, Shoshone, Comanche, Arapaho, Cheyenne, and Sioux have utilized the CGIDP area. Native American tribes were consulted during the scoping period for this EA. Tribes and/or individuals were sent certified letters requesting their comments concerning any religious or cultural areas within or near the CGIDP area.

Most of the cultural resources previously identified within the CGIDP area do not appear to have significance as Native American sacred sites or to qualify as traditional cultural properties (TCPs). However, six stone circles have been identified that could be Native American sacred sites or TCPs. Only representatives of Native American tribes can determine the significance of Native American sacred sites or TCPs, and to date no such determinations have been made. This may indicate that the tribes may not view these stone circles as sacred sites or are unwilling to identify them as such.

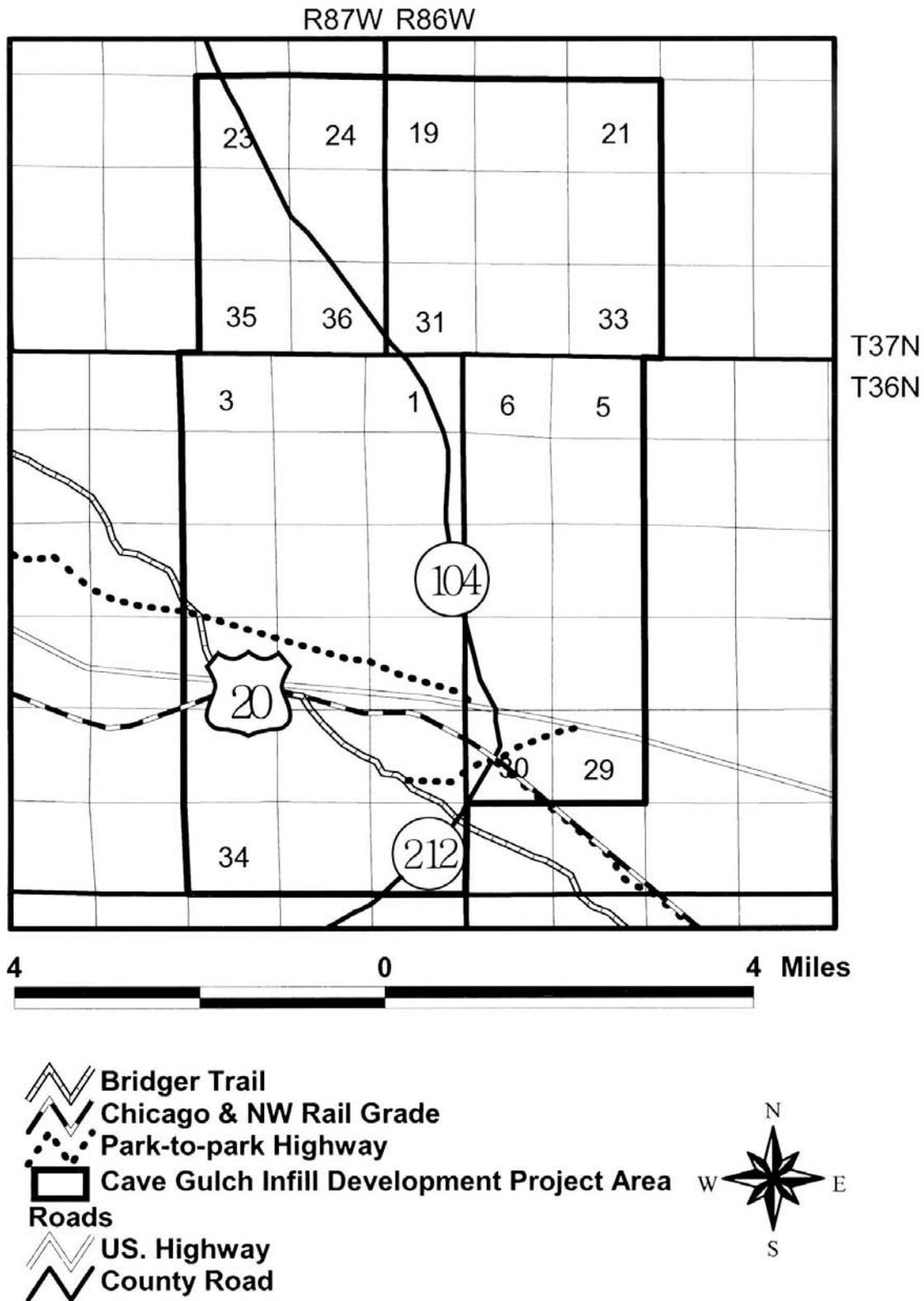


Figure 3.4 Location of Historical Trails, Roads, and Railroad Grades.

3.5.3 Land Use

Information concerning land use was taken from Sections 3.6 and 3.8 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Land use information for the 1,920-acre addition has been added.

3.5.3.1 Landownership and General Use

Approximately 66% of the surface within the CGIDP area is privately owned, approximately 27% is owned by the federal government (administered by BLM), and approximately 7% is owned by the state of Wyoming (see Table 1.1). Approximately 75% of the mineral estate is owned by the federal government (administered by the BLM), approximately 20% is privately owned, and approximately 5% is owned by the State of Wyoming (see Table 1.2). Major land uses within the CGIDP area include oil and gas development, livestock grazing, wildlife habitat, limited recreation, utility corridors (e.g., KN Pony Express pipeline, Western Power Administration Thermopolis-Alcove-Casper 230-kV transmission line, two PacifiCorp 230-kV transmission lines, and numerous distribution power lines), transportation corridors (e.g., U.S. Highway 20-26, County Roads 104 and 212, and the BNSF rail line), and human settlement (the unincorporated community of Waltman).

3.5.3.2 Livestock Grazing

The CGIDP area includes all or portions of seven public grazing allotments, one of which lies entirely within the CGIDP area (Table 3.6). The seven public allotments include approximately 25.2% of the CGIDP area and provide approximately 657 animal unit months (AUMs). Stocking rates range from 8 to 21 acres/AUM. The remaining portions of the CGIDP area are controlled by private landowners using similar stocking rates. Livestock grazing in the 1,920-acre addition is a continuation of the public and private grazing allotments discussed above.

3.5.3.3 Recreation

Recreational opportunities include hunting and scenic touring. No developed recreation sites occur, and the primary recreational use is hunting for antelope, mule deer, greater sage-grouse, and small game such as rabbits. Data on the extent of recreational use of the CGIDP area are not available; however, hunting

Table 3.6 Approximate Acreage and Number of Public AUMs on Grazing Allotments Within the CGIDP Area.

Allotment Number	Lessee(s)	Total Public Acres	Public Acres in Project Area	Percent of Project Area	Total Public AUMs	Public AUMs in Project Area	Acres per AUM
South Cave Gulch (10006)	Flying A Ranch c/o Bob Britain	5,130	4,050	15.0	395	314	13
Powder River Draw (10007)	Norman Preator	2,080	480	1.8	230	58	9
Sand Draw (20512)	Norman Preator	160	160	0.6	18	18	9
Waltman* (10008)	Carlson Ranch	1,280	880	3.2	139	103	9
	Brad Carlson	440	200	0.7	49	22	9
	Flying A Ranch	140	0	0.0	16	16	9
Keg Spring Draw (10029)	Deer Creek Ranch	579	74	0.3	45	4	21
South Hiland (10030)	Deer Creek Ranch	6,127	200	0.7	872	24	9
Miller (10130)	DEM Ranch Ltd Partnership	1,185	785	2.9	138	98	8
Total	17,	121	6,829	25.2	1,902	657	

¹ The Waltman Allotment is an "in common" allotment, where each lessee can take their allocated AUMs throughout the allotment, not just on the legal locations assigned to them in the BLM grazing lease.

opportunities are limited because approximately two-thirds of the overall project area is privately owned, and hunters must have permission from the landowner for trespass. Scenic touring occurs on the Wyoming Department of Transportation/BLM-designated South Big Horn/Red Wall Scenic Byway (Byway). The Byway is approximately 100 mi long and departs to the north from U.S. Highway 20-26 on County Road 125 (approximately 34 mi east of the CGIDP area and 13 mi west of Casper) and connects with County Roads 110, 109, and 104 where it rejoins U.S. Highway 20-26 at Waltman. The Byway can be used to access the southern end of the Big Horn Mountains that is located approximately 10 mi north of the CGIDP area. Much of the Byway is not paved, and access with a passenger car would be virtually impossible under wet or snowy conditions. Approximately 7.75 mi of the southern portion of County Road 104 is located within the CGIDP area. Although portions of the road are designated as a Byway, numerous human developments (oil and gas wells, pipelines, access roads, and electric transmission and distribution lines) are visible to the casual observer as they drive north on County Road 104 from Waltman toward Arminto. There are no Wyoming Department of Transportation/BLM-designated byways located within the 1,920-acre addition.

3.5.4 Visual Resources

The following information concerning visual resources was taken from Section 3.9 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Information has been updated where appropriate, and information for the 1,920-acre addition has been added.

The BLM mapped the entire Platte River Resource Area for visual resource management (VRM), including lands under its management in the CGIDP area, with the overall objective of minimizing visual impacts due to human activities (BLM 1985a). The VRM inventory process considers the scenic quality of the landscape, viewer sensitivity, and the distance from the viewer to the landscape, and VRM values are indicated by one of four designations (Table 3.8).

Within the CGIDP area, there is a 6-mile wide VRM Class III corridor along U.S. Highway 20-26 (3 miles on either side of the highway) that includes approximately 15,000 acres (56%) of the CGIDP area (Figure 3.5). The remaining approximately 12,000 acres (44%) is classified as VRM Class IV. All lands within the three-section addition are designated as VRM Class III.

The natural landscape in this 3-mile VRM Class III corridor along either side of U.S. Highway 20-26 has been subjected to some extensive cultural modifications, all of which contribute to the degradation of the scenic values in the southern end of the CGIDP area. These cultural modifications include, but are not limited to, the following facilities visible from both a foreground and/or middle ground perspective:

- aboveground power transmission lines traversing the overall project area and extending to the north across U.S. Highway 20-26 directly to the west of the community of Waltman;
 - an existing KN Energy compressor station located in the SE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 36, T36N, R87W, approximately 1 mile south of the community of Waltman (east side of Natrona County Road 212);
 - an existing rural store and extensive junkyard located in the S $\frac{1}{2}$ SW $\frac{1}{4}$ of Section 19, T36N, R86W, at the community of Waltman (north side of U.S. Highway 20-26);
 - ranch outbuildings and commercial facilities including an industrial water well, man camp for the water haulers, and a drilling rig stack yard located approximately 0.5 miles south of the community of Waltman in the NE $\frac{1}{4}$ SW $\frac{1}{4}$ of Section 30, T36N, R86W;
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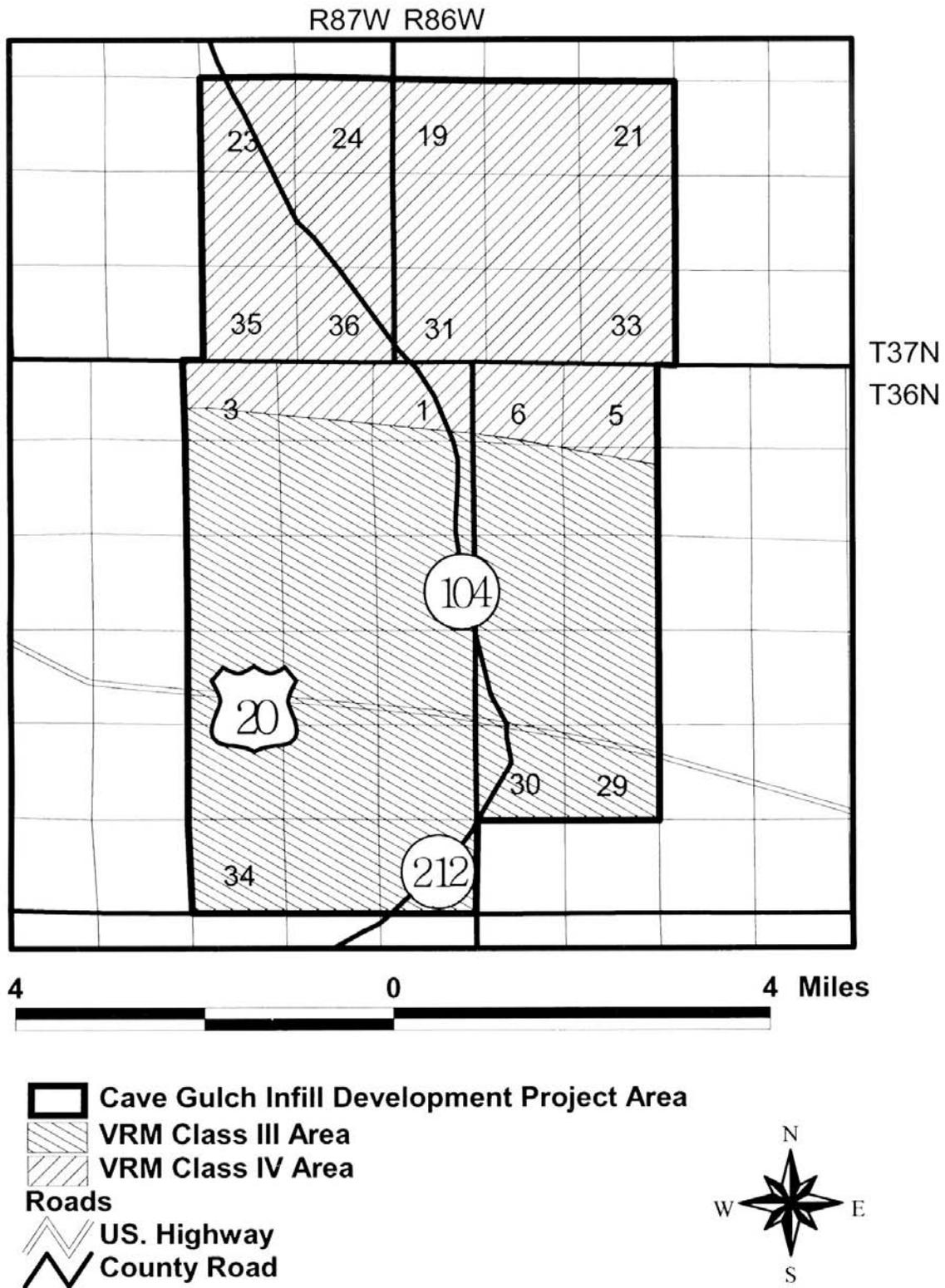


Figure 3.5 Visual Resource Management Classifications in the CGIDP Area.

Table 3.7 BLM Visual Resource Management Class Objectives.¹

Class	Description
I	Preserve the existing character of the landscape. Although this class provides mainly for natural ecological change, limited development activity may be allowed in some areas, if the level of change to the characteristic landscape is very low and nearly unnoticeable. This class includes primitive (wilderness) areas, some nature areas, wild sections of national wild and scenic rivers, and other congressionally and administratively designated area where decisions have been made to preserve a natural landscape.
II	Retain the existing character of the landscape. Management activities may be seen but should not attract the attention of the casual observer. Change to the characteristic landscape should be low, and change must repeat the basic elements (i.e., form, line, color, texture) found in the predominant natural features of the existing landscape.
III	Partially retain the existing character of the landscape. Moderate changes to the existing landscape are allowed, although management activities associated with these changes should not dominate the view of the casual observer. As in Class II, change should repeat the basic elements of the characteristic landscape.
IV	Provide for management activities that require major modification of the existing character of the landscape. Although management activities may dominate the view and be the major focus of viewer attention, every attempt should be made to minimize the impact of these activities through careful location selection, minimal disturbance, and repetition of the basic elements of the characteristic landscape. The relative change to the characteristic landscape can be high.

¹ Source: BLM (1986).

- an industrial water well with associated water storage tanks, office trailer, and a truck parking/turn around facility located in the NE¹/₄NE¹/₄ of Section 30, T36N, R86W, approximately 0.75 mi east of the community of Waltman (north side of U.S. Highway 20-26);
- approximately nine producing oil/gas well facilities within 1 mi of U.S. Highway 20-26 that are visible from the highway;
- landscape modifications resulting from dry land farming activities being conducted by Powder River Agri-Organics, Inc. to the south of U.S. Highway 20/26 and east of Natrona County Road #212; and
- existing exploration and development activities in the Cooper Reservoir Field to the south of U.S. Highway 20-26.

3.5.5 Socioeconomics

Information concerning socioeconomics was updated from the data presented in Section 3.11 of the Cave Gulch EIS.

Waltman, an unincorporated community, is the only identified community in the CGIDP area, and according to census records no one lives in Waltman (U.S. Department of Commerce [USDOC] 2000).

Based on the 2000 census, Natrona County's population is estimated at 66,533, a 3.1% decrease in population from 1990. Total full-time and part-time employment in Natrona County was 35,081 in 2000 (USDOC 2000). In December 2003, state-wide oil and gas extraction accounted for approximately 3,200 jobs, compared with approximately 30,200 workers employed in retail trade, 65,300 workers employed by government and government enterprises, and 203,100 workers employed in the service industry (Wyoming Department of Employment 2004).

Annual per capita personal income in 2000 in Natrona County was \$18,913 (USDOC 2000), and the adjusted unemployment rate in March 2004 was 5.0% (Wyoming Department of Employment 2004). The cost of living index was 97 during the last quarter of 2003, compared to a Wyoming statewide average of 100 (Wyoming Division of Economic Analysis 2004). According to the 2000 census, 8.7% of Natrona County residents lived below the poverty level. There were 3,063 vacant housing units, or 10.3% of all housing units in Natrona County in 2000, compared to the statewide average vacant housing rate of 13.5% (USDOC 2000). In 1999, the average annual direct wage (not including benefits) for workers in the oil and gas extraction industry in Wyoming was approximately \$41,887 (Foulke et al. 2001).

There are no multi- or single-family units available for rent or purchase within the CGIDP area, and most of the workforce would likely reside in Casper or Shoshoni, thereby benefiting the local economy and Natrona County.

3.5.6 Health, Safety, and Transportation

Information concerning health, safety, and transportation was taken from Sections 3.12 and 3.13 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Additional information for the 1,920-acre addition has been added.

Current activities and conditions potentially contributing to the health and safety of individuals working or recreating in the CGIDP area include the following:

- occupational hazards associated with oil and gas drilling and field operations,
 - risks associated with vehicle operation on improved and unimproved roads,
 - potential vehicular collisions with big game or livestock,
-

-
- hunting-related firearm-related accidents, and
 - natural hazards such as flash floods and range fires.

Transportation systems serving the CGIDP area include U.S. Highway 20-26, Natrona County Roads 104 and 212, numerous unpaved access roads and two-track roads, and the BNSF rail line (Figure 3.6). U.S. Highway 20-26 runs in an east/west direction through the southern quarter of the area. County Road 104 begins at the intersection of U.S. Highway 20-26 and runs north approximately 5.75 mi, where it exits the CGIDP area. County Road 212 also begins at the intersection of U.S. Highway 20-26 and runs south approximately 2.5 mi, where it exits the CGIDP area. Numerous unpaved access roads and two-track roads also occur. Many of these roads support livestock grazing operations; however, most have been constructed within the past several years to support natural gas development. Roads are maintained by the appropriate state or county agencies (e.g., Wyoming Department of Transportation or Natrona County Roads, Bridges, and Parks Department) or private entities. There are approximately 99.7 mi total of all types of roads within the CGIDP area (including the 1,920-acre addition)--an average road density of 2.36 mi of road per mi²--and approximately 4 mi of BNSF rail line in the northeast portion. There are no rail sidings or rail loading facilities within the CGIDP area.

3.5.7 Wastes (Hazardous and Solid)

The following information concerning hazardous and solid wastes was taken from Section 3.13 of the Cave Gulch EIS, and the reader is referred to that document for additional detail. Information has been updated where appropriate, and information for the 1,920-acre addition has been added.

There are no known hazardous or solid wastes present within the CGIDP area; however, limited quantities of hazardous and solid wastes may be produced. Areas or activities that could possibly produce hazardous or solid waste include the auto salvage yard located near Waltman and on-going natural gas exploration, development, and production areas located throughout the CGIDP area. In accordance with regulations promulgated under the *Resources Conservation and Recovery Act* (RCRA), most wastes associated with exploration, development, and/or production of crude oil or natural gas are not classified as hazardous wastes; rather, they are considered nonhazardous solid waste. However, it is possible that natural gas operators could generate some nonexcluded hazardous wastes that are subject to RCRA regulations. The Operators are designated as small-quantity generators under RCRA regulations (meaning that they generate between 100 to 1,000 kg per month of hazardous waste). All hazardous and

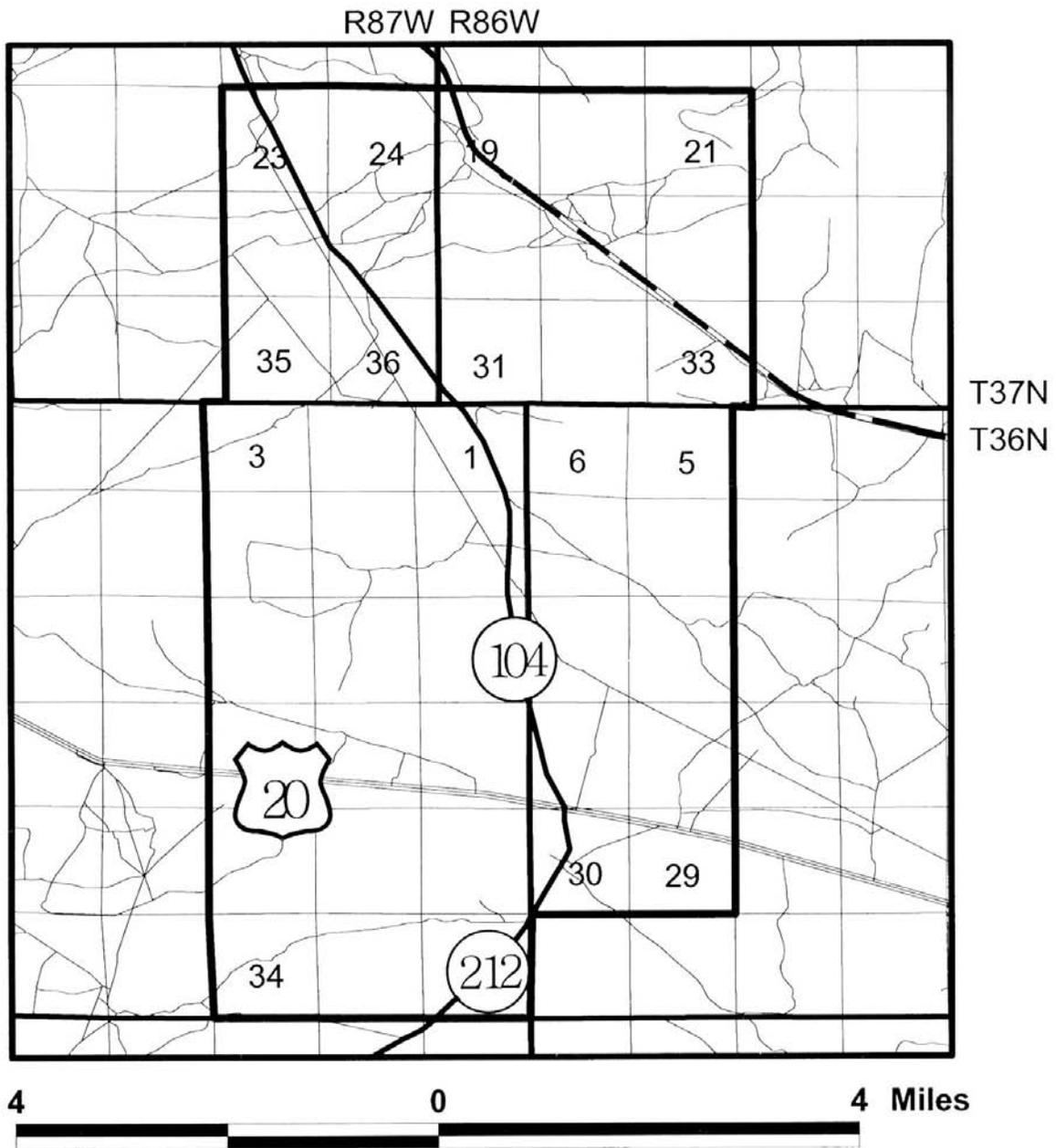


Figure 3.6 Location of Major Transportation Systems Within the CGIDP Area.

solid wastes generated by the oil and gas industry within the CGIDP area are disposed of in accordance with applicable regulations. In addition, there are no known hazardous or solid waste disposal sites within the CGIDP area (Wyoming Department of Environmental Quality, Solid and Hazardous Waste Department [WDEQ/SHWD] 2004).

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4.0 ENVIRONMENTAL IMPACTS

4.1 INTRODUCTION

In accordance with 40 C.F.R. 1502.16, this chapter discloses the environmental consequences of the Proposed Action and the No Action Alternative on each of the affected resources. An environmental impact is defined as a change in the quality or quantity of a given resource due to a modification in the existing environment as a result of project-related activities. Impacts may be beneficial or adverse, may be a primary (direct) result or secondary (indirect) result of an action, and may be long-term (more than 5 years) or short-term (less than 5 years) in duration. Impacts may vary in degree from a slightly discernible change to a total change in the environment. This impact assessment assumes that all applicant-committed measures described in the Proposed Action would be successfully implemented. If such measures are not implemented, additional adverse impacts may occur.

Residual impacts are unavoidable impacts resulting from the Proposed Action after application of appropriate mitigation (BLM 1988).

Cumulative impacts result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions, regardless of who is responsible for such actions. Cumulative impacts may result from individually minor, but collectively significant, actions occurring over a period of time (40 C.F.R. 1508.7). The cumulative impact assessment area (CIAA) for the CGIDP includes 10 Hydrologic Unit Code (HUC) Order 12 drainage basins totaling 61,618 acres. Nine of the drainage basins, encompassing 53,458 acres, are from the Cave Gulch EIS: Alkali Creek, Poison Creek, North Branch of Cave Gulch, Main Branch of Cave Gulch, South Branch of Cave Gulch, Waltman Draw, Upper Sand Draw, Sand Draw Tributaries, and Keg Springs Draw. Because the CGIDP added 1,920 acres to the south end of the original Cave Gulch EIS area, an additional portion of Sand Draw, delineated in the *Modified Cooper Reservoir Natural Gas Development Environmental Assessment* and totaling 8,160 acres, was added to the CIAA. This CIAA is used to analyze cumulative impacts for the following resources: cultural resources; geology, geologic hazards, and minerals; health, safety, and transportation; land use, including grazing and recreation; Native American religious concerns; paleontological resources; soils; TEPC and BLM-sensitive species; vegetation; visual resources; solid and hazardous wastes; and water resources. This is consistent with the analysis of cumulative impacts in the Cave Gulch EIS (BLM 1997a). Total disturbance, including the CGIDP, from past, present, and reasonably foreseeable future actions within the CIAA is 3,883 acres, whereas LOP disturbance totals 1,410 acres.

The CIAA for air quality includes Johnson, Washakie, Big Horn, Sheridan, and Natrona counties, whereas the CIAA for socioeconomic resources is Natrona County. The CIAAs for mule deer and pronghorn antelope are their respective herd units, and CIAA for small mammals, upland game birds, migratory birds, reptiles, amphibians, and fish is the CGIDP area.

Each resource discussed in this chapter includes a description of:

- impacts due to the implementation of the Proposed Action,
- impacts due to the implementation of the No Action Alternative,
- additional mitigation and monitoring measures,
- residual impacts, and
- cumulative impacts.

Impact analysis assumes that mitigation included in Appendices A and B of the Cave Gulch ROD is applied. The mitigation is incorporated by reference into this EA. It also assumes implementation of applicant-committed environmental protection measures listed in Section 2.2.14 and Appendix A of this EA.

4.2 PHYSICAL RESOURCES

4.2.1 Air Quality

The Cave Gulch EIS summarized impacts to air quality as follows.

- No violations of applicable Wyoming or federal air quality regulations or standards are expected to occur as a result of direct, indirect, or cumulative project emissions (including construction and operation.). The maximum potential air pollutant concentrations would occur close to, and between, well locations, even with the densest assumed well spacing. That is, the maximum ground level concentrations occurred so close to each well that adding additional wells in the field would not increase the overall maximum concentration.
 - Potential air quality impacts would be below applicable significance criteria for atmospheric deposition at the Cloud Peak Class II Wilderness Area.
 - Given the inherent conservatism in the analysis, operation emissions would not result in any perceptible visibility impact on the cleanest days at the Cloud Peak Class II Wilderness Area. This conclusion is based on an extremely clean assumed background
-

standard visual range (374 km) and very conservative Interagency Workgroup on Air Quality Modeling (IWAQM) Preliminary Screening Analysis.

An extensive air quality impact assessment was documented in the 1997 *Cave Gulch Cumulative Air Quality Impact Analysis Technical Support Document* (TRC Environmental Corporation 1997) prepared as part of the Cave Gulch EIS.

The scope of the current project differs from the scope of the Cave Gulch EIS project in well numbers, well locations and densities, wellsite equipment, and compression emission rates, and these differences result in changes in projected air emissions.

4.2.1.1 Proposed Action

Emissions Inventory - Construction. Air pollutant emissions from the construction phase of the Proposed Action would result from construction of well pads and access roads, travel on unpaved roads, heavy construction equipment, drilling rig engines, and well completion. Specifically, particulate matter less than 10 microns in diameter (PM₁₀) and particulate matter less than 2.5 microns in diameter (PM_{2.5}) emissions would result from well pad and access road construction and travel on unpaved roads, and oxides of nitrogen (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), and/or sulfur dioxide (SO₂) emissions would occur from drilling rig engine operation, tailpipe emissions from heavy construction equipment, and flaring operations during completion. Air pollutant impacts from each well would be temporary, occurring during the well construction/completion phase.

Emissions resulting from well pad construction for an individual well would not change from levels calculated in the Cave Gulch EIS and are presented in Table 4.1.

Emissions Inventory - Production. Emissions of PM₁₀, PM_{2.5}, NO_x, CO, VOC, SO₂, and hazardous air pollutants (HAPs) would occur from production facilities including glycol dehydrators and compressor engines. Emission-generating equipment proposed for each new well would include one 0.75 million British Thermal Units per hour (MMBtu/hr) separator and associated heater and one condensate storage tank.

Total production emissions calculated for the Proposed Action are provided in Table 4.2.

Table 4.1 Wellsite Construction Emissions Summary for a Single Well.¹

Activity	Pollutant	Single Well Emission Rate (lb/well)	Single Well Emission Rate (tons/well)
Resource Road/Well Pad Construction	PM ₁₀	1,031.31	0.52
	VOC	7.92	0.0040
	CO	29.21	0.015
	NO _x	114.54	0.057
	SO ₂	13.02	0.0065
Rig-up, Drilling, Rig-down	PM ₁₀	2,205.64	1.10
	VOC	516.50	0.26
	CO	1,381.50	0.69
	NO _x	6,275.20	3.14
	SO ₂	424.10	0.21
Completion and Testing	PM ₁₀	4,509.40	2.25
	VOC	9.40	0.0047
	CO	12,974.40	6.49
	NO _x	2,398.90	1.20
	SO ₂	1.60	0.0008

¹ Source: TRC (1997).

Table 4.2 Production Emissions Under the Proposed Action.

Activity Pollutant	2004 Proposed - 30 mmscf/day (tpy)	2004 Proposed - 60 mmscf/day (tpy)	
Wellsite Emissions	NO _x 44.7	44.7	
	CO	14.9	
	PM ₁₀ 0.0	0.0	
	SO ₂ 0.0	0.0	
	VOC	816.4	2,708.6
	Formaldehyde	0.0	0.0
	HAPs	17.45	59.7
	NO _x	146.8	146.8
Centralized Compression and Processing Facilities	CO	217.8	217.8
	PM ₁₀ 0.0	0.0	
	SO ₂ 0.0	0.0	
	VOC	62.4	67.8
	Formaldehyde	7.2	7.2
	HAPs	10.2	13.5
	NO _x 191.5	191.5	
	CO	232.7	232.7
Total Annual Production Emissions	PM ₁₀ 0.0	0.0	
	SO ₂ 0.0	0.0	
	VOC	878.8	2,776.4
	Formaldehyde	7.2	7.2
	HAPs	27.7	73.2

Wellsite equipment specified for the Proposed Action varies from that analyzed in the Cave Gulch EIS due to the movement of the wellsite glycol dehydration units to centralized locations, a reduction in condensate production, and the use of one separator heater at each wellsite. This configuration is currently used at all existing wells and will be used at remaining wells authorized under the Cave Gulch ROD. It results in a reduction in emissions from levels reported in the Cave Gulch EIS. Horsepower requirements for compression in the Cave Gulch EIS project area have not changed, but advancements in the best achievable control technology (BACT) required under WDEQ/AQD regulations have resulted in the reduction of unit compressor engine emissions. These reductions in emissions, when applied to existing/authorized development and proposed development, result in field-wide reductions in emissions. Table 4.3 presents a summary of the change in emissions among pre-1997 existing wells plus development authorized as part of the 1997 EIS, all at emission rates analyzed in 1997, and pre-1997 existing wells, development authorized as part of the Cave Gulch EIS, and the 2004 Proposed Action, all at emission rates reflecting current field operations. This comparison was performed with the current field producing at both 30 million standard cubic feet per day (mmscf/day) and 60 mmscf/day.

Emissions Inventory - Wind Erosion. Emissions of particulate matter from wind erosion of disturbed areas were calculated for the Cave Gulch EIS and reflected emissions from surface disturbance. Total disturbed area under the 1997 proposal was 25,093 acres, and total proposed disturbed area under this EA is 27,013 acres, a 7.65% increase. Wind erosion emissions calculated for the 1997 EIS were 0.60 tons per year (tpy) PM₁₀ and 0.24 tpy PM_{2.5}. Adjusting these by the total disturbed area results in total emissions of 0.65 tpy PM₁₀ and 0.26 tpy of PM_{2.5}. PM_{2.5} emissions are assumed to equal 40% of PM₁₀ emissions based on guidance contained in AP-42 Chapter 13.2.5, Industrial Wind Erosion.

Ambient Impacts. A dispersion modeling analysis was performed for the Cave Gulch EIS to predict maximum near-field concentrations for comparison to ambient air quality standards. A representative well pad layout was modeled with the ISCST3 model and Casper surface station meteorological data to quantify impacts of PM₁₀ and SO₂ emissions from construction and NO_x, CO, and HAP emissions from production. Ambient background concentrations reflective of existing conditions in the region, which are added to modeled concentrations to determine total impacts, have been updated to current recommended values for all pollutants and are shown in Table 4.4.

Construction emissions would be short-term and localized in nature, occurring at individual construction sites. PM₁₀, PM_{2.5}, and SO₂ construction impacts calculated in the original Cave Gulch EIS remain representative of a reasonable worst-case scenario and are shown in Table 4.5.

Table 4.3 Production Emissions - Change in Total Field.

Activity	Pollutant	Existing Field Pre-1997 + 1997 Authorized (tpy)	Proposed 2004 (30 mmscf/day) ¹ (tpy)	Proposed 2004 (60 mmscf/day) ¹ (tpy)	Emission Change from 1997 to 2004 (30 mmscf/day) (tpy)	Emission Change from 1997 to 2004 (60 mmscf/day) (tpy)
Wellsite	NO _x	274.5	105.3	105.3	(169.2)	(169.2)
Emissions	CO	834.6	35.1	35.1	(799.5)	(799.5)
	PM ₁₀ --		--	--	--	--
	SO ₂ --		--	--	--	--
	VOC	5,562.4	816.4	2,708.6	(2,853.8)	(2,853.8)
	Formaldehyde	0	0	0	0	0
	HAPs	240.4	17.45	59.7	(180.7)	(180.7)
Centralized	NO _x 290.0		146.8	146.8	(143.2)	(143.2)
Compression	CO	580.0	217.8	217.8	(362.2)	(362.2)
and Processing	PM ₁₀	--	--	--	--	--
Facilities	SO ₂	--	--	--	--	--
	VOC	145.0	62.4	67.8	(77.2)	(77.2)
	Formaldehyde	17.4	7.2	7.2	(10.2)	(10.2)
	HAPs	17.4	10.2	13.5	13.5	13.5
Total Annual	NO _x 564.5		252.1	252.1	(312.4)	(312.4)
Production	CO	1,414.6	252.9	252.9	(1,161.7)	(1,161.7)
Emissions	PM ₁₀	--	--	--	--	--
	SO ₂ --		--	--	--	--
	VOC	5,707.4	878.8	2,766.4	(4,828.6)	(2,931.0)
	Formaldehyde	17.4	7.2	7.2	(10.2)	(10.2)
	HAPs	240.4	27.7	73.2	(212.8)	(167.2)

¹ Includes emissions from 202 existing/authorized wellsites within the field.

Table 4.4 Summary of Pollutant Background Concentrations.

Pollutant	Averaging Period	Current Background Concentration (µg/m ³)	Data Source Current Background	Current Value Collection Period
CO	1-Hour	3,336	Amoco Ryckman Creek	1978-1979
	8-Hour	1,381		
NO ₂	Annual	5.0	WDEQ: Thunder Basin	2002
Ozone (O ₃)	1-Hour	162	WDEQ: Thunder Basin	2001-2002
	8-Hour	150		
SO ₂	3-Hour	93	Lost Cabin	1986-1987
	24-Hour	32		
	Annual	4		
TSP	24-Hour	N/A	N/A	--
PM ₁₀	24-Hour	33	WDEQ: Cheyenne	2001
	Annual	16		
PM _{2.5}	24-Hour	13	WDEQ: Cheyenne	2001
	Annual	5		

Table 4.5 Construction Impacts Summary.¹

Pollutant	Averaging Period	1997 Modeled Impact ($\mu\text{g}/\text{m}^3$)	Current Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Concentration ($\mu\text{g}/\text{m}^3$)	WAAQS/NAAQS ($\mu\text{g}/\text{m}^3$)
PM ₁₀	24-Hour	24.2	33	57.2	150
	Annual	5.3	16	21.3	50
PM _{2.5} ²	24-Hour	12.1 ¹ 13		25.1	65
	Annual	2.7 ¹	5	7.7	15
SO ₂	3-Hour	70.7	93	163.7	1300/1300
	24-Hour	20.3	32	52.3	260/365
	Annual	3.8	4	7.8	60/80

¹ Source: TRC Environmental Corporation (1997).

² PM_{2.5} concentrations estimated as 50% of PM₁₀ modeled concentrations in the absence of modeling results for this pollutant.

NO_x and CO impacts from production activities were modeled in 1997 using calculated emissions from wellsites and compressor engines. As discussed previously, advancements in BACT for compressor engines has resulted in a reduction in unit emissions from levels analyzed in 1997, and compressor engines are the primary emissions sources modeled to determine NO_x and CO concentrations. The impact assessment performed in 1997 has been revised to account for the source-specific change in emissions for each of the modeled pollutants shown in Table 4.3. The revised concentrations were calculated based on the reasonable assumption that modeled impacts change in direct relationship to modeled emission rates. NO_x emissions from compression analyzed in 1997 were 290.0 tpy and CO emissions were 580.0 tpy. Using BACT currently applied to permitted engines in the field, NO_x and CO emissions from total compression proposed in the field would equal 146.8 tpy NO_x and 217.8 tpy CO. These values represent a 50.6% decrease in NO_x emissions and a 37.5% decrease in CO emissions compared to levels predicted in 1997. These reductions were applied directly to modeled emissions to derive adjusted impacts, expressed as NO₂ and CO (Table 4.6). NO₂ and CO concentrations plus background are less than WAAQS/NAAQS, and the NO₂ concentration is less than the NO₂ PSD Class II Increment. Note that proposed compression is identical for both the 30 m mscfd and 60 m mscfd field production rates; therefore, NO_x and CO emissions are identical for both. Emissions of wellsite HAPs (n-hexane, benzene, toluene, ethylbenzene and xylene) were modeled in 1997 and found to be below short-term (acute) exposure levels in existence at that time as reflected by a range of various states' Acceptable Ambient Concentration Levels (AACLs). Updated Environmental Protection Agency (EPA) data is now used, including 1-hour EPA Reference Exposure Levels (RELs) for benzene, toluene, xylene, and

Table 4.6 Production NO₂ and CO Impacts.¹

Pollutant	Averaging Period	1997 Modeled Impact (µg/m ³)	2004 Adjusted Modeled Impact (µg/m ³)	Current Background Concentration (µg/m ³)	Total Concentration (µg/m ³)	WAAQS/NAAQS (µg/m ³)	PSD Class II Increment (µg/m ³)
CO	1-Hour	1,020	377.4	3,336	3,713.4	40,000	--
	8-Hour	727	269.0	1,381	1,650.0	10,000	--
NO ₂	Annual	22.3	11.3	5.0	16.3	100	25

¹ Source: TRC Environmental Corporation (1997).

formaldehyde and 1-hour EPA Immediately dangerous to life or health (IDLH) values for ethylbenzene and n-hexane. Table 4.3 demonstrates that wellsite HAP emissions have decreased due to the removal of wellsite glycol dehydration and the installation of a centralized dehydration facility at the compressor locations. As a result, modeled short-term HAP concentrations quantified in 1997 are assumed to represent a conservative estimate of impacts that would occur under the Proposed Action and are presented in Table 4.7. As shown in Table 4.3, formaldehyde emissions from compressor engines would decrease from levels analyzed in 1997. Eight-hour concentrations of benzene, toluene, ethylbenzene, xylene, n-hexane, and formaldehyde are converted to 1-hour concentrations using standard conversion guidance (EPA 1997) and compared to applicable 1-hour EPA RELs or IDLH values (Table 4.7).

In addition, long-term (annual) exposures to HAPs are compared to reference concentrations for chronic inhalation (RFCs) for non-carcinogenic effects on human health (Table 4.8). Modeled 8-hour concentrations of toluene, xylene, ethylbenzene, and n-hexane from the 1997 study are converted to annual concentration values using standard conversion guidance. All concentrations are below the applicable RFC (Table 4.8).

Long-term exposures to emissions of suspected carcinogens (benzene and formaldehyde) were also modeled in the 1997 study. Cancer risks for the most likely exposure (MLE) and the maximally exposed individual (MEI) were calculated from the modeled concentrations. The predicted annual concentrations were 0.09 µg/m³ (benzene) and 0.28 µg/m³ (formaldehyde). Using the benzene and formaldehyde concentrations from the 1997 study, the estimated MLE scenario cancer risk for benzene (7E-08), formaldehyde (4E-07) and the total MLE cancer risk (5E-07) are below the acceptable range of 1E-04 to 1E-06. Under the MEI scenario, both the individual cancer risks for benzene and formaldehyde (2E-07 and 1E-06) are less than or equal to 1E-6, and the total cancer risk for the inhalation pathway is 1E-6.

Table 4.7 Short-Term HAP Impacts.

Pollutant	1997 Modeled 8-Hour Concentration ($\mu\text{g}/\text{m}^3$)	1997 Modeled 1-Hour Concentration ($\mu\text{g}/\text{m}^3$)	REL/IDLH ¹ ($\mu\text{g}/\text{m}^3$)
Benzene	10.4	14.9	1,300
Toluene	46.6	66.6	37,000
Ethylbenzene	10.4	14.9	35,000
Xylene	42.7	61.0	22,000
n-hexane	72.5	103.6	39,000
Formaldehyde	13.7	19.6	94

¹ EPA Air Toxics Database, Table 2 (EPA 2003).

Table 4.8 Long-Term HAP Impacts.

Pollutant	Annual Concentration ($\mu\text{g}/\text{m}^3$) Non-Carcinogenic	RFC ¹ ($\mu\text{g}/\text{m}^3$)
Benzene	0.09	30.0
Toluene	6.7	400.0
Ethylbenzene	1.5	1,000.0
Xylenes	6.1	100.0
n-Hexane	10.3	200.0
Formaldehyde	0.28 9.8	

¹ EPA Air Toxics Database, Table 1 (EPA 2003).

Ozone (O_3) is formed as a result of chemical reactions involving ambient concentrations of VOCs and NO_x . The 1997 air quality study demonstrated that VOC and NO_x emissions resulting from a group of eight wells and a nearby compressor station would not cause or contribute to an exceedance of the hourly NAAQS for ozone ($235 \mu\text{g}/\text{m}^3$). Because overall field emissions of NO_x and VOCs would be less than what was analyzed in the 1997 study, there would be less potential for ozone formation and lower expected ozone concentrations.

4.2.1.2 The No Action Alternative

Under the No Action Alternative, the BLM would deny the CGIDP, and no additional disturbance/development would occur beyond that which has already been approved by the BLM. There would be no additional impacts to ambient air quality beyond those previously analyzed in the Cave Gulch EIS, and those impacts, as previously explained, would be reduced due to advances in BACT for compressor engines.

4.2.1.3 Mitigation and Monitoring

In addition to mitigation presented in Appendix A of the Cave Gulch ROD, BACT would be applied for reciprocating internal combustion engines, condensate storage, and other applicable emission sources to reduce air emissions in accordance with Wyoming Air Quality Standards and Regulations (WAQSR) Section 2(c)(v) and WDEQ/AQD guidance for oil and gas sources.

4.2.1.4 Residual Impacts

Some increase in emissions would occur as a result of the Proposed Action. However, dispersion modeling of these emissions predicts impacts below applicable significance thresholds.

4.2.1.5 Cumulative Impacts

A cumulative air quality impact assessment was performed for the Cave Gulch EIS and documented in the *Cave Gulch Cumulative Air Quality Impact Analysis Technical Support Document* (TRC Environmental Corporation 1997). The analysis assessed the potential cumulative emissions of NO_x and SO₂ from the Cave Gulch EIS project area and six emission sources, identified from WDEQ/AQD air permitting records, to be located within an area which included Johnson, Washakie, Big Horn, Sheridan, and Natrona counties. Modeling of potential cumulative emissions was performed to quantify NO₂ and SO₂ emissions at the Cloud Peak Wilderness Area boundary (a PSD Class II area) and at a U.S. Forest Service (USFS)-identified sensitive lake (Florence Lake). Potential nitrogen and sulfur deposition and regional visibility impacts at the Cloud Peak Wilderness Area and changes in acid-neutralizing capacity (ANC) at Florence Lake were calculated. PSD Class II areas such as Cloud Peak Wilderness Area have no visibility protection under state or federal law but were identified as sensitive area for the purposes of the analysis.

A net overall decrease in production NO_x emissions of 44.7% has been shown to result from changes in field production as documented in Section 4.2.1.1. Therefore, the analysis that was performed in 1997 predicted emissions greater than those anticipated from the current project design when combined with identical regional sources. The 1997 analysis demonstrated that the maximum predicted change in visibility resulting from cumulative emissions impacts would be 0.4 deciview, which is below the current Federal Land Managers' Air Quality -Related Values Workgroup cumulative analysis threshold of a

1.0 deciview or 10% change in light extinction. The maximum potential change in ANC at Florence Lake was predicted to be 0.02%, well below the USFS threshold value of 10%.

4.2.2 Geology, Geologic Hazards, and Minerals

The Cave Gulch EIS concluded that the inherent geologic hazards in the project area did not pose a significant danger or public safety hazard and that impacts related to natural geologic hazards would not likely occur as a result of project-related activities. The Cave Gulch EIS concluded that no major mineral resources would be impacted other than oil and natural gas reserves.

4.2.2.1 Proposed Action

The Proposed Action would not impact the basic geology of the CGIDP area, and the inherent geologic hazards in the CGIDP area do not pose a significant danger or public safety hazard. Therefore, impacts related to natural geologic hazards would not likely occur due to topographic alterations resulting from project-related activities. As discussed in Section 3.3.2.1 of this EA, no major landslide areas have been identified within the CGIDP area, and construction activities would not likely initiate landslides, mudslides, debris flows, slumps, or other forms of mass-wasting. Seismic activity in the CGIDP area is low; therefore, the potential for damage of project-related facilities would be low. There would be minimal risk that the Proposed Action would initiate any seismic activity.

The primary impact on mineral resources would be the removal of additional reserves of natural gas from the Tertiary Wind River and Fort Union Formations and the Cretaceous Lance/Meeteetse, Frontier, Muddy, and Cloverly formations. As a result, these resources would not be available in the future.

There are no known solid mineral leases (i.e., coal), locatable mineral mines (e.g., precious metals, bentonite, etc.), economically recoverable deposits of locatable minerals, or active construction aggregate quarries, and there are no claims for any locatable minerals within the CGIDP area. Therefore, the Proposed Action would have no impacts on these resources, and no development conflicts are anticipated. If conflicts were to arise, development priorities would conform to existing federal law and BLM policies and regulations.

4.2.2.2 No Action Alternative

Under the No Action Alternative, no additional disturbance/development would occur beyond that which has already been approved by the BLM, and there would be no additional impacts to geology and geologic hazards. Exploration for and development of natural gas as currently proposed by the Operators within the CGIDP area would not occur beyond those levels previously authorized by the BLM in the Cave Gulch EIS. However, natural gas exploration and development on private and state lease areas could continue and would likely result in the drainage of some natural gas from adjacent federal mineral estate with the consequential loss of revenue (reduction in mineral royalties paid) to the federal government. Under the No Action Alternative, some of the natural gas reserves on federal lands within the CGIDP area could remain available for future recovery. However, an extensive delay in the development of the federal leases could render some of these reserves unrecoverable and would result in the ultimate waste of natural gas reserves within the affected federal leases. Other mineral resources located on federal lands would not be impacted and could be developed in the future based on product availability, demand, and federal land management policies.

4.2.2.3 Mitigation and Monitoring

No additional mitigation or monitoring is recommended.

4.2.2.4 Residual Impacts

The Proposed Action would not result in any residual impacts to geology, geologic hazards, or minerals.

4.2.2.5 Cumulative Impacts

Cumulative disturbance in the CIAA total 3,883 acres. None of the disturbance would affect landslide deposits or be likely to trigger geologic hazards such as landslides, mudslides, debris flows, or slumps; therefore, there would be no incremental increase associated with geologic hazards. The same is true regarding mineral resources--none of the projects would impact other mineral resources, and there would be no cumulative impacts.

4.2.3 Paleontological Resources

The Cave Gulch EIS concluded that project-related construction activities could result in the exposure and possible destruction of fossil resources, as well as associated geologic information. Accelerated erosion could also adversely affect fossil resources. However, the magnitude of adverse impacts to fossils could be reduced and beneficial impacts fostered by the application of appropriate mitigation measures.

4.2.3.1 Proposed Action

Under the Proposed Action, approximately 766 acres of additional surface disturbance would occur. Approximately 8% (or 2,111 acres) of the CGIDP area has been designated as having a high potential for the occurrence of scientifically important fossils. Prior to the initiation of project-related activities, the Operators would have a qualified paleontologist collect a representative sample of fossil remains from the surface and from anthills in the areas of proposed disturbance having a high potential for important fossils. That material would be evaluated, curated, and documented as described in Appendix A of the Cave Gulch ROD.

The remaining 92% of project area has a low probability for the occurrence of scientifically important fossils. However, to mitigate the potential loss of unanticipated scientifically important fossils, the Operators would inform all field personnel not to search for, scavenge, or remove any paleontological resources while working on the project. In addition, if new fossils are discovered during surface-disturbing activities, work would cease until the fossil find was evaluated and appropriate mitigation performed, which may include recording and recovery of the fossil material or delaying continued construction until full recovery can be completed. Because of these mitigation measures, impacts to paleontological resources would be negligible to low.

4.2.3.2 No Action Alternative

Under the No Action Alternative, the BLM would deny the Proposed Action, and no additional disturbance/development would occur beyond that already authorized by the BLM. There would be no adverse impacts to paleontological resources as a result of the CGIDP. However, sampling efforts associated with mitigation for surface-disturbing activities would not occur, and additional fossils may not be discovered.

4.2.3.3 Mitigation and Monitoring

No additional mitigation or monitoring is recommended.

4.2.3.4 Residual Impacts

Some fossils could be destroyed during the course of surface-disturbing activities because most of the fossils are quite small.

4.2.3.5 Cumulative Impacts

There are no known areas within the CIAA that have a high probability of scientifically important fossils other than those identified in the original Cave Gulch EIS project area; therefore, implementation of the Proposed Action and the Cave Gulch EIS project would be the only source of impacts to scientifically important paleontological resources. Mitigation in the Cave Gulch EIS and this EA would minimize adverse impacts to fossils and could result in the identification of important fossils.

4.2.4 Soils

The Cave Gulch EIS concluded that “Assuming avoidance of sensitive soils to the maximum extent practicable, effective surface runoff, erosion, and sedimentation control combined with effective revegetation would reduce the severity of adverse impacts to non-significant levels.” The Cave Gulch ROD (Appendix A, Section 8.3) required that the Operators “avoid to the maximum extent possible sensitive soils, areas with poor and very poor reclamation potential, and slopes in excess of 15 percent.”

4.2.4.1 Proposed Action

Under the Proposed Action, construction-related activities could result in removal of native vegetation, exposure of the soil, mixing of soil horizons, loss of topsoil productivity, soil compaction, and increased susceptibility to wind and water erosion. These impacts could, in turn, result in increased runoff, soil erosion, and sedimentation to receiving waters.

Under the Proposed Action, a total of 766 additional acres of soil resources would be disturbed over the life of the project. Approximately 510 acres would be reclaimed within 1 to 2 years following initial

disturbance, whereas the remaining 256 acres would be LOP disturbance. After reclamation has been successfully completed, soil stability would be achieved and soil erosion rates would be expected to return to pre-disturbance levels in 3 to 5 years.

Control of surface runoff and sedimentation would be accomplished by implementation of best management practices/mitigation measures specified in Appendix A of the Cave Gulch ROD and incorporated herein by reference. These mitigation measures include, but are not limited to, appropriate design and construction techniques to minimize disturbance; installation of culverts for the crossing of drainage channels; avoidance of disturbance within 100 ft of riparian area (except at drainage crossings); and salvaging and stockpiling topsoil for future use in reclamation. In addition, the Operators would, during the site-specific planning process, avoid to the maximum extent possible sensitive soil areas, areas with poor and very poor reclamation potential, and slopes in excess of 15%.

In accordance with the Cave Gulch ROD, the Operators have conducted qualitative monitoring of soil erosion and stability of disturbed areas associated with natural gas development. Erosion monitoring conducted in 2003 (the last year for which information is available) by the BLM reported that 13 of the 15 monitored sites were meeting erosion control objectives with only minor maintenance required. Two sites were in need of significant remediation work, and the Operators were advised of the situation. The Operators would continue to monitor disturbed and reclaimed areas to document soil stability and determine if erosion control measures are functioning as anticipated. The BLM reported that erosion control measures have proven effective, and that soil stability was generally good (BLM 2003). The impacts to soil resources from the Proposed Action would likely be similar to those reported in the monitoring studies, and impacts would be low.

The precise location of the wells that would be drilled in conjunction with the Proposed Action is not available at this time. However, assuming that the wells are geographically distributed in approximately the same manner as the wells drilled under the Cave Gulch EIS, the total disturbance, LOP disturbance, and percent of LOP disturbance in each watershed that would occur in the CGIDP is presented in Table 4.9.

It is unlikely that well distribution would be similar to that resulting from the Cave Gulch EIS; rather, it is likely that less disturbance would occur in the core area and more would occur in some of the watersheds that have fewer wells, such as the watersheds in the southern portion of the CGIDP area.

Table 4.9 Surface Disturbance in Watersheds in the CGIDP Area.

Well Location	Total Disturbance (acres)	LOP Disturbance (acres)	Percentage of LOP Disturbance
Alkali Creek	56	21	1.2
Poison Creek	303	85	2.0
North Branch Cave Gulch	264.93		2.7
Main Branch Cave Gulch	756	281	9.3
South Branch Cave Gulch	242.87		3.2
Waltman Draw	791	247	5.9
Sand Draw	201	51	1.4
Sand Draw Tributary	91	46	2.3
Keg Springs Draw	40.8		1.4

4.2.4.2 No Action Alternative

Under the No Action Alternative, the BLM would deny the Proposed Action, and no additional disturbance would occur beyond that already authorized. Impacts to soil resources within the Cave Gulch EIS project area would continue at current rates.

4.2.4.3 Mitigation and Monitoring

No additional mitigation or monitoring is recommended.

4.2.4.4 Residual Impacts

The Proposed Action would result in some increased soil loss and sedimentation from water and wind erosion. Productivity of some disturbed soils would be reduced due to the removal of vegetation, compaction, and exposure of the soils, mixing of soil horizons, and increased susceptibility to wind and water erosion.

4.2.4.5 Cumulative Impacts

Soil resources within the CIAA would continue to be impacted by ongoing oil and natural gas development, livestock grazing, and recreational use. Cumulative total disturbance in the CIAA would total 3,883 acres, and cumulative LOP disturbance would total 1,410 acres, including proposed

disturbance from the CGIDP. However, once natural gas facilities have been abandoned and reclaimed, erosion rates would eventually return to pre-disturbance levels. Based on the actual, authorized, and proposed disturbance associated with natural gas development discussed above, total surface disturbance would total approximately 6% of the CIAA and LOP disturbance would total approximately 2%. The use of Best Management Practices (BMPs) to minimize soil erosion and promote reclamation would result in low cumulative impacts to soils.

Assuming that the wells are geographically distributed in approximately the same manner as the wells drilled under the Cave Gulch EIS, the approximate cumulative total disturbance and cumulative LOP disturbance that would occur in each watershed within the CIAA, as well as the percent of each watershed within the CIAA that would be disturbed for the LOP would be as follows: Alkali Creek - 168 acres total disturbance, 76 acres (1.7%) LOP disturbance; Poison Creek - 313 acres total disturbance, 95 acres (1.5%) LOP disturbance; North Branch Cave Gulch - 378 acres total disturbance, 166 acres (1.4%) LOP disturbance; Main Branch Cave Gulch - 789 acres total disturbance, 318 acres (7.4%) LOP disturbance; South Branch Cave Gulch - 340 acres total disturbance, 133 acres (1.6%) LOP disturbance; Waltman Draw - 791 acres total disturbance, 247 (5.9%) LOP disturbance; Sand Draw - 275 acres total disturbance, 95 acres (1.9%) LOP disturbance; Sand Draw Tributary - 162 acres total disturbance, 87 acres (3.0%) LOP disturbance; Keg Springs Draw - 281 acres total disturbance, 76 acres (1.2%) LOP; and Sand Draw (in Modified Cooper Reservoir project area) - 407 acres total disturbance, 117 acres (1.4%) LOP disturbance.

The Cave Gulch EIS established the following significance criterion: “The proposed project would increase the total cumulative soil disturbance within the project area to more than a total of 10 percent of a given watershed intersected by the project area.” Pages 5 through 8 of the Cave Gulch EIS explains the 10% threshold is important because at that level of disturbance watersheds begin to show obvious adverse signs of instability and adjustment (i.e., excessive erosion, slope stability, channel instability, and sedimentation). The 10% disturbance threshold is supported by research in humid regions that indicates that urbanization producing more than 10% effective impervious areas in a watershed will lead to degradation of the stream channel (Booth 2000). A threshold value for disturbance in any given watershed in a semi-arid region such as the Casper Field Office area has not been accurately determined. However, the 10% criterion would not be exceeded for LOP disturbance in any of the watersheds in either the CGIDP area of the CIAA.

Erosion conditions have been carefully documented through field inspections in the Cave Gulch EIS area. “Obvious adverse signs of instability and adjustment” have not been observed. Field-wide inspections conducted by BLM in the fall of 2003 noted generally stable soil conditions.

4.2.5 Water Resources

The Cave Gulch EIS concluded that most adverse impacts to water resources could be avoided or reduced by implementation of mitigation presented in that document.

4.2.5.1 Proposed Action

Potential impacts to surface water resources from the Proposed Action include increased turbidity, salinity, and sedimentation due to increased runoff and erosion from 766 acres of disturbance or from accidental spills of petroleum products or other pollutants. Erosion would increase above current rates until all disturbed areas are successfully revegetated. The potential for erosion and stream sedimentation would be minimized by implementation of applicant-committed environmental protection measures, including proper facility siting to avoid riparian areas, use of BMPs, and prompt implementation of reclamation. Areas disturbed by development authorized in the Cave Gulch ROD were monitored in 1998, 2000, and 2003, and it was determined that 13 of the 15 evaluated sites met erosion control objectives and required only minor maintenance, whereas two sites required major remediation efforts (BLM 2003).

Extensive mitigation measures included as applicant-committed environmental protection measures and Appendix A of this EA would be implemented by the Operators to minimize impacts to water resources, as would measures contained in Appendix A of the Cave Gulch ROD, which are incorporated by reference into this EA. The Operators would not construct any well pads, access roads, or pipelines within 100 ft of any ephemeral or intermittent drainage channel except where pipeline or road crossings are required. The Operators would bury all pipelines below the maximum scour depth or a minimum of 4 ft below the bottom of all channel crossings and would reclaim any ephemeral or intermittent drainage channels that would be disturbed during construction. Produced water from the Proposed Action would be disposed of in accordance with existing, approved disposal methods within the CGIDP area, including surface discharge under pre-existing NPDES permits and via sub-surface injection in the existing water disposal wells. Four additional water disposal wells are proposed in conjunction with the Proposed Action. There would be no adverse impacts to surface water resources resulting from produced water

discharges as the discharged water would be required to meet WDEQ water quality standards as specified in the approved NPDES permits. The Operators would minimize disturbance and would implement prompt reclamation in accordance with approved reclamation guidelines presented in Chapter 2 and Appendix A of this EA. Once reclamation has been successful, the rate of erosion and sedimentation would begin to approach pre-disturbance rates. Therefore, the Proposed Action would not result in any changes in water flow or water quality and would have negligible impacts on surface water resources.

Potential impacts to groundwater resources from the Proposed Action include water consumption during drilling, completion, testing, and production operations. Water required for the Proposed Action would be provided from existing wells as described in Section 2.2.6.1, and no adverse impacts to existing water rights would occur. During the exploration and development of each natural gas well, water and fluids used for drilling would be stored in reserve pits at each well location and all pits would be lined to reduce or limit any subsurface or groundwater contamination. Therefore, there would be a negligible impact to groundwater resources resulting from the use of lined, earthen reserve pits.

As discussed in Chapter 3 of this EA, there are no identified seeps or springs within the CGIDP area. However, to protect any previously unidentified seeps or springs, the Operators would evaluate potential drill sites during the APD process prior to constructing the well pad. As specified in the Cave Gulch EIS, the Operators would not construct any facilities within 200 to 600 ft of any seep or spring. The actual buffer distance would depend on the characteristics of the spring. Therefore, there would be negligible impacts to seeps and springs.

Other potential impacts to ground-water resources include cross-aquifer mixing through the well bore. These potential down-hole impacts would be minimized by the implementation of well drilling, casing, and cementing procedures conducted in accordance with *Onshore Oil and Gas Order No.2* (43 C.F.R. 3160). Therefore, the Proposed Action would have negligible impacts on groundwater resources due to cross-aquifer mixing.

Based on information presented in Section 3.3.5.3 of this EA, approximately 300 acres (0.1% of the CGIDP area) of potential wetlands and waters of the U.S. occur in the CGIDP area. As specified in the Proposed Action and Appendix A of the Cave Gulch ROD, the Operators would avoid, to the extent practicable, wetlands and other waters of the U.S. The Operators would coordinate with the COE to obtain proper authorization where avoidance would not occur. Therefore, the Proposed Action would have negligible impacts upon existing wetlands and waters of the U.S. The Operators would, however,

add a constructed wetland of approximately 0.34 acre as part of their water treatment and disposal facility that would be beneficial impact.

4.2.5.2 No Action Alternative

Under the No Action Alternative, the BLM would deny the Proposed Action, and no additional disturbance/development beyond that which has already been authorized by the BLM would occur. Impacts to water resources would continue at existing levels.

4.2.5.3 Mitigation and Monitoring

No additional mitigation or monitoring is recommended.

4.2.5.4 Residual Impacts

The Proposed Action would result in some small increase in turbidity, salinity, and sedimentation due to increased runoff and erosion from 766 acres of surface disturbance.

4.2.5.5 Cumulative Impacts

Surface water resources within the CIAA would continue to be impacted primarily by ongoing oil and natural gas development and livestock grazing, and the primary impact to surface water resources would be the introduction of soils eroded from disturbed lands. Cumulative total disturbance in the CIAA would total 3,883 acres, and cumulative LOP disturbance would total 1,410 acres. Based on the actual, authorized, and proposed disturbance associated with natural gas development, total surface disturbance would total approximately 6% of the CIAA and LOP disturbance would total approximately 2%. The use of BMPs to minimize soil erosion and promote reclamation would result in low cumulative impacts to water resources.

No serious ground-water pollution problems have been detected in the CIAA. Current oil and gas exploration and development activities must comply with federal and state environmental quality laws and, thus, serious water quality and quantity impacts are not expected on a cumulative scale. This is particularly true given Onshore Oil and Gas Order No. 2 and the recent BLM guidelines that direct well completion techniques that reduce the potential for ground-water contamination.

4.3 BIOLOGICAL RESOURCES

4.3.1 Vegetation (Including Invasive Non-native Species)

The Cave Gulch EIS concluded that “Impacts to vegetation include removal of cover types and the potential for noxious weed invasion. Except for waters of the U.S. (including wetlands) and special status plant species and their habitat, disturbance of vegetation cover types would not be important because upland types are common, have high frequencies of occurrence, cover large areas, and have wide distribution” and that “significant impacts to vegetation resources would not occur under the Proposed Action.”

4.3.1.1 Proposed Action

The primary impact of the Proposed Action would be the short-term loss of 766 acres of vegetation and vegetative production. Of this 766-acre loss, 510 acres would be returned to some level of vegetative production for livestock and wildlife grazing and wildlife habitat within 2 to 3 years following initial disturbance--possibly longer during periods of drought. These reclaimed areas would likely return to pre-disturbance levels of vegetative diversity and production within 20 to 30 years.

The disturbance of existing, native vegetation would create opportunities for the establishment of invasive non-native (invasive) species, a situation that has been observed during erosion and reclamation monitoring surveys in the Cave Gulch EIS project area. Invasive species (Russian thistle and halogeton) were the dominant species on 10 of 15 reclaimed well pads monitored by the BLM in 2003 (BLM 2003). Both Russian knapweed and cheatgrass also were found on many of the sites. Drought conditions over the past several years have contributed to the proliferation of these invasive species on recently reclaimed areas.

Invasive species are easily established and commonly found on all newly disturbed and reclaimed sites throughout Wyoming. These species are fast growing and can out-compete native species, increase the danger of wildfires, and prevent/deter the establishment of native species including grasses, forbs, and shrubs. However, assuming that permanent vegetation (those native species that were intentionally seeded) would eventually become established on these reclaimed sites, invasive species can, in the interim, reduce soil erosion by holding the soil, breaking the impact of direct precipitation on the soil

surface, and altering the microclimate of the soil by reducing soil temperatures, reducing wind speeds, collecting snow fall, and reducing soil moisture evaporation.

The Operators would continue to implement the invasive species control measures that were included in Appendix A of the Cave Gulch ROD. In addition, the Operators would conduct a weed control program over the next several years on problem areas where invasive species have become established. An aggressive weed control program coupled with prompt implementation of temporary and permanent reclamation measures would reduce the vegetative impacts to a low level.

4.3.1.2 No Action Alternative

Under the No Action Alternative, the BLM would deny the Proposed Action, and no additional disturbance/development would occur beyond that already authorized. Impacts to vegetation, including invasive nonnative species, would continue at current levels.

4.3.1.3 Mitigation and Monitoring

No additional mitigation or monitoring is recommended.

4.3.1.4 Residual Impacts

The Proposed Action would result in the disturbance/removal of vegetation from 766 acres within the CGIDP area, including 256 acres of LOP disturbance. It could take 20 to 30 years after reclamation has been initiated for some reclaimed areas to achieve vegetation production and species diversity comparable to pre-disturbance conditions.

4.3.1.5 Cumulative Impacts

Vegetation in the CIAA would continue to be impacted primarily by ongoing oil and natural gas development and livestock grazing. Cumulative total disturbance in the CIAA would total 3,883 acres and cumulative LOP disturbance would total 1,410 acres. Based on the actual, authorized, and proposed disturbance associated with natural gas development total surface disturbance would total approximately 6% of the CIAA and LOP disturbance would total approximately 2%. The use of BMPs and adherence to

the reclamation plan in Appendix A would result in low cumulative impacts to vegetation. No special habitats would be disturbed, and invasive species would be controlled by the Operators as necessary.

4.3.2 Wildlife Resources

The Cave Gulch EIS concluded that “The application of prescribed avoidance and mitigation measures as well as additional measures...would reduce the impact potential and allow for any of the action alternatives to be performed without significant impacts to wildlife.”

4.3.2.1 Proposed Action

Impacts to wildlife could result from loss of habitat due to vegetation removal; displacement due to disturbance by project-related activities; mortality due to construction-related activities; increased mortality due to poaching and harassment; and an increased likelihood of vehicle/animal collisions due to increased traffic within the CGIDP area.

The temporary loss of 766 acres of big game habitat due to vegetation removal would be mitigated with measures included in the Proposed Action to minimize surface disturbance and to ensure timely reclamation and revegetation of all disturbed areas.

Big Game. As indicated in Section 3.4.2.1, the CGIDP area includes both yearlong and winter/yearlong habitat for both pronghorn antelope (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*); however, no crucial habitats are known to exist for either species within the CGIDP area. Rather than direct habitat loss, the greatest impact on big game species would result from displacement of individual animals from preferred habitats as a result of increased levels of human activity (including vehicular traffic) and associated noise. The extent of this displacement is difficult to predict when one considers that response to noise and human presence varies from species to species, as well as among individuals of the same species. Some unquantifiable amount of displacement of pronghorns from areas adjacent to disturbance, such as construction and drilling operations, would reduce pronghorn use of additional habitat during the time the disturbance continued. Displacement likely would be about 0.5 mi (Gusey 1986; Guenzel 1987; Easterly et al. 1991). Once the disturbance ended, however, pronghorn likely would again utilize the habitat during production operations, although probably not to the same extent as prior to disturbance. Although methodologies for documenting animal displacement or changes in distribution are fairly straightforward, those for documenting population-level impacts (survival, reproduction) are

extremely complex. Therefore, little information is available concerning how human-related disturbances impact reproduction and survival of ungulates (Western EcoSystems Technology, Inc. [WEST] 2003).

Reeve (1984) reported that pronghorn habituated to increased traffic volumes and heavy machinery as long as traffic moved in a predictable manner. Reaction of pronghorns to roads is not well understood; however, Wyoming drivers often see pronghorns adjacent to road ROWs, including even busy interstate highways. It is likely that pronghorn movement is more affected by fences along ROWs than by the activity (traffic) on the ROW. At the same time, the difficulty that pronghorns have crossing fences adjacent to highway ROWs likely reduces the chance of vehicle/pronghorn collisions.

Easterly et al. (1991) reported that mule deer frequented areas near and in oil fields in the Rattlesnake Hills in Wyoming, and Reed (1981) reported that mule deer continued to occupy areas of the Belle Ayre coal mine in northeastern Wyoming during mining activity. Reeve (1996) reported no difference in the distance of mule deer observations and random points from roads and producing wells and concluded that mule deer were able to tolerate roads and wells associated with normal well field activities; however, West (2003) believed that the methods used to collect the data were biased and the data presented in the report do not support the conclusions. Lutz et al. (2003) reported that “Research addressing specific impacts of mineral exploration and development is scant. As a result, evaluations of potential impacts of such activities are often based on inferences made on observed effects by other similar actions,” and “Depending on time of year and availability of cover, mule deer avoided zones approximately 100-400 m (328-1,312 ft) from roads or human presence (Ward et al. 1980), changed behavioral patterns and habitat use patterns when harassed (Yarmonoy et al. 1988), and escaped from snowmobiles or humans walking, more so when disturbed repeatedly (Freddy et al. 1986).”

Some unquantifiable amount of displacement of mule deer from areas adjacent to disturbance, such as construction and drilling operations, would reduce deer use of additional habitat during the time the disturbance occurred. Once the disturbance ended, however, mule deer likely would utilize the habitat during production operations; however, there would be some loss of habitat effectiveness because habitat utilization would not be as high as prior to disturbance.

In addition to the avoidance response, an increased human presence intensifies the potential for wildlife-human interactions ranging from the harassment of wildlife to poaching and increased legal harvest. Likewise, increased traffic levels on existing access roads could increase the potential for wildlife-vehicle

collisions. These collisions are most frequent where roads traverse areas commonly frequented by game species.

Generally speaking, construction, drilling, and completion activities outside of the core area would temporarily displace big game animals in the immediate vicinity (up to 0.5 mi) of such activities. However, once such activities are completed, most big game animals would acclimate to some degree to the reduction in traffic and human activity and would utilize suitable habitat in closer proximity to well pads, access roads, and pipelines; however, such habitat likely would not be utilized to the same extent as it was prior to disturbance.

It could take from 10 to 20 years for some reclaimed areas to attain pre-disturbance shrub conditions and vegetation diversity. However, once all production operations have been completed, facilities abandoned, and re-vegetation operations are completed and suitable vegetation habitat re-established, big game would likely re-occupy all previously disturbed areas within the CGIDP area.

On the other hand, the intensive exploration and development activities proposed within the core area of the CGIDP area (including an approximately 0.5-mi buffer zone surrounding the core area) would likely render this area as ineffective for big game habitat for the LOP. However, final abandonment and reclamation of the facilities in the area, coupled with a cessation of human activity, would allow big game animals to re-occupy these areas. Considering the level of activity that has previously occurred within the core area, it is likely that displacement of big game species from that area has already occurred.

For the above-stated reasons, impacts to big game animals would be low.

Small Mammals. Impacts to small mammals resulting from implementation of the Proposed Action would include direct mortality during project-related activities, especially associated with construction activities and increased traffic. Generally, the dispersed and relatively small amount of habitat physically impacted by well pads, access roads, and pipeline ROWs outside of the core area would limit impacts to small mammal species. Many small mammal species are relatively tolerant of human activity and would likely experience population reductions in direct proportion to the amount of habitat removed. This would most likely be true for species with relatively small home ranges (rodents and lagomorphs) and less applicable to more wide-ranging species such as coyotes. Project-related impacts to small mammals would likely be masked by natural variations in weather, disease, and other natural factors. Impacts to rare habitats (wetlands areas) would be minimal. The loss of habitat for other mammals due to vegetation

removal would be mitigated with measures included in the Proposed Action to minimize surface disturbance and to ensure timely reclamation and revegetation of all disturbed areas.

Impacts to small mammal populations in the core area of the CGIDP area would be greater than in other portions of the CGIDP area because of the intensive activity associated with increased well densities.

Raptors. Minimal raptor nesting activity has occurred within the original Cave Gulch EIS area since the Cave Gulch ROD was issued in 1997, with one to three active nests observed in years when surveys were conducted (Table 4.10). Comprehensive inventories conducted in 2003 and 2004 failed to identify any *Buteo* (ferruginous, red-tailed hawk, or Swainson's hawk) nesting activity within the Cave Gulch EIS area. Successful golden eagle nesting activity did occur within the Cave Gulch EIS area at one nest located about 1.5 mi southeast of those areas that have experienced continuous oil/gas development. The buffer area for avoidance of active raptor nests by CGIDP-related activities is 0.5 mi--an increase over the 0.25 mi avoidance area prescribed the Cave Gulch EIS.

Table 4.10 Occupied Raptor Nests in the Cave Gulch EIS Project Area Since 1997.

Year	Occupied Nests		General Comments ²
	No. of Nests	Nest No. ¹	
1997	3	20c, 193	FEHA, GHOW, and RTHA nests. GHOW and RTHA nests were within 0.5 mile of development, but were not in line-of-sight. FEHA nest was > 1.5 miles east of development.
1998	3		FEHA, GHOW, and SWHA nests. None of the 3 nests were within 1 mile of development activity.
1999	1	2466 ³	SWHA nest was south of Hwy 20/26, > 1 mile away from development activities.
2000	2	5, 20c	GOEA and GHOW nests. GOEA nest was > 1.5 miles southeast of development activities. GHOW nest was within 0.5 mile of development, but was not in line-of-sight.
2001	0	--	No known nesting activity.
2002	0	--	No known nesting activity.
2003	0	--	No known nesting activity.
2004	1	5	GOEA nest was > 1.5 miles southeast of development activities.

¹ Nest numbers from *Raptor Technical Report for the Cave Gulch Analysis Area 1994, 1995, 1996*. Hayden-Wing Associates. February 1997.

² GHOW = Great horned owl
RTHA = Red-tailed hawk
SWHA = Swainson's hawk
FEHA = Ferruginous hawk
GOEA = Golden eagle

³ Nest identified by WGFD in 1999. Apparently a new nest that was not present during the Hayden-Wing inventories conducted prior to 1999.

The Cave Gulch EIS predicted that an estimated three to seven raptor nesting territories would be impacted over the short-term by project-related activities associated with the Cave Gulch EIS, with the number of territories impacted based upon the availability of prey species in any given year. The Cave Gulch EIS also predicted that impacted areas would be re-colonized as intensive development gave way to less intensive operations such as routine production and well maintenance. Based on monitoring data collected to date, *Buteo* sp. nesting activity has been completely displaced from the Cave Gulch EIS area, and golden eagle nesting activity has occurred only in an area more than 1.0 mi from development activities. This displacement is expected to continue, particularly in the core area of the CGIDP--until such time as intensive oilfield activities within the area have ceased. Whether or not these displaced raptors have established new territories as a result of ANSs installed subsequent to the issuance of the Cave Gulch ROD is not known. However, it is true that successful nesting activity has increased at these ANSs sites (two installed within the GRAA and 12 installed outside the GRAA) from one pair in 1998 to five pairs in 2004. Considering that intensive exploration and development activities are predicted for an additional 5 to 10 years within the CGIDP area, with production expected to last for approximately 40 years, these ANSs will continue to play an important role in promoting successful raptor nesting activity in this area of Natrona County.

As stated in the Cave Gulch EIS, some re-colonization would be expected once intensive operations associated with continued oil/gas exploration and development end. Considering that most potential impacts to raptor nesting activity within the CGIDP area have already occurred, implementation of the Proposed Action would not be expected to have an additional adverse impact on raptor nesting activity within the CGIDP area. To ensure continued nesting success, the 14 existing ANSs will be protected as outlined in the Cave Gulch ROD, including a 0.25-mi no surface occupancy (NSO) radius around each ANS.

Upland Game Birds and Other Migratory Birds. Three of the species identified in Table 3.5, including ferruginous hawk, greater sage-grouse, and mountain plover (BLM-sensitive species) are discussed below.

Surface-disturbing activities associated with the Proposed Action would result in the short-term disturbance of 766 acres of shrub-steppe and shortgrass prairie habitat, which would provide a source of food, security cover, and nesting habitat for many of the species listed in Table 3.3. Approximately 67% of this disturbance would be reclaimed within 5 years of initial disturbance, leaving a LOP loss of 256 acres of habitat. Reclamation of those non-working areas disturbed in conjunction with

additional exploration and development activities within the CGIDP area would introduce some degree of vegetative (habitat) diversity into the area which would benefit those species dependant upon the shortgrass prairie habitat type.

Considering the relatively small amount of surface disturbance proposed within the 27,013-acre CGIDP area, the actual magnitude of direct habitat loss and subsequent displacement would be negligible. Impacts would occur in direct proportion to the amount of a species' habitat that would be directly disturbed or rendered less habitable by adjacent human activity and the time of year the disturbance occurred. Some increased mortality would be likely from bird/vehicle collisions as a result of increased vehicle traffic and from collisions with structures. Impacts to waterfowl and shorebirds would be minimal because few areas of suitable habitat would be affected. Depending upon the time of year, birds could move to adjacent habitats undisturbed by project-related activities. However, project-related activities during the nesting season could result in nest failure or destruction. Such impacts, however, would be of such scale that they would be unlikely to affect area populations. Any power lines would be designed, constructed, operated, and maintained in conformance with the *National Electrical Safety Code* and other applicable codes and standards, as well as *Suggested Practices for Raptor Protection on Powerlines: The State of the Art in 1996* (Avian Power Line Interaction Committee 1996). Implementation of these standards would reduce the risk of bird electrocutions.

Amphibians, Reptiles, and Fish. Potential adverse impacts to amphibians or reptiles include direct mortality during surface-disturbing activities, loss of suitable habitat, and displacement of individuals. Such impacts would occur in direct proportion to the amount of suitable habitat disturbed. Mitigation described in the Proposed Action to minimize surface disturbance, to ensure timely reclamation, and to avoid wetlands would minimize project-related impacts to amphibians and reptiles to negligible levels.

4.3.2.2 No Action Alternative

Under the No Action Alternative, the BLM would deny the Proposed Action, and no additional disturbance/development would occur beyond those levels previously authorized. Wildlife populations would continue at present levels, with fluctuations due primarily to weather, disease, and other natural causes.

4.3.2.3 Mitigation and Monitoring

Implementation of the following BMP developed by Wyoming PIF (Nicholoff 2003) would reduce the impacts of surface disturbing activities within the CGIDP area on both migratory and non-migratory bird species.

- Relocate surface-disturbing activities to avoid large sagebrush stands to the greatest extent possible in order to prevent habitat fragmentation within the shrub-steppe habitat type.
- Where possible, restore or rehabilitate degraded and disturbed sites to native plant communities.
- In large disturbed areas, sagebrush and perennial grasses may need to be reseeded to shorten the recovery time and prevent dominance by non-native grasses and forbs.

4.3.2.4 Residual Impacts

The Proposed Action would result in the disturbance of approximately 766 acres of wildlife habitat. Some species such as big game, large mammals, upland game birds, and raptors would be temporarily displaced and some wildlife species, especially small mammals, small birds, amphibians, and reptiles would be killed during construction activities. There would also be an indeterminate increase in wildlife mortality from vehicle/animal collisions.

4.3.2.5 Cumulative Impacts

Cumulative impacts to wildlife resources would likely occur in direct proportion to the amount of habitat loss that occurs for each species. Cumulative total disturbance in the CIAA would be 3,883 acres (6% of the CIAA), and cumulative LOP disturbance would total 1,410 acres (2% of the CIAA). All but LOP disturbance would be reclaimed shortly after it occurred and would generally take 3 to 20 years to reach pre-disturbance conditions. Once natural gas facilities have been abandoned and reclaimed, all disturbed areas would eventually return to pre-disturbance conditions. No special habitats would be disturbed. There is no evidence that there are or have been any significant cumulative impacts to any wildlife species within the CIAA.

The CIAAs for pronghorn and mule deer are the respective herd units. Considering the level of activity that has previously occurred within the Cave Gulch EIS area, it is likely that displacement of big game

species from the affected area has, to a large degree, already occurred. No crucial habitats for either species would be disturbed. As a consequence, the loss of 766 acres of habitat (<0.02% of both the pronghorn and mule deer herd units) would be a negligible cumulative impact.

The CIAA for small mammals, upland game birds, migratory birds, reptiles, amphibians, and fish is the CGIDP area; therefore, cumulative impacts would be added to impacts resulting from actions described in the Cave Gulch EIS. Impacts to all of these animals would be negligible to low and would decrease as initial disturbance is reclaimed. The CIAA for raptors is the GRAA. As shown in Table 4.9, raptor nesting activity in the Cave Gulch EIS area has declined since the issuance of the Cave Gulch ROD. Inventories of raptor nesting activity in the GRAA conducted by private consultants via helicopter in 1996, 1997, and 1998 identified 18, 20, and 19 active nests, respectively --which would seem to indicate a relatively steady number of nesting pairs within the GRAA. However, the inventory conducted via fixed-wing aircraft in 1999 by the WGFD identified seven active nests within the GRAA. Whereas this would appear to be a substantial decrease in nesting pairs within the GRAA for the 1999 nesting season, a significant difference in the 1999 inventory methodology (fixed-wing aircraft versus helicopter) may well account for this apparent reduction in nesting pairs. As indicated in Section 3.4.2.3, operator-funded monitoring inventories within the GRAA were scheduled to cease after 1998. Because no intensive raptor nesting inventories have been conducted within the GRAA using a similar methodology since 1998, it is not possible to quantify nesting activity in this area in subsequent years. Although there has been an increasing use of the ANSs installed east/northeast of the Cave Gulch EIS area, cumulative impacts on raptor nesting and overall raptor populations in the CIAA are unknown subsequent to 1998.

4.3.3 Threatened, Endangered, Proposed, and Candidate Species and BLM-Sensitive Species

The Cave Gulch EIS concluded that there would be no impacts to black-footed ferret or mountain plover, and that mitigation measures were adequate to avoid adverse impacts to swift fox should they be determined to occur on the project area. Bald eagle and Ute ladies' -tresses were not discussed in the Cave Gulch EIS. Impacts to greater sage-grouse were predicted to be negligible. Other sensitive species would be impacted by destruction of habitat, displacement, and collisions with vehicles.

4.3.3.1 Proposed Action

Bald Eagle. The CGIDP area does not contain suitable roosting/perching habitat, concentrated feeding areas (perennial streams), or other special (nesting) habitats which might result in increased eagle activity

therein. Migrating or foraging bald eagles and those nesting or wintering along the North Platte River may occasionally forage or fly through the CGIDP area; however, such use is likely intermittent and for relatively short periods of time. Moreover, the level of human activity expected to occur within the project area would likely discourage eagle use. Consequently, any potentially significant impacts would not be expected to occur to bald eagle populations as a result of activities associated with the CGIDP. To minimize potential impacts to all raptors (including bald eagle), any project-related power lines would be designed and constructed in accordance with *Suggested Practices for Raptor Protection on Powerlines: The State of the Art in 1996* (Avian Power Line Interaction Committee 1996). Given the intermittent use and the lack of nesting and roosting habitat in the CGIDP area and the power line mitigation measures described above, it is anticipated that the Proposed Action will have no effect on bald eagles. Bald eagle use of this area is infrequent for the reasons stated above.

BLM-Sensitive Animal and Plant Species. Impacts to most BLM-sensitive species as a result of the Proposed Action likely would occur in direct proportion to the amount of their habitat that would be disturbed. The Proposed Action would result in approximately 766 acres of disturbance (256 acres of LOP disturbance), or approximately 3% of the CGIDP area. Most species are sufficiently mobile that, if present, they would not be affected by the Proposed Action. However, some individuals would be killed by vehicles or equipment, or temporarily or permanently displaced from their preferred habitats. Such impacts would be limited to a relatively few individuals and would not have an adverse effect on populations as a whole. As specified in the Cave Gulch ROD, the Operators would comply with seasonal nesting restrictions for raptors (but would increase the buffer area for active nests from 0.25 mi to 0.5 mi), and any project-related power lines would be designed and constructed in accordance with *Suggested Practices for Raptor Protection on Powerlines: The State of the Art in 1996* (Avian Power Line Interaction Committee 1996).

As indicated in Section 3.4.3.3, successful mountain plover nesting was documented in Section 27, T36N, R87W, in 2004. In addition, suitable habitat is known to exist within the CGIDP area--particularly in the 1,920-acre addition to the original Cave Gulch EIS project area, as well as the extreme northeastern corner of the CGIDP area (Ralston Flats area northeast of the BNSF railroad ROW). The Operators would assess potential impacts on mountain plovers in these areas on a well-by-well basis. If construction-related activities in potential mountain plover nesting habitat would occur between March 15 and July 10, surveys for the presence of nesting mountain plovers would be conducted in accordance with current survey protocol, and appropriate mitigation measures (seasonal avoidance) would be implemented as directed by the BLM.

The greater sage-grouse leks identified in Section 3.4.3.3 are all located more than 3 mi from the exterior boundary of the CGIDP. The closest known lek to the project area is Notches 3, which is located approximately 3.25 mi from the northeast corner of the CDIGP area and over 5 mi from the “core” area of the CGIDP. While greater sage-grouse nesting and early brood-rearing habitat does exist within selected portions of the CGIDP area as discussed in Section 3.4.3.3, the extent to which these habitats are currently being utilized by grouse for nesting (or other purposes) is unknown. However, considering that no greater sage-grouse leks or other important habitats have been documented within 3 mi of the CGIDP area, it is unlikely that the Proposed Action would adversely affect greater sage-grouse populations within the area of impact. Some individual greater sage-grouse could be killed as a result of vehicle/bird collisions; however, such collisions would be uncommon and would likely have negligible impacts on greater sage-grouse populations in the overall area. BLM would assess greater sage-grouse nesting and early brood-rearing habitat suitability in conjunction with the on-site inspection on a well-by-well basis as drilling proposals are submitted by the Operators. In those instances where suitable nesting and early brood-rearing habitat was identified, mitigation measures would be recommended in accordance with current BLM policy.

In summary, the Proposed Action would have negligible impacts on TEPC species and BLM-sensitive species and would not contribute to the need to list any species under the provisions of the *Endangered Species Act*.

4.3.3.2 No Action Alternative

Under the No Action Alternative, the BLM would not approve the Proposed Action, and no additional disturbance/development would occur beyond that already authorized. Impacts to TEPC species and BLM-sensitive species would continue at current levels, with fluctuations due primarily to weather, disease, and other natural causes.

4.3.3.3 Mitigation and Monitoring

The operators would comply with current BLM policy regarding greater sage-grouse management.

4.3.3.4 Residual Impacts

Under the Proposed Action, there could be some displacement of both TEPC and BLM-sensitive species. There would also be a slight risk of electrocution of raptor species should power lines be constructed and operated, although the risk would be mitigated by the utilization of a raptor-safe power line structure design. Some individuals of BLM-sensitive species may be adversely affected (greater sage-grouse collisions with vehicles) by the Proposed Action.

4.3.3.5 Cumulative Impacts

Cumulative impacts to TEPC and BLM-sensitive species would likely occur in direct proportion to the amount of disturbance to habitats of the specific species. Cumulative total disturbance in the CIAA would be 3,883 acres and LOP disturbance would total 1,410 acres. Potential impacts to TEPC species would be minimized by conducting species-specific surveys and the implementation of species-specific mitigation measures if the species occurs in an area to be affected by project-related activities. Impacts to BLM-sensitive species would be limited to areas where suitable habitat would be removed or the larger area from which individuals may be displaced by project-related activities. There is no evidence that there are or have been any significant cumulative impacts to any TEPC or BLM-sensitive species within the CIAA.

4.4 HUMAN RESOURCES

4.4.1 Cultural Resources

The Cave Gulch EIS stated that “Although the project area has a high degree of archaeological sensitivity, impacts to known cultural properties would not be significant. Potential impacts to known and anticipated cultural resources can be alleviated through appropriate mitigation measures.”

4.4.1.1 Proposed Action

As reported in Section 3.2 of this EA, Wyoming SHPO records indicate that numerous areas have been inventoried for cultural resources within the CGIDP area, and most of these inventories have been conducted in association with recent oil and gas development. Potential direct impacts to sites considered eligible to the NRHP would result primarily from construction-related activities on approximately

766 acres. Activities considered to have the greatest impacts on cultural resources include the construction of well pads, roads, and pipelines.

Indirect impacts to prehistoric sites include unauthorized surface collecting of artifacts and casual use activities that could physically alter a site. Indirect impacts could also result from the alteration of the surrounding environment by introducing visual changes into the viewshed, especially for historic sites such as the Bridger Trail, the abandoned Chicago & Northwest Railroad Grade, and the National Park-to-Park Highway/Yellowstone Highway.

Under the Proposed Action, the Operators would conduct a Class III cultural resource inventory of areas proposed for disturbance that have not previously been inventoried, including impacts to viewsheds of linear historic properties. These inventories would be conducted prior to BLM approval of individual actions associated with the Proposed Action and would recommend mitigation measures as necessary for the protection of those cultural resources identified on lands subject to federal jurisdiction. Cultural resources considered eligible for the NRHP would be avoided or mitigated prior to disturbance. If necessary, treatment plans or data recovery efforts would be conducted by authorized cultural resource personnel and the results approved by the BLM archaeologist and the SHPO. If a proposed well would physically disturb the Bridger Trail, the Chicago & Northwest Railroad Grade, or the National Park-to-Park Highway/Yellowstone Highway, the historic site would be evaluated and appropriate mitigation included in the APD.

The Operators would inform all field personnel not to search for, scavenge, or remove any cultural resources. Employees would be informed that they may be subject to federal prosecution for knowingly damaging, altering, excavating, or removing any archeological or historic objects or sites located on federal lands. If any previously unidentified archeological or historical materials are discovered, the Operators would suspend all operations that would further disturb such materials and immediately contact the BLM. Operations would not resume until a written authorization to proceed is issued by the BLM. Therefore, both documented and undocumented cultural resources would be protected from unauthorized disturbance and no unmitigated cultural resources that are considered eligible for the NRHP would be impacted by the Proposed Action.

4.4.1.2 No Action Alternative

Under the No Action Alternative, no additional disturbance/development would occur beyond that already approved by the BLM, and there would be no additional impacts to cultural resources.

4.4.1.3 Mitigation and Monitoring

No additional mitigation or monitoring is recommended.

4.4.1.4 Residual Impacts

Neither the Proposed Action nor the No Action Alternative would result in any residual impacts to identified cultural resources. However, some loss of undiscovered cultural resources or artifacts could occur.

4.4.1.5 Cumulative Impacts

Class III cultural resource surveys would be required on all lands subject to federal jurisdiction disturbed within the CIAA and would add to our knowledge of the history of the area. Sites would be avoided if practicable or, if not avoided, mitigated in accordance with BLM/SHPO recommendations. Some buried sites could be damaged, and vandalism may occur by the public. Cultural resources could be disturbed/destroyed by actions not requiring a federal permit. However, overall cumulative impacts to cultural resources are expected to be minimal.

4.4.2 Native American Religious Concerns

4.4.2.1 Proposed Action

No sites of religious concern to Native Americans are known to occur within the CGIDP area. If such sites are identified at a later date, their presence would be taken into consideration by the BLM and addressed in accordance with applicable rules, regulations, and policies.

4.4.2.2 No Action Alternative

Under the No Action Alternative, the BLM would deny the Proposed Action, and no additional disturbance/development beyond that already approved would occur. There would be no impacts to Native American religious sites.

4.4.2.3 Mitigation and Monitoring

No additional mitigation is recommended.

4.4.2.4 Residual Impacts

No residual impacts to Native American religious sites are anticipated.

4.4.2.5 Cumulative Impacts

Cumulative impacts to Native American religious sites would not be likely to occur because no sites of religious concern to Native Americans are known to occur within the CIAA. If such sites are identified at a later date, their presence would be taken into consideration by the BLM and addressed in accordance with applicable rules, regulations, and policies.

4.4.3 Land Use

The Cave Gulch EIS concluded that there would be no significant impacts to range resources from the authorized development. However, the document concluded that impacts would be significant to recreation because activities would be displaced for more than one season of use and because increased evidence of human activity would reduce recreationists' perceived levels of isolation and solitude.

4.4.3.1 Proposed Action

Under the Proposed Action, surface ownership and mineral ownership within the CGIDP area would not change. Other current land uses (livestock grazing, and dispersed recreation) could continue at reduced rates. The 766 acres that would be disturbed by the construction of the well pads, roads, and pipelines would be unavailable for livestock grazing and would also be lost to dispersed recreational use (to the

extent that dispersed recreation was previously available on those non-federal lands included within the CGIDP area). Approximately 256 acres would be unavailable for the LOP, and 510 acres would be unavailable for 3 to 5 years. However, once natural gas production operations have been completed, facilities removed, and the disturbed areas reclaimed, previous land uses would be available. Project-related activities would have a low to moderate impact on land use outside of the core area because of the dispersed nature of the disturbance, the limited amount of disturbance that would occur annually (70 to 140 acres), and the existing level of oil and gas development that has already occurred thereon.

The primary impact of the Proposed Action to livestock grazing within the overall CGIDP area would be the initial loss of vegetation and vegetative production resulting from 766 acres of short- and long-term disturbance. Assuming an average stocking rate of 10 acres per AUM and project-related disturbance only within public grazing allotments, the Proposed Action would result in a temporary reduction of 77 AUMs from public grazing allotments (51 AUMs due to short-term disturbance and 26 AUMs due to LOP disturbance). The 510 acres (51 AUMs) of short-term disturbance would return to some level of forage production for livestock grazing within 2 to 3 years and would likely return to pre-disturbance levels of forage production in 20 to 30 years. Some negligible to low level of disturbance to livestock management would also occur, and the potential for livestock/vehicle collisions would increase slightly.

The 256 acres (26 AUMs) of LOP disturbance would be unavailable for livestock grazing for 30 to 40 years until natural gas production operations are completed, facilities have been abandoned, and all remaining disturbance has been reclaimed. Once reclamation is completed, forage production would return and allow some level of livestock grazing within 2 to 3 years and livestock grazing would likely return to pre-disturbance levels in 20 to 30 years. Actual AUM adjustments, if necessary, would be made on an allotment basis and a separated decision regarding that matter will be issued. Overall, impacts to livestock grazing outside of the core area would be low.

Project-related activities within the core area would result in a proportionately higher loss of vegetation (and concomitant AUMs) as compared to the overall CGIDP area. The proportionately higher loss of AUMs in the core area would serve to further reduce livestock grazing opportunities therein due to the degree of surface disturbance and human activity associated with increased well densities. Conflicts between livestock operations and oil/gas exploration and development activity within the core area may increase to the point where grazing is no longer practical in this area for the LOP. These conflicts would include not only overgrazing of newly reseeded areas resulting in reclamation failure and the potential for

increased erosion and sedimentation but also an increased potential for livestock mortality due to collisions with oil-field-related traffic.

Under the Proposed Action, recreational resources/opportunities (hunting and scenic touring) within the CGIDP area would continue at their current levels. Whether the Cave Gulch EIS was correct in assessing significant impacts to recreation or not, the CGIDP would result in a continuation of the disturbance that resulted from the Cave Gulch EIS project; however, it would not increase impacts above current levels, but rather it would extend the time during which these impacts would occur. Access across and through the CGIDP area on public roads (U.S. Highway 20-26 and County Roads 104 and 212) would not be affected by the Proposed Action, and access to public lands within the CGIDP area would not be restricted or prohibited above or beyond pre-existing levels. The public would continue to be allowed to utilize public lands for these activities. In fact, access to public lands would be easier because of the construction of additional resource roads on public lands. Access to private property would not change, and the public would still be required to obtain landowner approval prior to accessing privately owned lands for hunting or scenic touring. Opportunities for upland game bird and small game hunting would be affected by project-related activities, and such activity could temporarily displace mule deer and pronghorn from lands outside of the core area.

Access to the southern Big Horn Mountains via the Byway would not be restricted. Some portions of the landscape along the Byway have already been affected by previous oil and gas exploration and development activity associated with the Cave Gulch EIS. These existing facilities are visible from a foreground perspective to the casual observer as they drive north from Waltman on County Road 104. While the Proposed Action would add to the existing visual intrusion of development along the 7.75 mile portion of County Road 104 within the CGIDP area, and could detract from the quality of the experience of some individuals traveling that portion of the Byway, the additional visual intrusion associated with the Proposed Action would not dramatically alter the existing viewer perspective. Impacts would be mitigated by prompt reclamation procedures and the Operators' continued implementation of other mitigation specified in Appendix A of this EA.

4.4.3.2 No Action Alternative

Under the No Action Alternative, the BLM would deny the current Proposed Action, and there would be no additional impacts to land use beyond those already authorized or that already exist. Impacts to livestock grazing would continue to occur at current low rates. Impacts to recreational resources would

continue to be affected by existing human development in the CGIDP area, including oil and gas development.

4.4.3.3 Mitigation and Monitoring

No additional mitigation or monitoring is recommended.

4.4.3.4 Residual Impacts

There would be both long- and short-term disruptions in current land use on the approximately 766 acres that would be disturbed during the construction of oil and gas infrastructure. This would include impacts to forage for, and displacement of both livestock and wildlife, and a reduction in recreational use. The Proposed Action would result in the short-term loss of 51 AUMs and the long-term loss of 26 AUMs from public grazing allotments. In addition, there would be a reduction in hunting opportunities and additional visual intrusions along a 7.75-mi portion of the Byway. These impacts would likely last for the LOP.

4.4.3.5 Cumulative Impacts

There would be no change in landownership in the CIAA. Land use would continue to be impacted by on-going oil and natural gas development, livestock grazing, and recreational use. Cumulative total disturbance in the CIAA would total 3,883 acres, and cumulative LOP disturbance would total 1,410 acres. Assuming an average of 10 acres/AUM, approximately 141 AUMs would be lost for the LOP in the CIAA. The CGIDP would add to disturbance that would further discourage recreation in the CIAA by extending the time over which oil and gas activity would occur. Other portions of the CIAA are not important for recreation, so cumulative impacts to recreation would be low to moderate.

4.4.4 Visual Resources

The Cave Gulch EIS concluded that neither the Proposed Action nor the alternatives would exceed the level of contrast allowed in a Class 4 zone. The only site specific exception would be the liquids recovery plant included in the Proposed Action and Alternatives A and B, which would produce significant visual impacts. The area of highest scenic quality within the project area would be seriously compromised by the Proposed Action and alternatives. Contrasts in line, form, color, and texture would dominate the

badland breaks. In addition the aesthetic experience of those traveling the By way would be substantially diminished by the Proposed Action and alternatives. The first 9 mi of the Byway would no longer be an attractive southern gateway to the Bighorns. The Proposed Action and all alternatives would also diminish the recreation experience of those who may continue to recreate in the area.

4.4.4.1 Proposed Action

The Proposed Action would continue activity similar to that approved in the Cave Gulch ROD. Much of the proposed disturbance would occur in the core area of the CGIDP area not visible from any public roads. Most of the proposed exploration and development activity would occur in VRM Class IV and would be in compliance with that designation.

As indicated in Section 2.2.4, U.S. Highway 20-26 traverses the southern end of the CGIDP area, with the southern boundary of the CGIDP area (see Figure 1.1) located approximately 2 mi south of the highway. The CGIDP area extends north of U.S. Highway 20-26 for approximately 6 mi, and some exploration and development would likely occur in the 6-mi wide VRM Class III corridor along the highway (3 mi each side of the highway). The natural landscape in this 6-mi VRM Class III corridor has been subjected to extensive cultural modifications from both a foreground and middle ground perspective as described in Section 3.5.4. These existing facilities would tend to distract the viewer and combine to appreciably diminish the aesthetic experience of the viewshed in this particular area, thereby minimizing the impact of additional disturbances within the VRM Class III corridor attributable to the Proposed Action.

Short-term disturbances associated with development activities within the Class III VRM corridor along U.S. Highway 20-26 would clearly be evident and, depending upon the level of activity ultimately proposed within this corridor, may well dominate the viewshed in the short-term while drilling and completion operations are underway. Removal of drilling/completion rigs and successful reclamation of the disturbed areas within the corridor would serve to reduce the long-term visual impacts of existing wells but may not reduce the visual contrast (form and texture of the landscape) to a level that is subordinate to the visual strength of the existing, natural landscape. However, the existence of unrelated, strong visual intrusions within the VRM Class III corridor referenced above (junk yard at Waltman, man camp directly south of Waltman, overhead power lines, agricultural operations, etc.), when combined with the relatively short overall viewing period to motorists traveling east/west along the highway, would serve to minimize the visual intrusions resulting from activities proposed in conjunction with the proposed CGIDP. Moreover, mitigation measures, including those carried over from the Cave Gulch EIS,

would further minimize the visual impacts of additional oil/gas exploration and development activity to viewers in both the foreground and middle ground perspective along U.S. Highway 20-26.

4.4.4.2 No Action Alternative

Under the No Action Alternative, the BLM would deny the Proposed Action, and no additional disturbance/development beyond that already authorized would occur. Impacts to visual resources would occur as described in the Cave Gulch EIS.

4.4.4.3 Mitigation and Monitoring

No additional mitigation or monitoring is recommended.

4.4.4.4 Residual Impacts

The Proposed Action would result in temporary impacts to visual resources in the CGIDP area. However, these impacts would be mitigated to the extent practicable, and major portions of the proposed development would not be visible from any public road.

4.4.4.5 Cumulative Impacts

Visual impacts to the Cave Gulch EIS project area, the CGIDP, and the original and modified Cooper Reservoir project areas add to existing impacts that have substantially altered the viewsheds along U.S. Highway 20-26 and County Roads 104 and 212. Although the number of facilities within the viewshed would be increased, the cumulative impacts of these facilities on the landscape would remain consistent with VRM designations because of the implementation of mitigation contained in the Cave Gulch EIS and this EA.

4.4.5 Socioeconomics

The Cave Gulch EIS concluded that “Given the relatively few annual number of wells to be drilled under the Proposed Action, and the fact that anticipated drilling levels are well within the range of recent drilling levels in the area, the socioeconomic effects of the Proposed Action would be largely positive. The increases in income associated with the Proposed Action and alternatives A and B would be

substantial. The Proposed Action and Alternatives A and B would provide continued and increased employment opportunities for some local residents. Anticipated tax revenues associated with the Proposed Action would also be substantial. Local government service impacts would be limited to localized increased demand for road maintenance and law enforcement services. Negative impacts would not be significant according to the thresholds used for this analysis.”

4.4.5.1 Proposed Action

Under the Proposed Action, current levels of employment would continue; therefore, the impacts on the infrastructure of and social services in Natrona County would continue at existing levels. Many workers currently employed by the Operators have established residence in Natrona County. Any new workers employed by the Operators would likely replace existing workers, so there would be little change in the total number of employees. The Operators would continue to hire qualified contractors from Natrona County. Therefore, the Proposed Action would have negligible impacts on the infrastructure and social services of local, county, or state governments.

Various taxes generated by the purchase and use of equipment and supplies, as well as taxes and royalties generated by natural gas production, would augment revenues to all levels of government. The Proposed Action would generate substantial revenues to the City of Casper, Natrona County, the State of Wyoming, and the federal government. Projected tax revenues generated under the Proposed Action cannot be accurately estimated; however, they would likely be on the scale presented in Section 4.11.3.1 of the Cave Gulch EIS. On that assumption, total revenues generated over the LOP to all government entities would be \$200 to \$300 million.

4.4.5.2 No Action Alternative

Under the No Action Alternative, the BLM would deny the Proposed Action, and no additional development would occur beyond that already authorized. Impacts to socioeconomic resources would continue to occur at current rates until all the authorized wells were drilled, after which the economic benefits from construction, drilling, and completion would end. Economic benefits from oil and gas production would continue as long as the existing wells continued to produce. However, all revenues that would be generated under the Proposed Action (\$200 to \$300 million) would not be realized.

4.4.5.3 Mitigation and Monitoring

No additional mitigation or monitoring is recommended.

4.4.5.4 Residual Impacts

The Proposed Action would provide continued economic benefits to all levels of government.

4.4.5.5 Cumulative Impacts

Conventional natural gas development in the CIAA would add to the economic viability of Casper, Natrona County, the State of Wyoming, and the U.S. by providing revenue from job-creation, spending, taxes, and royalties, and would provide well-paying jobs in Natrona County. It would also improve economic stability for the various government entities for the LOP. The current infrastructure in Natrona County would be capable of accommodating any changes in needed social services. Therefore, the beneficial impact to socioeconomics would be moderate to high.

4.4.6 Health, Safety, and Transportation

The Cave Gulch EIS concluded that “Hazards associated with the drilling and development activities, including construction and operation are the ones normally associated with heavy construction and industrial work. There would be a minor increased risk to the public caused by project implementation resulting from additional drilling and production related traffic in the project area. None of these impacts occur at significant levels.”

4.4.6.1 Proposed Action

Impacts to health, safety, and transportation would be similar to those identified in the Cave Gulch EIS and would include activities related to occupational hazards associated with the oil and gas industry, risks associated with vehicle operation on improved and unimproved roads, potential vehicular collisions with big game or livestock, hunting-related and firearm-related accidents, and natural hazards such as flash floods and range fires. The volume of traffic and the risk of traffic accidents on U.S. Highway 20-26 and County Roads 104 and 212 is not expected to increase above current levels. The risk of these impacts/hazards would be no greater under the Proposed Action than under the Cave Gulch EIS project

because there would be no an increase in project-related personnel working in the area. The Operators anticipate that four drilling rigs would be active at any one time, and personnel currently working in the area would simply transition to new well sites and related activities.

4.4.6.2 No Action Alternative

Under the No Action Alternative, the BLM would deny the current Proposed Action, and no additional disturbance/development would occur beyond that already approved. There would be no additional impacts to health, safety, and transportation concerns.

4.4.6.3 Mitigation and Monitoring

No additional mitigation or monitoring is recommended.

4.4.6.4 Residual Impacts

General and project-specific safety procedures would be implemented; however, there could be some accidents. The rate, type, and severity of these accidents would be similar to those identified in the Cave Gulch EIS and would likely be rare.

4.4.6.5 Cumulative Impacts

Cumulative impacts within the CIAA would continue to include occupational hazards associated with the oil and gas development and field operations, risks associated with vehicle operation on improved and unimproved roads, potential vehicular collisions with big game or livestock, and natural hazards such as flash floods and range fires. These impacts would be minimized within the CIAA by implementation of appropriate mitigation/safety measures.

4.4.7 Wastes (Hazardous and Solid)

The Cave Gulch EIS concluded that there would be no significant impacts associated with hazardous or solid wastes.

4.4.7.1 Proposed Action

Under the Proposed Action, a limited quantity of hazardous and solid wastes would likely be generated by the Operators. However, no hazardous or solid wastes would be disposed of on-site, and the Operators would handle and dispose of all hazardous wastes in accordance with applicable state and federal rules and regulations. Any release of hazardous substances in excess of reportable quantities, established in Title 40 C.F.R. Part 117, would be reported as required by CERCLA (as amended). If a release of a reportable quantity of any hazardous substances occurs, a report would be provided to WDEQ and all other appropriate federal and state agencies.

Toilets would be provided for workers on-site and the waste would be properly disposed of through the septic system or at an approved waste disposal facility on an as-needed basis. Solid waste such as garbage and other discarded solid materials would be collected at designated collection sites and disposed of at an approved solid waste management facility. Solid waste would not be imported into or disposed of within the CGIDP area. Spills of petroleum products may occur due to periodic equipment maintenance and/or accidents. If such spills occur, petroleum-contaminated soils would be disposed of in accordance with direction from the BLM and/or WDEQ as appropriate. All non-hazardous material would be disposed of in accordance with appropriate local, state, and federal regulations.

Overall, impacts associated with hazardous and solid wastes would be negligible to low.

4.4.7.2 No Action Alternative

Under the No Action Alternative, the BLM would deny the Proposed Action, and no additional disturbance/development would occur beyond the levels previously authorized. Impacts from hazardous and solid waste would remain at existing levels and would be negligible to low.

4.4.7.3 Mitigation and Monitoring

No additional mitigation or monitoring is recommended.

4.4.7.4 Residual Impacts

Some environmental damage could occur should a spill or other accident occur; however, such accidents would likely be minor and cleaned up expeditiously.

4.4.7.5 Cumulative Impacts

Under *Resource Conservation and Recovery Act* regulations, there are no designated hazardous waste generators within the CIAA other than oil and gas operators registered as small-quantity hazardous waste generators. There are no designated hazardous waste treatment, storage, or disposal facilities or solid waste disposal facilities within the CIAA. As a result, any hazardous or solid waste generated by these facilities is handled in accordance with specific federal and state rules and regulations, and cumulative impacts would be negligible.

5.0 CONSULTATION AND COORDINATION

5.1 BACKGROUND

The Cave Gulch Infill Project EA was prepared by an independent consulting firm with guidance, participation, and independent review and evaluation by the BLM CFO. A list of people responsible for document preparation is presented in Section 5.4.

5.2 PUBLIC PARTICIPATION

A scoping notice was sent to 87 agencies, organizations, Native American tribes, and individuals about May 7, 2004, describing the project and requesting that any comments regarding the project be submitted to BLM by June 7. A copy of the scoping notice, which includes a list of the recipients, is included as Appendix C.

Three comment letters were received. The Wyoming State Historic Preservation Office did not object to the project so long as it was conducted in accordance with Section 106 of the National Historic Preservation Act and Advisory Council regulation 36 C. F.R. Part 800. The Petroleum Association of Wyoming had several comments, including: preparation of the EA should not be delayed; previous documents prepared in the general area should be utilized to the maximum extent possible; directional drilling should not be mandated as the primary extraction technique; socioeconomic benefits should be recognized; and the CGIP is consistent with President Bush's National Energy Policy. The Wyoming Field Office of the USFWS listed the threatened, endangered, proposed, and candidate species that could occur in the project area, as well as discussing migratory birds, greater sage-grouse, and other sensitive species. They included a list of *Migratory Bird Species of Management Concern in Wyoming*.

5.3 AGENCIES, ORGANIZATIONS, AND INDIVIDUALS CONTACTED

All appropriate agencies were contacted with the scoping notice. In addition, several were contacted one or more additional occasions to obtain pertinent information. Those agencies include WGFD, USFWS, and WOGCC.

5.4 LIST OF PREPARERS

Tables 5.1 and 5.2, respectively, identify the BLM personnel associated with the review of this EA and the personnel responsible for its preparation.

Table 5.1 Interdisciplinary Team for the BLM.

Name	Area of Expertise
Casper Field Office	
Chris Arthur	Cultural/Historic Resources
James Bauer	Physical Scientist
Eve Bennett	Outdoor Recreation Planner
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Roger Schoumacher	EA Preparation
Susan J. Connell	Air Quality
Ed Schneider	Cultural Resources
Rosenberg Historical Consultants	
Robert G. Rosenberg	Historic Resources

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7.0 GLOSSARY

abandon: To cease producing oil or gas from a well when it becomes unprofitable. Usually, some of the casing is removed and salvaged, and one or more cement plugs placed in the borehole to prevent migration of fluids between formations.

acre foot: A volume of water that covers an area of one acre to a depth of one foot (43,560 cubic feet or 325,851 gallons).

affected environment: The area potentially affected by the proposed action and alternatives analyzed in a NEPA document.

allotment: An area of land where one or more permittees graze their livestock. Generally consists of public land but may include parcels of private or State lands. The number of livestock and season of use are stipulated for each allotment. An allotment may consist of several pastures or be only one pasture.

alluvium: Clay, silt, sand, and gravel or other rock material transported by flowing water and deposited as sorted or semi-sorted sediments.

ambient air quality: The state of the atmosphere at ground-level as defined by the range of measured and/or predicted ambient concentrations of all significant pollutants for all averaging periods of interest.

ambient concentration: The mass of a pollutant in a given volume of air. It is typically measured as micrograms of pollutant per cubic meter of air.

ambient: The environment as it exists at the point of measurement and against which changes or impacts are measured.

ancillary facilities: Facilities often required in an oil and gas field other than the wells and pipelines, such as compressor stations.

animal unit month (AUM): The amount of forage necessary for the sustenance of one cow/calf pair for 1 month.

Application for Permit to Drill (APD): The Department of the Interior's application permit form to authorize oil and gas drilling activities on federal land.

aquifer: A water-bearing bed or layer of permeable rock, sand, or gravel capable of yielding water, or the part of a water-driven reservoir that contains the aquifer.

background concentration: The existing levels of air pollutant concentration in a given region. In general, it includes natural and existing emission sources, but not future emission sources.

badland: Steep or very steep, commonly non-stony barren land dissected by many intermittent drainage channels. Badland is most common in semi-arid and arid regions where streams are entrenched in soft geologic material. Runoff potential is very high, and geologic erosion is active in such areas.

borehole: The circular hole made by drilling, and extending from the surface to the gas resource to be recovered.

casing: Steel pipe placed in an oil or gas well to prevent the hole from collapsing.

completion: The activities and methods to prepare a well for production. Includes installation of equipment for production from an oil or gas well.

condensate: Hydrocarbons contained in the natural gas stream and removed by condensation. Condensates are a saleable by-product of the gas recovery process.

conglomerate: A sedimentary rock comprised of an unstratified mixture or stratified layers of cobbles, gravel, and sand.

Council on Environmental Quality (CEQ): An advisory council to the President established by the National Environmental Policy Act of 1969. It reviews Federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

critical elements of the human environment: A list of 14 resource concerns that must be addressed in every NEPA document.

crucial range: Any particular seasonal range or habitat component that has been documented as the determining factor in a population's ability to maintain itself at a certain level over the long-term.

cultural resources: The physical remains of human activity (artifacts, ruins, burial mounds, petroglyphs, etc.) and the conceptual content or context (as a setting for legendary, historic, or prehistoric events, such as a sacred area of native peoples, etc.) of an area of prehistoric or historic occupation.

cumulative impact: The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taken place over a period of time (40 C.F.R. 1508.7).

cuttings: The material removed from the borehole by the drill bit and lifted to the surface.

directional drilling: The intentional deviation of a well bore from vertical to reach subsurface areas off to one side from the drilling site.

discharge: The volume of water flowing past a point per unit time, commonly expressed as cubic feet per second (cfs), gallons per minute (gpm), or million gallons per day (mgd).

drainage: Natural channel through which water flows some time of the year. Natural and artificial means for effecting discharge of water as by a system of surface and subsurface passages.

drilling fluid: Fluid used to lubricate and cool the drill bit, assist in lifting cutting from the borehole, and control pressures in the borehole.

drilling mud: The circulating fluid used to bring cuttings out of the well bore, cool the drill bit, and provide hole stability and pressure control. Drilling mud includes a number of additives to maintain the mud at desired viscosities and weights. Some additives that may be used are caustic, toxic, or acidic.

earthquake: Sudden movement of the earth's crust resulting from faulting, volcanism, or other mechanisms.

emission factor: An empirically derived mathematical relationship between pollutant emission rate and some characteristic of the source such as volume, area, mass, or process output.

emission: Air pollution discharge into the atmosphere, usually specified by mass per unit time.

endangered species (animal): Any animal species in danger of extinction throughout all or a significant portion of its range. This definition excludes species of insects that the Secretary of the Interior determines to be pests and whose protection under the Endangered Species Act of 1973 would present an overwhelming and overriding risk to man.

endangered species (plant): Species of plants in danger of extinction throughout all or a significant portion of their ranges. Existence may be endangered because of the destruction, drastic change, or severe curtailment of habitat, or because of over exploitation, disease, predation, or even unknown reasons. Plant taxa from very limited areas (e.g. the type localities only), or from restricted fragile habitats usually are considered endangered.

environment: The aggregate of physical, biological, economic, and social factors affecting organisms in an area.

environmental impact statement (EIS): An analysis of alternative actions and their predictable environmental impacts, including physical, biological, economic, and social consequences and their interactions; short- and long-term impacts; direct, indirect, and cumulative impacts.

ephemeral drainage: A drainage area or a stream that has no base flow. Water flows for a short time each year but only in direct response to rainfall or snowmelt events.

erosion: The removal, detachment, and entrainment of earth materials by weathering, dissolution, abrasion, and corrosion, later to be transported by moving water, wind, gravity, or glaciers.

fault: A fracture in bedrock along which there has been vertical and/or horizontal movement caused by differential forces in the earth's crust.

floodplain: That portion of a river valley, adjacent to the channel, which is built of recently deposited sediments and is covered with water when the river overflows its banks at flood stages.

forage: Vegetation of all forms available for animal consumption.

forb: A broad-leaved flowering herb other than grass.

frac (fracturing): A method of stimulating well production by increasing the permeability of the producing formation. Under extremely high hydraulic pressure, the fracturing fluid (water, oil, dilute hydrochloric acid, or other fluid) is pumped into the formation which parts or fractures it. Proppants or propping agents such as sand or glass beads are pumped into the formation as part of the fracturing job. The proppants become wedged in the open fractures, leaving channels for oil to flow into the well after the hydraulic fracture pressure is released. This process is often called a "frac job." When high concentrations of acid are used, it may be called an "acid frac job."

groundwater: Water contained in the pore spaces of consolidated and unconsolidated surface material.

habitat: A specific set of physical conditions that surround a single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.

human environment: The factors that include, but are not limited to biological, physical, social, economic, cultural and aesthetic factors that interrelate to form the environment.

hydrostatic testing: Testing of the integrity of a newly placed, but uncovered pipeline for leaks. The pipeline is filled with water and pressurized to operating pressures, and the pipeline is visually inspected.

impacts: These include: a) Direct impacts, which are caused by the action and occur at the same time and place; b) Indirect impacts, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect impacts may include growth inducing impacts and other impacts related to induced changes in the pattern of land use, population density or growth rate, and related impacts on air and water and other natural systems, including ecosystems. Impacts include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Impacts may also include those resulting from actions which may have both beneficial and detrimental impacts, even if on balance the agency believes that the impact will be beneficial (40 C.F.R. 1508.8).

impoundment: The accumulation of any form of water in a reservoir or other storage area.

increment: Incremental standards (prevention of significant deterioration) are the maximum amounts of pollutants allowed above the baseline in regions of clean air.

infrastructure: The basic framework or underlying foundation of a community including road networks, electric and gas distribution, water and sanitation services, and facilities.

interdisciplinary team (IDT): A group selected to work within the NEPA process in scoping, analysis, and document preparation. The purpose of the team is to integrate its collective knowledge of the physical, biological, economic, and social sciences and the environmental design arts into the environmental analysis process. Interaction among team members often provides insight that otherwise would not be apparent.

intermittent stream: A stream or reach of a stream that drains a watershed of at least one square mile; or a stream or reach of a stream that is below the local water table for at least some part of the year, and obtains its flow from both surface runoff and groundwater discharge.

land use: Land uses determined for a given area that establish the types of activities allowed (e.g., mining, agriculture, timber production, residential, industrial).

lease: (1) A legal document that conveys to an operator the right to drill for oil and gas. (2) The tract of land on which a lease has been obtained, where producing wells and production equipment are located.

lek: An assembly area for communal courtship display, usually in reference to greater sage-grouse or other grouse.

life-of-project (LOP): Begins with the first disturbance authorized under the ROD for this project and ends when all wells are plugged and abandoned and all surface disturbance meets the reclamation performance objective of 80% of original cover and plant composition.

lithic scatter: A surface scatter of cultural artifacts and debris that consists entirely of lithic (stone) tools and chipped stone debris. This is a common prehistoric site type that is contrasted to a cultural material scatter, which contains other or additional artifact types such as pottery or bone artifacts, to a camp which contains habitation features, such as hearths, storage features or occupation features, or to other site types that contain different artifacts or features.

log: A systematic recording of data, as from the driller's log, mud log, electrical well log, or radioactivity log. Many different logs may be run to obtain various characteristics of downhole formations.

long-term impacts: For the purpose of this project, long-term impacts are those that last for the life of the project or beyond.

mitigate: To lessen the severity.

mitigation measures: Actions taken to reduce or minimize potential impacts to the environment.

mitigation: Avoiding the impact altogether by not taking a certain action or parts of an action; minimizing impacts by limiting the degree of magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and/or compensating for the impact by replacing or providing substitute resources or environments.

monitor: To systematically and repeatedly watch, observe, or measure environmental conditions in order to track changes.

mud system: A system used to manage suspended mud in the well-drilling process.

National Ambient Air Quality Standards (NAAQS): The allowable concentrations of air pollutants in the air specified by the Federal government. The air quality standards are divided into primary standards (based on the air quality criteria and allowing an adequate margin of safety and requisite to protect the public health) and secondary standards (based on the air quality criteria and allowing an adequate margin of safety and requisite to protect the public welfare from any unknown or expected adverse effects of air pollutants).

National Environmental Policy Act (NEPA): The federal law established in 1969, which went into effect on January 1, 1970, that (1) established a national policy for the environment, (2) requires federal agencies to become aware of the environmental ramifications of their proposed actions, (3) requires full disclosure to the public of proposed federal actions and a mechanism for public input into the federal decision-making process, and (4) requires federal agencies to prepare an environmental impact statement for every major action that would significantly affect the quality of the human environment.

National Register of Historic Places: A list of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture.

natural gas: Those hydrocarbons, other than oil and other than natural gas liquids separated from natural gas, that occur naturally in the gaseous phase in the reservoir and are produced and recovered at the wellhead in gaseous form. Natural gas includes coal bed methane gas.

No Action Alternative: The management direction, activities, outputs, and effects likely to exist in the future if the current plan would continue unchanged.

no surface occupancy: A stipulation in a lease that disallows any surface disturbance in the lease area at any time. Natural gas or oil, for instance, would have to be recovered by directional drilling.

noxious weeds: Officially designated undesirable or invading weedy species generally introduced into an area due to human activity.

oil and gas field: A natural accumulation of oil and gas in the subsurface. Oil and gas may be present in two or more reservoirs at different depths.

oil and gas lease: A federal oil and gas lease is a legal document that gives the lease holder the right to explore for and develop any oil and gas that may be present under the area designated in the lease while complying with any surface use conditions which may have been stipulated when the lease was issued.

ozone: A molecule containing three oxygen atoms (O_3) produced by passage of an electrical spark through air or oxygen (O_2).

particulate matter: A particle of soil or liquid matter (e.g., soot, dust, aerosols, fumes and mist).

perennial stream: A stream or reach of a stream that flows throughout the year.

physiographic province: A region having a pattern of relief features or landforms that differs significantly from adjacent regions.

physiographic: pertaining to the genesis and evolution of landforms.

PM_{2.5}: Airborne suspended particles with an aerodynamic diameter of 2.5 microns or less.

PM₁₀: Airborne suspended particles with an aerodynamic diameter of 10 microns or less.

preferred alternative: The alternative identified in the EIS as the action favored by the agency.

prevention of significant deterioration of air quality (PSD): A classification established to preserve, protect, and enhance the air quality in National Wilderness Preservation System areas in existence prior to August 1977 and other areas of National significance, while ensuring economic growth can occur in a manner consistent with the preservation of existing clean air resources. Specific emission limitations and other measures, by class, are detailed in the Clean Air Act (42 U.S.C. 1875 et 15q).

produced water: Formation water pumped during the development of a gas well.

production casing: Steel pipe installed in the borehole to isolate all formation in the borehole and eliminate communication between hydrocarbon-bearing zones and/or water aquifers and other mineral resources.

PSD increments: The maximum allowable increase in pollutant concentrations permitted over baseline conditions as specified in the EPA prevention of significant deterioration (PSD) regulations (40 C.F.R. Part 52.21). The regulations apply only to areas currently attaining NAAQS/WAAQS. Most National parks and wilderness areas are Class I Areas, where almost no future pollution increase is permitted. Most other areas are Class II Areas, where moderate increases in pollution levels are allowed.

range: Land producing native forage for animal consumption and lands that are revegetated naturally or artificially to provide forage cover that is managed like native vegetation, which are amenable to certain range management principles or practices.

raptor: A group of carnivorous birds consisting of hawks, eagles, falcons, kites, vultures, and owls.

reclamation: rehabilitation of a disturbed area to make it acceptable for designated uses. This normally involves regrading, replacement of topsoil, revegetation and other work necessary to restore it for use.

record of decision (ROD): A decision document for an environmental impact statement or supplemental EIS that publicly and officially discloses the responsible official's decision regarding the actions proposed in the EIS and their implementation.

reserve pit: (1) Usually an excavated pit that may be lined with plastic, that holds drill cuttings and waste mud. (2) Term for the pit which holds the drilling mud.

reserves: Identified resources of mineral-bearing rock from which the mineral can be extracted profitably with existing technology and under present economic conditions.

revegetation: The re-establishment and development of self-sustaining plant cover. On disturbed sites, human assistance will speed natural processes by seed bed preparation, reseeding and mulching.

rig: A collective term to describe the permanent equipment needed when drilling a well.

right-of-way (ROW): The legal right for use, occupancy, or access across land or water areas for a specified purpose or purposes.

riparian: Land areas which are directly influenced by water. They usually have visible vegetative or physical characteristics showing this water influence. Streamsides and lake borders are typical riparian areas.

roosting: To rest or sleep in a roost. A bird will typically use the same roost for an extended period of time.

runoff: That part of precipitation that appears in surface streams; precipitation that is not retained on the site where it falls and is not absorbed by the soil.

scatter (archeological): Random evidence of prior disturbance that is distributed about an area rather than concentrated in a single location.

scoping: An early and open process for determining the scope of issues to be addressed in an EIS and for identifying the significant issues related to a proposed action. Scoping may involve public meetings, field interviews with representatives of agencies and interest groups, discussions with resource specialists and managers, and written comments in response to news releases, direct mailings, and articles about the proposed action and scoping meetings.

sediment: Soil or mineral transported by moving water, wind, gravity, or glaciers, and deposited in streams or other bodies of water, or on land.

seismic: Pertaining to an earthquake or earth vibration, including those that are artificially induced.

short-term impacts: For the purpose of this NEPA analysis, short-term impacts are generally defined as those that would last for 5 years or less.

significant impact: A meaningful standard to which an action may impact the environment. The impact may be beneficial, adverse, direct, indirect, or cumulative, and may have short-term or long-term impacts.

soil: Loose, unconsolidated surface material comprising topsoil and subsoil.

spacing: The number of acres per given well. For instance, 160-acre spacing means that one well would be drilled in each quarter section (160 acres), or up to four wells per section (640 acres).

species: (1) The classification level of biological nomenclature which categorized each group of related organisms potentially capable of interbreeding; (2) the accepted level of classification to differentiate one specific type of organism from another.

stipulation: A legal requirement, specifically a requirement that is part of the terms of a mineral lease. Some stipulations are standard on all federal leases. Other stipulations may be applied to the lease at the discretion of the surface management agency to protect valuable surface resources.

strata: An identifiable layer of bedrock or sediment; does not imply a particular thickness of rock.

substrate: Material consisting of silts, sands, gravels, boulder and woody debris found on the bottom of a stream channel.

threatened and endangered species: Any species, plant or animal, which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Threatened species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.

topography: The features of the earth, including relief, vegetation, and waters.

vegetation type: A plant community with visually distinguishable characteristics, named for the apparent dominant species.

vegetation: All of the plants growing in and characterizing a specific area or region; the combination of different plant communities found there.

visual resource: The composite of basic terrain, geologic features, water features, vegetation patterns, and land use effects that typify a land unit and influence the visual appeal the unit may have for viewers.

Visual Resource Management (VRM): A system of visual management used by the BLM. The program has a dual purpose, to manage the quality of the visual environment and to reduce the visual impact of development activities while maintaining effectiveness in all Bureau resource programs. VRM also identifies scenic areas that warrant protection through special management attention. The system uses five classes for categorizing visual resources.

Class 1 - Natural ecological changes and very limited management activity are allowed. Any contrasts created within the characteristic landscape must not attract attention. This classification is applied to wilderness areas, wild and scenic rivers, and other similar situations.

Class 2 - Changes in any of the basic elements (form line, color, texture) caused by a management activity should not be evident in the characteristic landscape. Contrasts are seen, but must not attract attention.

Class 3 - Contrasts to the basic elements caused by a management activity are evident, but should remain subordinate to the existing landscape.

Class 4 - Any contrast attracts attention and is a dominant feature of the landscape in terms of scale, but it should repeat the form, line, color and texture of the characteristic landscape.

Class 5 - The classification is applied to areas where the natural character of the landscape has been disturbed to a point where rehabilitation is needed to bring it up to one of the four other classifications. The classification also applies to areas where unacceptable cultural modification

has lowered scenic quality; it is often used as an interim classification until objectives of another class can be reached.

water quality: Refers to a set of chemical, physical, or biological characteristics that describe the condition of a river, stream, or lake. The quality of water determines which beneficial uses it can support. Different instream conditions or levels of water quality are required to support different beneficial uses.

watershed: The total land area that drains to a given location.

well: Refers to a well bore or bottomholes, several of which may be drilled from a single well pad.

well pad: Relatively flat work area that is used for drilling a well and producing from the well once it is completed. The term “well pad” as used in this EIS identifies the surface location from which a single or multiple wells or well bores or bottomholes may be drilled.

well bore: The hole drilled from the surface to the gas-bearing formation.

wetlands: Areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

winter range: The place where migratory (and sometimes non-migratory) animals congregate during the winter season.

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APPENDIX A:
RECLAMATION PLAN

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RECLAMATION PLAN FOR THE
CAVE GULCH INFILL DEVELOPMENT PROJECT

Prepared for

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ACRONYMS AND ABBREVIATIONS

APD	Application for Permit to Drill
BLM	Bureau of Land Management
CGIDP	Cave Gulch Infill Development Project
ft Foot/f	feet
LOP	Life-of-project
POD	Plan of Development
PLS	Pure Live Seed
RMP	Resource Management Plan
SUP	Surface Use Plan

A-1.0 INTRODUCTION

This reclamation plan will serve as guidance to achieve successful reclamation on federal lands, administered by the Bureau of Land Management (BLM), within the Cave Gulch Infill Development Project (CGIDP) area. Alternate reclamation procedures may be implemented on federal lands as directed by the BLM, or on private and state lands by the respective landowners. This plan complies with BLM reclamation and management directives specified in the Platte River Resource Management Plan (RMP) (BLM 1995) for the Casper Field Office, and complies with *Executive Order* 13112 (control of invasive species).

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A-2.0 RECLAMATION REQUIREMENTS AND SUCCESS STANDARDS

A-2.1 RECLAMATION REQUIREMENTS

BLM's reclamation requirements include the following major goals:

- recontour the land surface and implement other soil conservation, surface manipulation, and water management techniques to establish stable slopes, water courses, and drainage features to minimize erosion and sedimentation (also protecting surface and ground water resources);
- revegetate disturbed areas to establish self-perpetuating native plant communities capable of supporting existing and future land uses; and
- minimize visual contrasts.

A-2.2 RECLAMATION SUCCESS STANDARDS

The following reclamation success standards are the measures that would be used to assess whether BLM's reclamation requirements are being met. The procedures presented below are designed to achieve the success standards and, in doing so, to meet BLM's requirements. Reclamation would be implemented, managed, and monitored by the Operators with BLM oversight/approval. Alternatives to all or portions of this reclamation plan may be implemented if the following standards would be met.

- 1) No contaminated materials would be left at or near the surface, and all such buried materials would be encapsulated in impermeable material (sealed pit liners, concrete) and covered with at least 4 ft of soil material.
 - 2) The subsurface would be stabilized. Holes would be plugged and no indications of subsidence, slumping, and/or significant downward movement of surface soil materials would be visible.
 - 3) Reclaimed areas would be free of trash, debris, and other solid wastes.
-

- 4) Reclaimed areas would be free from rills or gullies greater than 2 inches deep, actively eroding rills or gullies, perceptible soil movement or head cutting in drainages, and/or slope instability on or adjacent to reclaimed areas.
 - 5) Soil surfaces would have adequate surface roughness to reduce runoff and to capture rainfall and snow melt.
 - 6) Vegetative canopy cover, production, and species diversity of desirable species would approximate the surrounding undisturbed areas. Vegetation would help stabilize the site, would support post-disturbance land uses, and would be self-sustaining. Revegetated areas would exhibit vegetative reproduction and would be as free as practicable from noxious, non-native, and invasive species.
 - 7) The reclaimed landscape would approximate the visual quality of adjacent areas with regard to line, form, and texture, contour, color, and orientation of major landscape features, and would support pre-disturbance land uses.
-

A-3.0 RECLAMATION PLAN

A-3.1 PREDISTURBANCE PLANNING AND SITE PREPARATION

Predisturbance planning would minimize the amount of reclamation at a site by minimizing surface disturbance, and would include planning for salvaging and stockpiling topsoil and spoil separately, locating facilities away from cut-and-fill slopes, and minimizing the area occupied by facilities to facilitate reclamation success.

A-3.1.1 Predisturbance Planning

Operators would avoid the following areas, where practical, during selection of drill sites, roads, pipelines, and ancillary facilities:

- areas with high erosion potential (e.g., rugged topography, steep slopes [$>25\%$], stabilized sand dunes, floodplains);
- areas with saturated soils;
- areas within 500 ft of wetland or riparian areas; and
- areas within 100 ft of ephemeral channels.

The Operators would cooperate with the BLM, as part of the application for permit to drill (APD) and right-of-way (ROW) grant process, in on-site inspections of areas proposed for disturbance to determine the suitability of proposed locations with regard to the above-listed avoidance areas. In addition, Operators would submit for BLM approval, as appropriate, surface use plans (SUP) and/or plans of development (POD) for each proposed surface disturbance.

These plans would include the following components:

- project administration, time frames, and responsible individuals;
 - a commitment to adhere to this reclamation plan;
 - detailed descriptions of all deviations from this plan that may be required due to site-specific conditions, and the rationale for such changes; and
 - a commitment to meet the reclamation success standards previously described.
-

A-3.1.2 Site Preparation

Topsoil would be salvaged and stockpiled from all areas proposed for disturbance unless the BLM deems that leaving topsoil in place would facilitate reclamation. Vegetation would be salvaged and stockpiled with topsoil to incorporate native seeds and organic matter. The volume of topsoil or other suitable plant growth material to be salvaged, proposed topsoil replacement depth, and topsoil storage areas would be determined during the on-site inspection and subsequently specified in the APD. If less than 6 inches of topsoil is available, topsoil would be added to an appropriate quantity of suitable subsoil, with BLM approval, so that a minimum of 6 inches of plant growth material would be available during revegetation operations. Only suitable subsoil (Table A-3.1) would be salvaged and used for revegetation purposes. Suitable subsoil that might be used for revegetation would be stockpiled separately and would not be mixed with topsoil. Signs with the words “topsoil” and “subsoil” would be placed on each appropriate topsoil and subsoil pile.

Operators would (to the extent practicable) balance the volumes of cut versus fill material, where cut-and-fill construction technique is required, to minimize the volume of excess spoil material that would be stockpiled and to minimize the amount of surface disturbance.

Table A-3.1 Criteria to Establish Suitability as Topsoil (or Topsoil Substitutes).¹

Parameter	Suitability		
	Suitable	Marginal	Unsuitable
PH	5.5-8.5	5.0-5.5	<5.0 >9.0
EC (conductivity) mmhos/cm	0-4	8-12	>12
SAR	0-10	10-12	>12
Boron	<5.0 ppm		>5.0 ppm
Coarse Frag. (% volume)	<25%	25-35%	>35%

¹ Adapted from Wyoming Department of Environmental Quality Land Quality Division (1984).

Topsoil would be salvaged from all areas to be disturbed for pipelines and access roads constructed on slopes of less than 15%. The topsoil would be stockpiled in windrows within the construction right-of-way by sidecasting with a grader. Where pipelines and roads are to be constructed on slopes greater than 15%, topsoil would be transported to more level terrain for stockpiling.

Topsoil and suitable subsoil stockpiles would be constructed to remain stable until they are used for reclamation. Whenever practicable, topsoil would be replaced at the first seasonal opportunity. All soil material stockpiled for 10 months or longer would be signed and stabilized with vegetation by seeding with annual ryegrass (*Lolium multiflorum*) at a rate of 10 pound/acre. If topsoil or suitable subsoil is to be stockpiled for more than 2 years, the piles would be seeded with the appropriate seed mixture (Table A-3.2). Stockpiles would have a maximum slope of 5:1 or less on the long axis and a maximum of 1:1 on the side slopes. If a topsoil stockpile is located on or adjacent to ground that slopes 3:1 or more, runoff would be diverted around the stockpile via interceptor ditches. Interceptor ditches would be V-shaped--1 ft deep and 3 ft wide with gently sloping sides--and would empty onto native, undisturbed vegetation. All stockpiles would be placed to avoid impacts to existing drainage channels.

A-3.2 RECLAMATION TIMING

Temporary and permanent reclamation would occur in the first seasonal opportunity (after the frost has left the ground and prior to May 15 in the spring or from September 1 to ground frost in the fall). Spring seeding would be conducted only if fall seeding is not feasible following completion of construction activities.

Relying solely on fall seeding, however, may not be appropriate during the continued drought. In normal years, the presumption is that seasonal snow cover would protect the seed and would provide a source of early spring moisture to facilitate germination and seeding success. Because we have not had prolonged seasonal snow cover for several years, seed planted in the fall has been subjected to severe dispersion due to the scouring effect of the high winds. This may explain poor seeding success in Cave Gulch. As long as the present weather patterns continue,

spring seeding is probably more conducive to successful reclamation as long as the seeding occurs as soon as possible following the thaw.

A-3.3 TEMPORARY RECLAMATION

Temporary reclamation would be conducted on areas that would be redisturbed prior to final project abandonment, such as topsoil and subsoil stockpiles. The Operators may elect to conduct either temporary or permanent reclamation on pad cut-and-fill slopes on operating wells; however, the Operators would not use temporary reclamation to delay permanent reclamation on areas that would not be redisturbed.

Temporary reclamation areas would be regraded and recontoured to slopes of 3:1 or less. Regraded surfaces would be scarified (ripped) to a depth of 1 ft, if necessary (e.g., on roads) to reduce soil compaction. Topsoil would not be replaced on temporary reclamation areas. The temporary reclamation areas would then be seeded using the temporary seed mixture (Table A-3.2).

Table A-3.2 Temporary Seed Mixture.¹

Species	Approximate Seeding Rate (PLS/acre) ²
Western wheatgrass (<i>Elymus smithii</i>)	3.0
Slender wheatgrass (<i>Elymus trachycaulus</i>)	3.0
Streambank wheatgrass (<i>Elymus lanceolatus</i> var. <i>riparius</i>)	3.0
Total	9.0

¹ It is anticipated that this seed mixture primarily would be used on topsoil and subsoil stockpiles designated for long-term storage.

² PLS/acre = pounds of pure live seed per acre; alternate seeding rates may be applied in some areas as deemed appropriately by BLM and specified in the approved APD.

A-3.4 PERMANENT RECLAMATION

Permanent reclamation would be implemented on all disturbed areas that are no longer required for ongoing field operations, such as portions or all of well pads, road out-slopes, and pipeline corridors. Because permanent reclamation would occur throughout the life of project (LOP), this plan does not differentiate between "interim" and "final" reclamation. All permanent reclamation is considered final unless monitoring shows that it needs to be augmented or repeated. Operators would permanently reclaim all portions of well pads not required for production operations, access road out-slopes, and pipeline corridors following construction operations, as well as abandoned well locations. If reclamation involves facility removal, regrading and reseeding would occur at the first seasonal opportunity following facility removal.

A-3.4.1 Facility Removal

Some facilities would reach the end of their operational life during the LOP, whereas others would remain in use until field production is complete. When the Operators determine that a well or other facility is no longer required for ongoing operations it would be removed and the area would be permanently reclaimed.

Wells would be abandoned in accordance with BLM and/or Wyoming Oil and Gas Conservation Commission regulations. Underground pipelines would be purged of gas or liquid materials, plugged, and abandoned in place. All surface facilities would be removed and either reused, recycled, or taken to an approved disposal facility. Any liquid or solid wastes remaining at well locations would be tested and properly disposed in accordance with appropriate state and federal regulations. Concrete foundations, pads, or footings would be broken-up and removed to an approved disposal site or buried on-site. Aggregates used for well pad, road, and other facility construction activities would be removed or buried on-site. Operators would obtain BLM approval for the on-site burial of any material.

Road reclamation would include the removal of fill material, any surface materials, culverts, sediment control structures, and signs not required for ongoing operations. Drainage-crossing sideslopes would be reduced to no more than 4:1 to reduce bank erosion and ensure stable

sideslopes. Barriers, such as water bars, would be used to discourage travel on reclaimed roads and pipeline ROWs until permanent reclamation is deemed successful.

A-3.4.2 Surface Preparation

A-3.4.2.1 Backfilling and Grading

Areas requiring backfilling include reserve pits, cut slopes, pipeline trenches, borrow ditches, and facility foundations. Pipeline trenches would be backfilled so that the spoil berm is approximately 3 inches higher than the natural ground. Soil material (subsoil) to be used for backfill would be obtained from material excavated from the trenches.

Areas to be reclaimed would be graded to approximate original contours to blend with adjacent topography. Area-wide drainage would be restored so that surface runoff flows and gradients are returned to the pre-disturbance conditions to the extent practicable. Graded surfaces would be suitable for the replacement of a uniform depth of topsoil/suitable subsoil that would promote cohesion between subsoil and topsoil layers, would reduce wind erosion, and would facilitate moisture retention. Specialized grading techniques would be applied at the Operators' discretion and may include slope rounding, bench grading, stair-step grading, and/or contour furrowing. Bulldozers, loaders, scrapers, and/or motor graders would typically be used for backfilling and regrading operations.

A-3.4.2.2 Ripping

Compacted areas such as roads and wellpads would be scarified (ripped) to a depth of approximately 1 to 2 ft to improve soil aeration, water infiltration, and root penetration. Scarification (ripping) would typically be accomplished using motor graders or tractors equipped with ripping shanks. Ripper shanks would be set approximately 3 to 4 ft apart.

A-3.4.3 Seedbed Preparation

Seedbed preparation maximizes seeding efficiency and improves reclamation success. It includes topsoil replacement and discing. Surface roughening procedures, including pitting and gouging, also may be applied at the discretion of Operators.

A-3.4.3.1 Topsoil Replacement

Waterbars and erosion control devices would be installed on reclaimed areas prior to topsoil replacement, as necessary, to reduce storm water runoff and control topsoil erosion and.

The depth of topsoil/suitable subsoil to be replaced would be dependant on the amount of material that was previously salvaged and stockpiled. If the stockpile for a specific location contains insufficient topsoil to meet the required 6-inch minimum, suitable subsoil would be replaced first and then the available topsoil would be placed on the surface. Topsoil and suitable subsoil would not be mixed prior to final placement.

A-3.4.3.2 Seedbed Preparation

After topsoil replacement and prior to commencement of seeding operations, the seedbed would be prepared by disking on the contour to a depth of 4 to 6 inches, leaving no depressions that would trap water or form ponds. This would reduce soil compaction, break up soil clods, improve root penetration and water retention/infiltration, and provide a suitable seedbed. The surface would be left rough to reduce wind and water erosion and to promote moisture retention and infiltration.

A-3.4.3.3 Fertilizer and Soil Amendments

Operators have the discretion to conduct soil fertility tests and/or use fertilizers or other soil amendments necessary to help establish a permanent vegetation community. However, fertilization and/or the addition of soil amendments would generally not be required at the first attempt at permanent revegetation. Fertilizers generally are not effective in semi-arid climates and typically promote establishment and growth of various invasive, non-native, and noxious

species. If, after two growing seasons, initial revegetation efforts are unsuccessful, the Operators may conduct soil fertility tests to determine if soil fertility is an issue. If soil fertility is an issue, appropriate fertilizers would be applied in consultation with the affected landowner(s). Fertilizers would not be used near open water.

A-3.4.4 Revegetation

A-3.4.4.1 Seeding

Once the seedbed has been prepared, seeding would occur within 2 weeks unless the ground is wet or frozen, in which case seeding would be delayed until the ground dries or thaws to the point where the soil is friable. Reclaimed areas would be seeded using the permanent seed mixtures presented in Tables A-3.3 through A-3.5. These seed mixtures were developed based on general conditions within the analysis area, species adaptations to site conditions, usefulness of the species for rapid site stabilization, species success in past revegetation efforts, seed costs and availability, and compliance with *Executive Order* 13112 and BLM Manual Section 1745 (i.e., use of native species). Alternative species and seeding rates may be used at Operator discretion and with BLM/landowner approval if warranted by site-specific conditions or seed availability, provided that the alternative species/seeding rates facilitate achieving reclamation success. All seeds used for revegetation purposes would be certified weed-free.

Operators, in consultation with BLM and the landowner, would determine which seed mixture to use and which substitute species may be appropriate to include in the mixture in consultation with BLM/landowner. Operators may also elect to use interseeding/reseeding techniques if initial vegetation establishment is not successful.

Seeding would be conducted in the fall (after September 1 and prior to ground frost). If fall seeding is not feasible, seeding may occur in the spring after the frost has left the ground but prior to May 15. Seeds would be planted on the contour using a rangeland-type seed drill equipped with an agitator and depth regulator to mix seed and ensure proper seeding depths. Seeds would be planted at depths of 0.25-0.50 inch. Fluffy seeds, such as winterfat, would be broadcast seeded. Broadcast seeding may be used at the Operators' discretion for other shrub and forb species, and may utilize either hand or specialized broadcast seeders.

Table A-3.3 Permanent Reclamation Seed Mixture for Sagebrush-dominated Communities with Sandy Soils.¹

Species	Drill Seeding Rate (PLS/acre) ²
Grasses	
Thickspike wheatgrass (<i>Elymus lanceolatus</i> var. <i>lanceolatus</i>)	2.00
Western wheatgrass (<i>Elymus smithii</i>)	2.00
Bluebunch wheatgrass (<i>Elymus spicatum</i>)	2.00
Indian ricegrass (<i>Oryzopsis hymenoides</i>)	3.00
Needle-and-thread (<i>Stipa comata</i>)	3.00
Forbs (select one or more of the following forb species)	
Desert Indian paintbrush (<i>Castilleja chromosa</i>)	1.00
Scarlet globemallow (<i>Sphaeralcea coccinea</i>)	1.00
Shrubs (select 2 or more of the following shrub species)	
Wyoming big sagebrush (<i>Artemisia tridentata wyomingensis</i>)	0.25
Common winterfat (<i>Krascheninnikovia lanata</i>) ³	1.00
Four-wing saltbush (<i>Atriplex canescens</i>)	3.00
Antelope bitterbrush (<i>Purshia tridentata</i>)	1.00
Total	14.25-19.25

¹ Operators may submit for approval alternative site-specific seed mixtures.

² PLS/acre = pounds of pure live seed per acre. Seeding rates would be doubled if seed is to be broadcast.

³ Winterfat seed would be broadcast simultaneously with drill-seeding other species.

Table A-3.4 Permanent Reclamation Seed Mixture for Sagebrush-dominated Communities with Alkaline Soils.¹

Species	Approximate Seeding Rate (PLS/acre) ²
Grasses	
Western wheatgrass (<i>Elymus smithii</i>)	3.00
Thickspike wheatgrass (<i>Elymus lanceolatus</i> var. <i>lanceolatus</i>)	3.00
Alkaligrass (<i>Puccinellia distans</i>)	3.00
Alkali sacaton (<i>Sporobolus airoides</i>)	3.00
Forbs (select one or more of the following forb species)	
Scarlet globemallow (<i>Sphaeralcea coccinea</i>)	1.00
Evening primrose (<i>Oenothera</i> sp.)	1.00
Shrubs (select two or more of the following shrub species)	
Wyoming big sagebrush (<i>Artemisia tridentata wyomingensis</i>)	0.25
Common winterfat (<i>Krascheninnikovia lanata</i>) ³	1.00
Four-wing saltbush (<i>Atriplex canescens</i>)	3.00
Gardner saltbush (<i>Atriplex gardneri</i>)	1.00
Total	14.25-19.25

¹ Operators may submit for approval alternative site-specific seed mixtures.

² PLS/acre = pounds of pure live seed per acre. Seeding rates would be doubled if seed is to be broadcast.

³ Winterfat seed would be broadcast simultaneously with drill-seeding other species.

Table A-3.5 Permanent Reclamation Seed Mixture for Saltbush Communities.¹

Species	Approximate Seeding Rate (PLS/acre) ²
Grasses	
Sandberg bluegrass (<i>Poa sandbergii</i>)	1.0
Western wheatgrass (<i>Elymus smithii</i>)	2.0
Thickspike wheatgrass (<i>Elymus lanceolatus</i> var. <i>lanceolatus</i>)	2.0
Alkaligrass (<i>Puccinellia distans</i>)	3.0
Alkali sacaton (<i>Sporobolus airoides</i>)	3.0
Forbs (select one or more of the following forb species)	
Gooseberryleaf globemallow (<i>Sphaeralcea grossulariaefolia</i>)	1.0
Northern sweetvetch (<i>Hedysarum boreale</i>)	1.0
Evening primrose (<i>Oenothera</i> sp.)	1.0
Shrubs (select two or more of the following shrub species)	
Four-wing saltbush (<i>Atriplex canescens</i>)	3.0
Shadscale (<i>Atriplex confertifolia</i>)	1.0
Gardner saltbush (<i>Atriplex gardneri</i>)	1.0
Common winterfat (<i>Krascheninnikovia lanata</i>) ³	1.0
Total 16-20	

¹ Operators may submit for approval alternative site-specific seed mixtures.

² PLS/acre = pounds of pure live seed per acre. Seeding rates would be doubled if seed is to be broadcast.

³ Winterfat seed would be broadcast seeded.

When drill-seeding is not practical due to steep slopes, rocky surfaces, or wet soil conditions, seeding rates would be doubled, seeds would be broadcast, and the area would be raked or chained to cover the seed. Operators may also elect to broadcast seed after applying and crimping the mulch.

A-3.4.4.2 Mulching

Areas determined to require mulching to ensure successful reclamation would be uniformly mulched with certified weed-free native grass, hay, or small grain straw at a rate of 2 tons/acre. Cotton, jute, or synthetic netting may be applied in steep areas where erosion would be a problem. Mulch would be crimped 2-4 inches into the soil on the contour, tackified, or incorporated into erosion control blankets to prevent it from blowing or washing away and from entering waterways. Mulch would protect the soil from wind and water erosion, raindrop impact, and surface runoff, and would help hold seeds in place. Mulching may occur prior to or after broadcast seeding but must not occur before drill seeding.

Hydromulch, biodegradable erosion control netting, or matting would be firmly attached to the soil surface on steep slopes where it is unsafe to operate equipment, at sites where soils have 35% or more surface rock content, or on notably unstable areas.

A-3.5 EROSION CONTROL

All reclaimed surfaces would be left rough and would be mulched as described above to reduce wind and water erosion. Erosion and sediment control structures would be installed on reclaimed areas wherever slopes exceed 3:1 and where monitoring demonstrates that erosion control structures are needed.

Runoff from reclaimed areas on hillsides with 3:1 or greater slopes (and where monitoring suggests that it is warranted) would be controlled using standard structures including, but not limited to, waterbars, silt fences, geotextile, and/or energy dissipaters. Areas with concentrated development with closely spaced pads (more than 1/40 acres) would be subject to reclamation efforts that address cumulative runoff, regardless of slope. Waterbars would be installed in accordance with standard BLM specifications. Prior to commencement of reseeding activities on/along reclaimed well locations and access roads, waterbars would be constructed at least 1 ft deep, on the contour, with approximately 2 ft of drop per 100 ft of waterbar to ensure drainage, and extended into established vegetation. All waterbars would be constructed with the berm on the downhill side to prevent the soft material from silting in the trench. The initial waterbar would be constructed at the top of the back slope. Subsequent waterbars would follow the spacing guidelines in Table A-3.6. Silt fences would be placed downslope from reclaimed areas where erosion may impact a waterbody, and would be installed according to manufacturers' instructions. Energy dissipaters would be used to slow flows wherever water is channelized (e.g., by a waterbar or an interceptor ditch). All runoff and erosion control structures would be inspected and maintained by the Operators on a regular basis until the site is determined to be stable.

Table A-3.6 Spacing Guidelines for Waterbar Installations.

% Slope	Spacing Intervals (feet)
2% or <	200
2% - 4%	100
4% - 5%	75
5% or >	50

A-3.6 WEED CONTROL

Operators would be responsible for the control of non-native, invasive, and noxious weeds from all project activities for the LOP. Weed control could include one or more of the following techniques:

1. cultural controls, such as prompt seeding, plowing, reseeding, and use of certified weed-free revegetation materials (seed and mulch);
2. physical controls, such as hand-pulling, hoeing, or mowing with weed cutting machines or tractor mower; and
3. chemical controls--the use of herbicides.

If the Operators or BLM determines that the use of herbicides is necessary, a *Pesticide Use Proposal* (form WY-04-9222-1) and pesticide label would be submitted to the Authorized Officer no later than December 1st for use during the following spring/summer period. All herbicides would be used only in the season or growth stage during which they are most effective, and subject to the following conditions.

1. Application applicators will have their Commercial Pesticide Applicator License.
2. Applicators will fill out daily pesticide use logs.
3. Application operations will be suspended when any of the following conditions exist on the treatment area:
 - a) wind velocity exceeds 6 mph for applications of liquids or 15 mph for the application of granular herbicides, or as specified on the label;
 - b) precipitation is occurring or is imminent within 24 hours;

- c) snow, ice or frost covers the treatment area; and
 - d) fog significantly reduces visibility.
4. During operations, radio contact will be maintained to link all parts of the project.
 5. All individuals involved in the herbicide handling or application will be instructed on the safety plan and spill procedures.
 6. Protective buffer zones will be provided along important riparian habitat not designated for treatment and along streams, rivers, lakes, wetlands, and xeroriparian areas. Protective buffer zones will also be provided around non-target plant species.
 7. Applicators will not apply herbicides at rates higher than the maximum application rates allowed for on Federal Land and higher than the herbicide labels recommendations.

Use of certified weed-free seeds and mulches would minimize the potential for weed introduction. Prompt reclamation of disturbed sites would minimize potential for weed infestations.

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A-4.0 FENCING

In order to protect newly revegetated areas, the Operators (with the approval of the BLM/landowner) may install fencing around any reclaimed areas that may receive grazing pressure that would interfere with the successful reestablishment of native vegetation. The fences would prevent cattle from entering a specific area, but would not interfere with the movement of wildlife. All fences would comply with appropriate RMP guidance and BLM Manual Handbook H-1471-1.

Because of livestock grazing on previously revegetated areas within the core area of the CGIDP area, the Operators would fence portions of some private surface within the core area until such time as the newly established vegetation is capable of withstanding grazing pressure. One proposed fencing alternative would have a perimeter of 0.73 mi, would enclose approximately 23 acres, and would include adequate gates and/or cattle guards that would comply with appropriate RMP guidelines and BLM Manual Handbook H-1471-1 (Figure A-4.1).

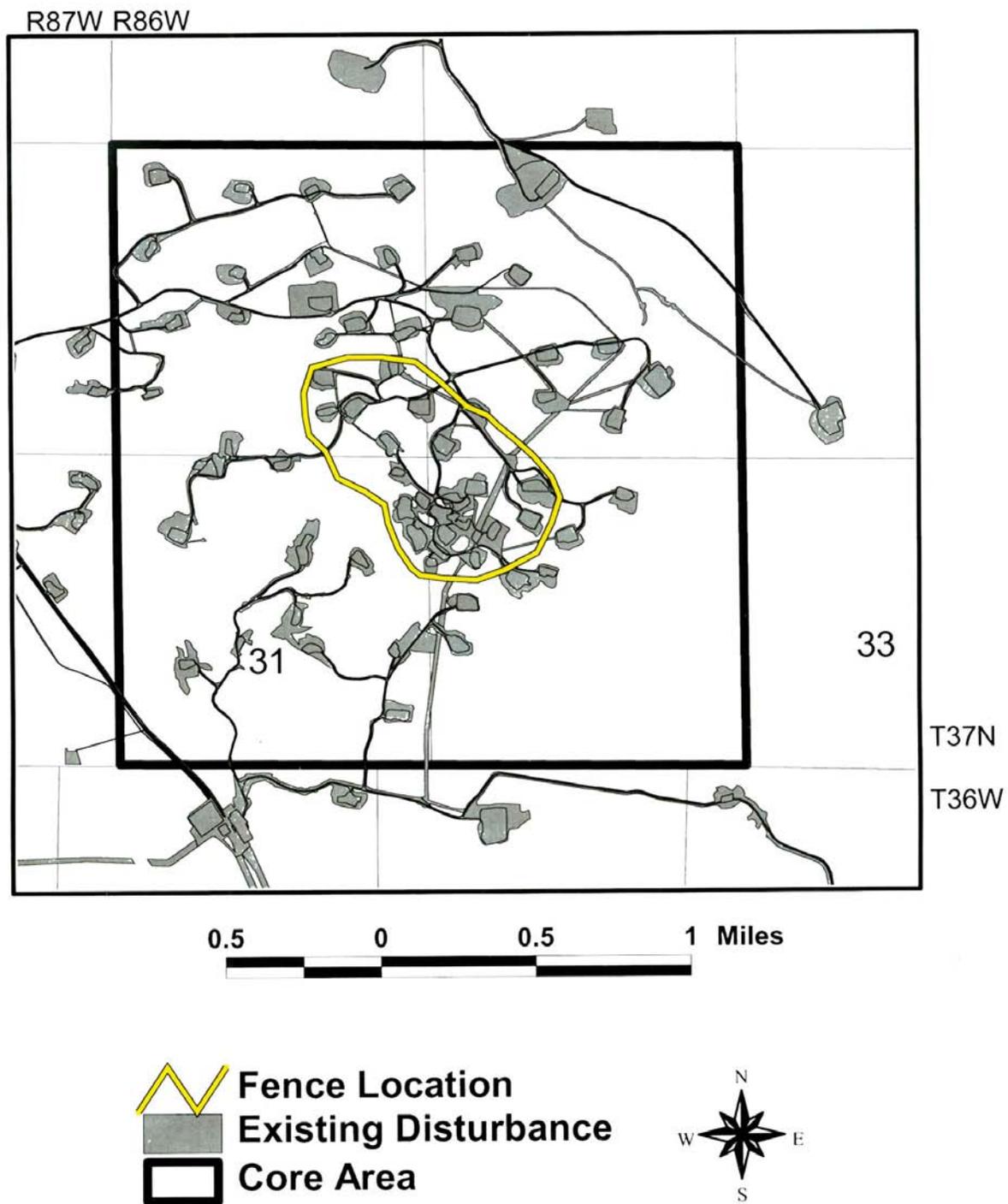


Figure A-4.1 Location of Area Proposed for Fencing to Exclude Livestock to Encourage Revegetation Success.

A-5.0 REMEDIAL WEED CONTROL PROGRAM

As part of the on-going monitoring plan for the CGIDP, the Operators and BLM have monitored reclamation success and weed establishment on numerous reclaimed areas. As a result, the Operators and BLM have identified numerous areas within the CGIDP area that require reseeding and/or remedial actions to control the establishment and spread of weeds. It is acknowledged that drought in the project area has contributed to poor establishment of desirable species and the establishment and spread of weeds on some reclaimed areas. To correct this problem, the Operators would undertake a 3-year remediation program to reseed or interseed areas and/or to control weeds on previously reclaimed areas. Approximately 1/3 of the areas would be evaluated and remediated in each of 2005, 2006, and 2007. The Operators would document which areas have been remediated in an annual report to BLM.

The Operators would utilize the following decision points to guide remedial management actions.

Seeding Decisions and Actions

- In areas with two or more years of growth and there are more than two planted seedlings per square foot but the area contains only one of the three types of reclamation life forms (e.g., grasses, forbs, or shrubs), the area would be interseeded with an appropriate seed mixture utilizing the seed mixtures presented above to guide species selection and application rate. Interseeding would be conducted during the first fall opportunity.
 - In areas with two or more years of growth and there are less than two desirable seedlings per square foot, the areas would be disked or harrowed and reseeded with the complete and appropriate seed mixture. The Operators would follow the permanent reclamation guidance presented above. Reseeding would be conducted during the first fall opportunity.
-

Weed Control Decisions and Actions

- In areas with less than 1 year of growth, the Operators would mow the area but would not reseed, interseed, or apply any herbicide.
- In areas with more than 1 year of growth and less than 30% of the area is covered with weeds, the Operators would spot spray the target areas with the appropriate herbicide.
- In areas with more than 1 year of growth and more than 30% of the area is covered with weeds, the Operators would spray the entire effected area with the appropriate herbicide.

If the Operators or BLM determine that the use of herbicides is necessary, a *Pesticide Use Proposal* would be submitted to the BLM for approval as discussed in Section A-3.6.

The Operators would monitor all previously reclaimed areas and would implement remedial seeding and weed control actions at the same time on any given area. The Operators would continue to monitor the status of all permanently reclaimed areas and would implement appropriate remediation actions until such time as the BLM determines that they meet reclamation standards.

A-6.0 RECLAMATION SUCCESS MONITORING

A-6.1 MONITORING TEMPORARY RECLAMATION

Temporary reclamation would be monitored annually and would include visual inspections for vegetation establishment, soil stability, the effectiveness of erosion control practices, and weed invasion. When practicable, the Operators would correct problems within 3 weeks of discovery and reseeding and/or interseeding would be conducted, as necessary, at the first seasonal opportunity utilizing the procedures previously presented in this document.

A-6.2 MONITORING PERMANENT RECLAMATION

Permanent reclamation success would be monitored annually and would include visual inspection for vegetation establishment, soil stability, effectiveness of erosion control practices, and weed invasion. When practicable, the Operators would correct any problem within 3 weeks of discovery and reseeding and/or interseeding would be conducted, as necessary, at the first seasonal opportunity utilizing the procedures previously presented in this document.

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A-7.0 REFERENCES

Bureau of Land Management. 1995. Platte River Resource Area Resource Management Plan Final Environmental Impact Statement and Record of Decision. Bureau of Land Management, Wyoming State Office, Cheyenne, WY. BLM-WY-ES-84-020-4410. July 1995. 249 pp.

Wyoming Department of Environmental Quality, Land Quality Division. 1984. Guideline No. 1, Topsoil and Overburden. Wyoming Department of Environmental Quality, Cheyenne, Wyoming. 23 pp.

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APPENDIX B:
SCOPING NOTICE



United States Department of the Interior

1790

BUREAU OF LAND MANAGEMENT
Casper Field Office
2987 Prospector Drive
Casper, Wyoming 82604-2968

APR 26 2004

RE: Scoping Notice
Cave Gulch-Bullfrog-Waltman
Infill Natural Gas Project

Dear Reader:

The enclosed Scoping Notice, as required by the National Environmental Policy Act, initiates the analysis process for Bill Barrett Corporation, Chevron USA Inc., and Prima Energy proposed continued development in the Cave Gulch-Bullfrog-Waltman Fields. If you are interested in participating in the scoping process, we request you respond by supplying your written or e-mail comments or concerns about the proposed activity by June 7, 2004. Please submit your written comments to:

Joe Meyer, Project Manager
Bureau of Land Management
Casper Field Office
2987 Prospector Drive
Casper, Wyoming 82604
e-mail: casper_wymail@blm.gov

(Please refer to the Cave Gulch-Bullfrog-Waltman Infill Natural Gas Project in your response.)

Additionally, the Scoping Notice will be posted on the Bureau of Land Management, Casper Field Office's homepage at www.wy.blm.gov/cfo. Your response is important and will be considered in the environmental analysis process. If you do respond, we will keep you informed of decisions resulting from the analysis. Please note that public comments submitted for this scoping review, including names, e-mail addresses, and street addresses of the respondents, will be available for public review and disclosure at the above address during regular business hours (7:45 a.m. to 4:30 p.m.), Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish to withhold your name, e-mail address, or street address from public review or from disclosure under the Freedom of Information Act, you must state this plainly at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

If you have questions concerning this proposal or if you need additional information, please contact Joe Meyer at the above e-mail address, street address, or by phone at (307) 261-7641.

Sincerely,

Field Manager, Casper

Enclosure

**SCOPING STATEMENT
CAVE GULCH-BULLFROG-WALTMAN INFILL
NATURAL GAS DEVELOPMENT PROJECT
ENVIRONMENTAL ASSESSMENT**

Bill Barrett Corporation, Chevron USA Inc. and
Prima Energy Corporation

Bureau of Land Management
Casper Field Office

Description of Project

Bill Barrett Corporation, Chevron USA Inc., and Prima Energy, hereafter known collectively as the operators, propose continued development in the Cave Gulch-Bullfrog-Waltman Fields. The current programmatic NEPA analysis, the Cave Gulch-Bullfrog-Waltman Natural Gas Development Project (CGBWNGDP) EIS, completed in May 1997, analyzed impacts from 160 wells on 107 well pads, and activity to date has nearly reached these levels. Based on current data, the operators estimate that up to 149 additional wells would be required to fully develop all currently known oil and gas resources within the project area (Figure 1).

The operators propose to drill a maximum of 149 wells on 105 well pads over a ten year period. Of this total, 111 wells would be drilled to the relatively shallow Fort Union and Lance Formations (< 10,000'), with 38 wells proposed in the deeper horizons of the Cody and Mesa Verde Formations. The core area of the field in Sections 29, 30, 31 and 32 of T37N, R86W will see much of the drilling, with development at 20 and 10 acre densities in certain areas. Field wide, the operators estimate that 82 wells would be drilled at a 40 acre density, 26 wells would be drilled at a 20 acre density, and 41 wells would be drilled at a 10 acre density. The operators propose to utilize directional drilling techniques in conjunction with some of the 20 acre and all of the 10 acre density wells. The number of wells ultimately drilled at each density, locations of the proposed drill sites, and timing of drilling activities would be dictated by the continued success of development wells, the future success of wells drilled at increased depth and well densities, technological advances that allow for the efficient development of marginal resources, and future economic considerations.

The operators also foresee drilling wells in three sections south of the southern boundary of the analysis area originally considered in the 1997 CGBWNGDP EIS document. Some of the wells tabulated above are proposed for Sections 34, 35 and 36 in T36N, R87W. As a consequence, the analysis area would be increased by approximately 1,920 acres from the 25,093 acres originally analyzed in the CGBWNGDP EIS to 27,013 acres currently proposed for additional infill development (see Figure 1).

Drilling, completion, and production methods will be similar to those utilized to date and previously analyzed in the 1997 CGBWNGDP EIS.

It is likely that two additional produced water injection wells, to be proposed at as yet undetermined locations, will be needed. Existing compression facilities are considered adequate to handle the additional volumes of gas and no new compression is being proposed. The existing gathering

system will also be utilized by the new wells with incremental expansion of said gathering system to the new well sites, typically using a utility (pipeline) corridor that is common with and parallel to the access road.

The proposed development would be initiated upon approval and drilling will probably occur over a 10-year period. The operators project that up to four drilling rigs may be active at any one time in the area and that most of the drilling would occur within 5 years of initial project approval.

National Environmental Policy Act

On reviewing the current proposal received from the Operators, the CFO/BLM has determined that an Environmental Assessment (EA) will be initiated to determine if an environmental impact statement (EIS) is required. If the impacts of the proposed action analyzed in the EA are determined to be “not significant”, then an EIS will not be required, and the BLM Field Manager may sign a Decision Record(DR) with a “Finding of No Significant Impact”(FONSI), which would allow the infill drilling program to proceed as described in the EA. If the impacts of the proposed action analyzed in the EA are determined to be significant, the preparation of an EIS will be required.

One element of the *National Environmental Policy Act* (NEPA) process is scoping. Scoping activities are initiated early in the process:

- to identify reasonable development alternatives to be considered in the environmental document;
- to identify environmental/socioeconomic issues of concern related to the proposed project; and
- to determine the depth of analysis for issues addressed in the environmental document.

This scoping statement has been prepared to enable government agencies, the general public, and other interested parties to participate in and contribute to the analysis process. Public input is important in establishing the scope of analysis for any NEPA document, and the BLM encourages public participation.

Identified Resource Management Issues, Concerns, and Opportunities

The major issues related to the Cave Gulch-Bullfrog-Waltman Infill Natural Gas Development Project identified to date include the potential differences in impacts to resources previously analyzed.

Interim Drilling Activities

While the Cave Gulch-Bullfrog-Waltman Infill Natural Gas Development Project EA is being prepared, the BLM may allow development to continue on a case-by-case basis under the drilling program as approved in the August 1997 Record of Decision for the Cave Gulch-Bullfrog-Waltman Natural Gas Development Project Environmental Impact Statement.

Interdisciplinary Team

Based on the current understanding of issues, concerns, and opportunities and established objectives from the previous analysis, an interdisciplinary team (IDT) made up of the following specialists and skills have been identified:

- Air Quality Specialist;
- Archaeologist;
- Environmental Protection Specialist (surface protection);
- Geologist;
- Hydrologist;
- Interdisciplinary Team Leader;
- Petroleum Engineer;
- Public Affairs Specialist;
- Range Management Specialist;
- Realty Specialist;
- Recreation Planner;
- Soil Scientist; and
- Wildlife Biologist.

Timing Needs and Requirements

Public input is important in establishing the level and scope of the analysis. The public is encouraged to participate throughout the environmental analysis process to help in identifying the level of analysis needed, alternatives to the proposed action, other issues or concerns that should be analyzed, mitigative opportunities, and any other comments or ideas to help ensure the completeness of the analysis process.

Your comments are due by June 7, 2004. Please submit your comments to:

Address: Joe Meyer, Project Manager
Bureau of Land Management
Casper Field Office
2987 Prospector Drive
Casper, WY 82604

Email: casper_wymail@blm.gov

(Please refer to the Cave Gulch-Bullfrog-Waltman Infill Natural Gas Project in your response.)

PUBLIC PARTICIPATION

Attached to this scoping notice is a list of agencies, companies, individuals and organizations who will receive a copy of this scoping statement. In addition, a notice will be distributed to local media and posted on the BLM web page at: www.wy.blm.gov/cfo.

Agencies, companies, individuals and organizations receiving this notice:

Bill Barrett Corporation	Chevron USA Incorporated
Chevron USA Production	Yates Petroleum Corporation
Yates Drilling Company	ABO Petroleum Corporation
MYCO Industries Incorporated	Cabot Oil & Gas Corporation
Marathon Oil Company	Texaco Exploration and Production
Incorporated Los Chicos	Tom Brown Incorporated
Sacramento Partners LP	Marico Exploration Incorporated
John A. Yates	Trust Q
Lillie M. Yates	Marathon Oil Company
Sharbro Oil LTD Company	Prima Oil & Gas Company
John P. Lockridge	Nancy L. Kittinger
Bruce E. Kittinger	Mary Laura Lockridge
Liberty Petroleum Corporation	NPC Incorporated
Hanson & Strahn Incorporated	Lindenmuth & Associates
Pioneer Natural Resources USA Inc.	INTOIL Incorporated
Keith L. Mohl	Bill Womacks
W. A. Moncrief	KENTTA Corporation
Vernon R. Drwenski	Lee Wiley Moncrief 1988 TRST
C. B. Moncrief	RWM 1988 Trust
Monty Brennan Moncrief Trust	TO Moncrief Trust
Richard Jason Moncrief Trust	Mindyanne E Moncrief Trust
W A Moncrief	City of Casper
U.S. Environmental Protection Agency	Murie Audubon Society
Natrona County Commissioners	Natrona County Conservation District
Sierra Club	The Nature Conservancy
U.S. Representative Barbara Cubin	U.S. Senator Craig Thomas
U.S. Senator Mike Enzi	U.S. Fish & Wildlife Service
Wyoming Nature Conservancy	Wyoming Outdoor Council
Land Quality Advisory Board	Natrona County Weed Control District
Wyoming Department of Agriculture	Wyoming Game & Fish Department
Wyoming Geological Survey	Wyoming Office of Federal Land Policy
Wyoming Office of State Lands and Investments	Wyoming Oil & Gas Conservation Comm.
Wyoming State Engineer's Office	Wyoming State Historic Preservation Office
Wyoming State Planning Office	Wyoming Wildlife Federation
Petroleum Association of Wyoming	Brad and Donna Carlson
Flying A Ranch	Norman Preator
Deer Creek Ranch Inc.	Murphy Ranch Company
Colorado Interstate Gas Company	Encana Pipelines (USA), Inc.
Express Pipeline Partnership	Frontier Pipeline, Inc.

Kinder Morgan, Inc.
Rocky Mountain Pipeline Systems, LLC
Crow Tribe
Northern Arapaho Tribe
Oglala Lakota

Platte Pipeline Company
Cheyenne / Arapahoe Tribes of Oklahoma
Eastern Shoshone Tribe
Northern Cheyenne Tribe

Figure 1. Project Area Location Map.

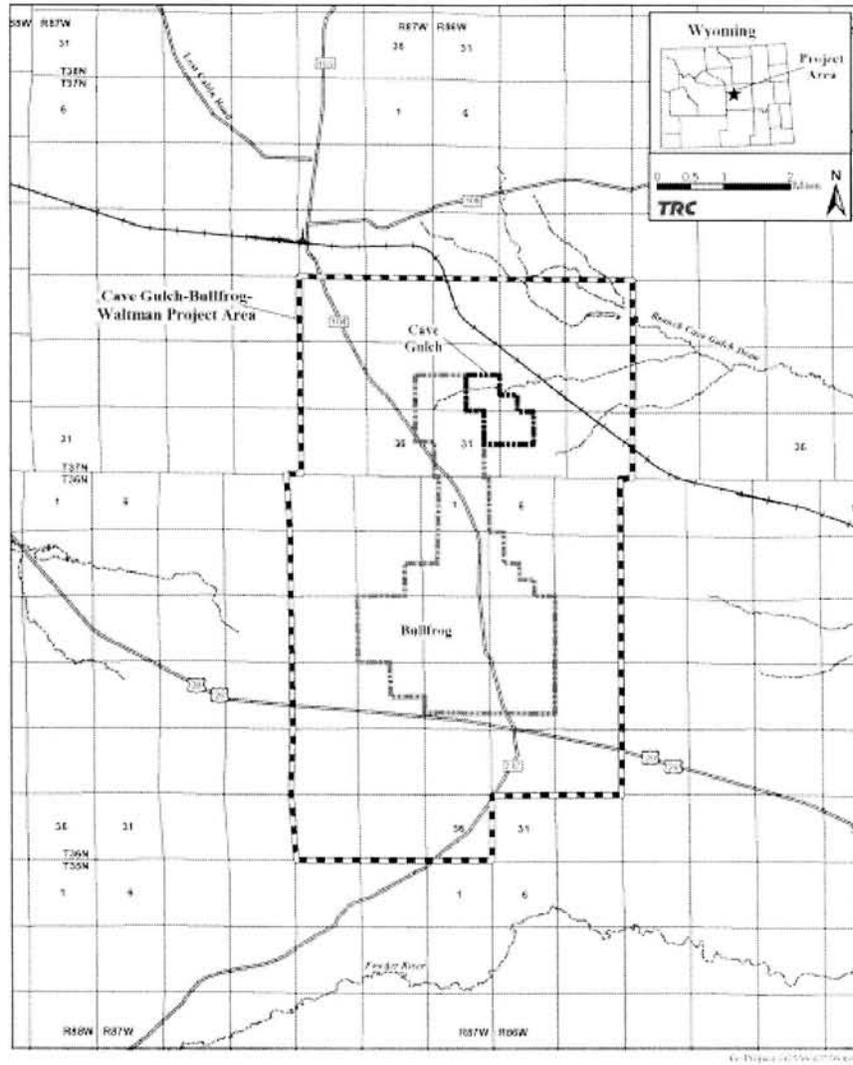


Figure 1. Location of the Cave Gulch-Bullfrog-Waltman Project Area.