U.S. Department of the Interior

Bureau of Land Management
Rawlins Field Office

April 2001

Environmental Assessment for the Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming

MISSION STATEMENT

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

WY-030-EA00-288

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Rawlins Field Office
1300 North Third Street
Rawlins, Wyoming 82301-4376

1790

APR 2 6 2001

Re: Seminoe Road Coalbed (CBM) Methane Pilot Project

Dear Reader:

Enclosed for your review and comment is the Environmental Assessment (EA) for Dudley & Associates, LLC, Seminoe Road Coalbed Methane Pilot Project. In order to satisfy the requirements of the National Environmental Policy Act, the EA was prepared to analyze impacts associated with the exploration of coalbed methane resources west of Seminoe Reservoir in Carbon County, Wyoming.

Analysis of the environmental consequences has led to the determination that this proposed project, with the appropriate mitigating measures, will not have a significant effect on the human environment. Therefore, an Environmental Impact Statement will not be required. Pending the results of a public review of this document, the Bureau of Land Management (BLM) will prepare a formal Decision Record.

Your comments should be as specific as possible. Comments on the alternatives presented and on the adequacy of the impact analysis will be accepted by BLM until June 1, 2001.

Comments may be submitted via regular mail to:

Brenda Vosika Neuman, Project Manager
Bureau of Land Management
Rawlins Field Office
P.O. Box 2407
1300 North Third Street
Rawlins, Wyoming 82301

or be submitted electronically (please refer to the Seminoe Road CBM Pilot Project) at:

e-mail: rawlins_wymail@blm.gov

Please note that 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 confidentially. 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.

Please retain this EA for future reference. A copy of the EA has been sent to affected government agencies and to those who responded to scoping or otherwise indicated that they wished to receive a copy of the EA. The EA may also be reviewed at the following locations:

Bureau of Land Management
Wyoming State Office
5353 Yellowstone Road
Cheyenne, Wyoming 82009

Bureau of Land Management
Rawlins District Office
1300 N. Third Street
Rawlins, Wyoming 82301

or at the Wyoming Bureau of Land Management homepage at www.wy.blm.gov.

If you require additional information regarding this project, please contact Brenda Vosika Neuman at the above e-mail or street address or phone (307) 328-4389.

Sincerely,

Kurt J. Kotter

Field Manager

ENVIRONMENTAL ASSESSMENT FOR THE SEMINOE ROAD COALBED METHANE PILOT PROJECT, CARBON COUNTY, WYOMING

Prepared for

Bureau of Land Management
Rawlins Field Office
Rawlins, Wyoming

This Environmental Analysis was prepared by TRC Mariah Associates Inc., an environmental consulting firm, with the guidance, participation, and independent evaluation of the Bureau of Land Management (BLM). The BLM, in accordance with Title 40 Code of Federal Regulations, Part 1506(a) and (b), is in agreement with the findings of the analysis and approves and takes responsibility for the scope and content of this document.

April 2001

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LIST OF ACRONYMS

ACEC	Area of Critical Environmental Concern
APD	Application for Permit to Drill
APLIC	Avian Power Line Interaction Committee
AQD	Air Quality Division
ARPA	*Archaeological Resource Protection Act of 1979*
AUM	Animal unit month
BA	Biological Assessment
bbl	42-gallon barrel
BLM	Bureau of Land Management
BO	U.S. Fish and Wildlife Service Biological Opinion
bpd	Barrels per day
C.F.R.	*Code of Federal Regulations*
CBM	Coalbed methane
CCRBD	Carbon County Road and Bridge Department
CEQ	Council on Environmental Quality
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
cfs	Cubic feet per second
CIAA	Cumulative impact assessment area
CO	Carbon monoxide
COE	U.S. Army Corps of Engineers
dBA	A-weighted decibel
Dudley	Dudley & Associates, LLC
EA	Environmental assessment
EPA	U.S. Environmental Protection Agency
FLPMA	*Federal Land Policy and Management Act of 1976*
FONSI	Finding of No Significant Impact
GDRA	Great Divide Resource Area
HAP	Hazardous air pollutant
hp	Horsepower
I-80	Interstate 80
LOP	Life-of-project
mcf	Thousand cubic feet
mcfgpd	Thousand cubic feet of gas per day
mmcfd	Million cubic feet per day
mg/l	Milligrams per liter
mi	Mile(s)
MSDS	Material Safety Data Sheets
MSHA	Mine Safety and Health Administration
n.d.	No date
NAAQS	National Ambient Air Quality Standards
NCPA	National Cultural Programmatic Agreement
NEPA	*National Environmental Policy Act*

LIST OF ACRONYMS (CONTINUED)

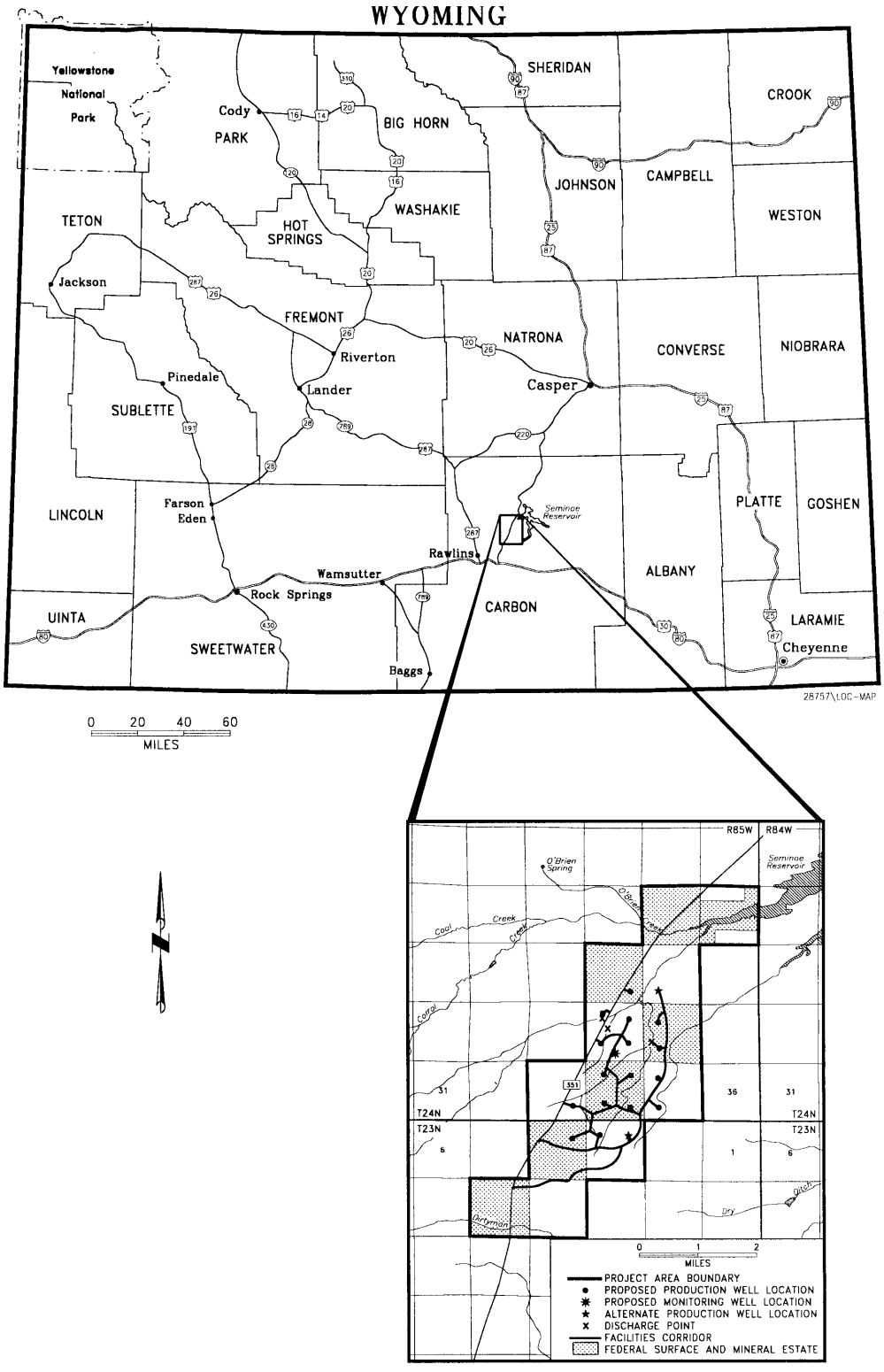
NO_2	Nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NSO	No Surface Occupancy
NTL	Notice to Lessee
O_3	Ozone
ORV	Off-road vehicle
Pb	Lead
PM_{10}	Respirable particulates
PSD	Prevention of Significant Deterioration
RFO	Rawlins Field Office
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-way
SAR	Sodium absorption ratio
SARA	*Superfund Amendments and Reauthorization Act of 1986*
SHPO	State Historic Preservation Office
SO_2	Sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SRPPA	Seminoe Road Pilot Project Area
TCP	Traditional Cultural Properties
TD	total depth
TDS	total dissolved solids
TEP&C	Threatened, endangered, proposed, and candidate
USDC	U.S. Department of Commerce
USDI	U.S. Department of Interior
USFWS	U.S. Fish and Wildlife Service
VRM	Visual Resource Management
WAAQS	Wyoming Ambient Air Quality Standards
WAPA	Western Area Power Authority
WDE	Wyoming Department of Employment
WDEQ	Wyoming Department of Environmental Quality
WDOT	Wyoming Department of Transportation
WGFD	Wyoming Game and Fish Department
WIMS	Wyoming Internet Map Server
WNDD	Wyoming Natural Diversity Database
WOGCC	Wyoming Oil and Gas Conservation Commission
WQD	Water Quality Division
WRCC	Western Regional Climate Center
WSEO	Wyoming State Engineer's Office
WSP	Wyoming State Protocol

1.0 INTRODUCTION

Dudley & Associates, LLC (Dudley) of Denver, Colorado, proposes a pilot coalbed methane (CBM) project located in Townships 23 and 24 North, Range 85 West, Carbon County, Wyoming (Map 1.1). The Seminoe Road Pilot Project Area (SRPPA) encompasses approximately 8,320 acres, 3,840 acres (46%) of which are federal surface and mineral estate.

The pilot project would consist of drilling, completing, and producing 18 CBM wells for evaluation (including two alternative well locations that may or may not be developed) and one centrally located monitoring well (19 total wells). Eight of these wells would be drilled on federal lands administered by the Bureau of Land Management (BLM). Drilling operations are currently ongoing on private lands and are proposed to begin on public lands in late spring/early summer 2001 or as soon as all necessary permits are obtained. Production wells would be spaced at 160 acres, or four wells per section, and each well would require approximately 10 days to drill, log, and case using a conventional rotary drilling rig and associated rig equipment. Up to 8 additional days would be required to run a bond log, perforate, and set a pump with a completion rig. The estimated maximum size of each well pad would be 2.5 acres, with site disturbance required to place the drilling rig on level ground and construct a reserve pit to hold drilling fluids and cuttings.

The wells would be drilled and cased for production through the Almond and Allen Ridge Formations of the Mesaverde Group (approximately 6,000 ft total depth [TD]). The single pressure observation/monitoring well at the center of the pilot project would be used initially for monitoring formation pressures. In order to liberate the methane gas contained in the coal seams, it would be necessary to dewater the coal seams so as to lower the hydrostatic pressure and desorb the methane gas. Water produced from the wells would be collected and discharged into an ephemeral drainage--Pool Table Draw--which discharges into Seminoe Reservoir (Map 1.1). Each well would be production tested continuously for 6-12 months to evaluate the commercial feasibility of producing CBM from coals in the Almond and Allen Ridge Formations of the Mesaverde Group (Cretaceous age) coals underlying the SRPPA. If such CBM



Map 1.1 General Location Map, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.

recovery is deemed commercially feasible, additional development would likely occur; however, any such additional development would require additional analysis under the *National Environmental Policy Act* (NEPA) prior to BLM approval.

Each well would require an access road, a water discharge line, a gas gathering line, and a power line. Pipelines and power lines would be located parallel to roads within a single facilities corridor, where practical.

For the purposes of the analyses presented in this environmental assessment (EA), the Proposed Action involves federal authorization of six wells and associated rights-of-way (ROWs) on federal lands in the SRPPA. The No Action Alternative considers the two additional wells and associated facilities on federal lands that have been approved by the BLM and are currently being developed. The entire 19-well project is considered in cumulative impact analyses.

The BLM would allow Dudley to develop two test wells on federal lands within the proposed SRPPA during preparation of this EA to allow for the acquisition of data necessary for completion of the EA. Interim drilling would be monitored by the BLM to ensure that such activities do not significantly affect the environment or prejudice the decision to be made as a result of this NEPA analysis

1.1 PURPOSE AND NEED

The purpose of the proposed project is to determine the commercial feasibility of producing federally owned CBM gas by a private company pursuant to their rights under existing oil and gas leases issued by the BLM and to prevent drainage of federal minerals by adjacent wells on nonfederal lands. National mineral leasing policies and the regulations by which they are enforced recognize the statutory right of lease holders to develop federal mineral resources to meet continuing national needs and economic demands so long as undue and unnecessary environmental degradation is not incurred. Privately owned gas would likely be developed regardless of development on federal lands.

Natural gas is an integral part of the U.S. energy future due to its availability, the presence of an existing market delivery infrastructure, and the environmental advantages of clean-burning natural gas as compared with other fuels. In addition, the development of abundant domestic reserves of natural gas would reduce the country's dependence on foreign sources of energy and maintain an adequate and stable supply of fuel for economic well-being, industrial production, power generation, and national security. The environmental advantages of natural gas combustion versus other conventional fuels are emphasized in the *Clean Air Act* amendments of 1990.

1.2 CONFORMANCE AND AUTHORIZING ACTIONS

This EA is prepared in accordance with the NEPA and is in compliance with all applicable regulations and laws passed subsequently, including Council on Environmental Quality (CEQ) regulations (40 *Code of Federal Regulations* [C.F.R.] 1500-1508), U.S. Department of Interior (USDI) requirements (*Department Manual 516, Environmental Quality* [USDI 1980]), guidelines listed in the BLM *NEPA Handbook, H-1790-1* (BLM 1988a), and *Guidelines for Assessing and Documenting Cumulative Impacts* (BLM 1994). This EA assesses the environmental impacts of the Proposed Action and No Action Alternative and serves to guide the decision-making process.

The Great Divide Resource Area (GDRA) Record of Decision (ROD) and approved Resource Management Plan (RMP) (BLM 1990a) directs the management of BLM-administered lands within the SRPPA. The objective for management of oil and gas resources, as stated in the RMP, is to provide for leasing, exploration, and development of oil and gas while protecting other resource values. The BLM considers existing RMP oil and gas decisions to be adequate for CBM and allows for exploration and testing to determine the viability of CBM development. If this pilot project proves viable and additional CBM development beyond that described herein is proposed, BLM would then require further NEPA analysis for these additional proposals.

The proposed project is also in conformance with the *State of Wyoming Land Use Plan* (Wyoming State Land Use Commission 1979) and the Carbon County Land Use Plan (Pederson Planning Consultants 1997, 1998) and would comply with all relevant federal, state, and local laws and regulations (Table 1.1).

Table 1.1 Federal, State, and County Permits, Approvals, and Authorizing Actions, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.[1]

Agency	Permit, Approval, or Action	Authority
Bureau of Land Management (BLM)	Permit to drill, deepen, or plug back on BLM-managed land (APD process)	*Mineral Leasing Act of 1920*, as amended (30 U.S.C. 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 C.F.R. 3162)
	ROW grants and temporary use permits for pipelines on BLM-managed land	*Mineral Leasing Act of 1920*, as amended (30 U.S.C. 185); Onshore Oil and Gas Unit Agreements: Unproven Areas, as amended (43 C.F.R. 3180)
	ROW grants for access roads on BLM-managed land	*Federal Land Policy and Management Act* (43 U.S.C. 1761-1771); Right-of-Way, Principles and Procedures, as amended (43 C.F.R. 2800)
	Authorization for flaring and venting of natural gas on BLM-managed land	*Mineral Leasing Act of 1920*, as amended (30 U.S.C. 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 C.F.R. 3162)
	Plugging and abandonment of a well on BLM-managed land	*Mineral Leasing Act of 1920*, as amended (30 U.S.C. 181 et seq.); Requirements for Operating Rights Owners and Operators, as amended (43 C.F.R. 3162)
	Antiquities and cultural resource permits on BLM-managed land	*Antiquities Act of 1906*, as amended (16 U.S.C. 431-433); *Archaeological Resources Protection Act of 1979*, as amended (16 U.S.C. Sections 470aa-470ll); Preservation of American Antiquities, as amended (43 C.F.R. 3)
	Approval to dispose of produced water on BLM-managed land	*Mineral Leasing Act of 1920*, as amended (30 U.S.C. 181 et seq.); Special Provisions, as amended (43 C.F.R. 3164); Onshore Oil and Gas Order No. 7, as amended (58 Fed. Reg. 47,354)
Carbon County	Construction/use permits	County Code and Zoning Resolution
	Conditional use permits	County Code and Zoning Resolution
	Road use agreements/oversize trip permits	County Code
	County road crossing/access permits	County Code/Engineering Department
	Small wastewater permits	County Health Department
	Hazardous material recordation and storage	County Code
	Zone changes	Zoning Resolution
	Filing fees	County Code
	Noxious weed control	County Code

Table 1.1 (Continued)

Agency	Permit, Approval, or Action	Authority
U.S. Army Corps of Engineers (COE)	Section 404 permits and coordination regarding placement of dredged or fill material in area waters and adjacent wetlands	Section 404 of the *Clean Water Act of 1972*, as amended (33 U.S.C. 1344); EPA-administered Permit Programs: The National Pollutant Discharge Elimination System (NPDES), as amended (40 C.F.R. 122); State Program Requirements (40 C.F.R. 123); Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Filled Material, as amended (40 C.F.R. 230)
U.S. Fish and Wildlife Service (USFWS)	Coordination, consultation and impact review on federally listed threatened and endangered (T&E) species	*Fish and Wildlife Coordination Act* (16 U.S.C. 661-666c); Section 7 of the *Endangered Species Act of 1973*, as amended (16 U.S.C. 1536); *Bald Eagle Protection Act* (16 U.S.C. 668-668dd)
	Migratory bird impact coordination	*Migratory Bird Treaty Act* (16 U.S.C. 704)
U.S. Department of Transportation (DOT)	Control pipeline maintenance and operation	Transportation of Natural and Other Gas by Pipeline; Annual Reports, Incident Reports, and Safety Related Condition Reports, as amended (49 C.F.R. 191); and Transportation of Natural and Other Gas by Pipeline: Minimum Safety Standards, as amended (49 C.F.R. 192)
Wyoming Department of Environmental Quality - Water Quality Division (WDEQ-WQD)	Permits to construct settling ponds and waste water systems, including ground water injection and disposal wells	*Wyoming Environmental Quality Act*, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311)
	Regulate disposal of drilling fluids from abandoned reserve pits	*Wyoming Environmental Quality Act*, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311)
	NPDES permits for discharging produced water and storm water runoff	WDEQ-WQD Rules and Regulations, Chapter 18; *Wyoming Environmental Quality Act*, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311); Section 405 of the *Federal Water Pollution Control Act (Clean Water Act)* (codified at 33 U.S.C. 1345); EPA-administered Permit Programs: NPDES, as amended (40 C.F.R. 122); State Program Requirements (40 C.F.R. 123); EPA Water Program Procedures for Decision-making, as amended (40 C.F.R. 124)
	Administrative approval for discharge of hydrostatic test water	*Wyoming Environmental Quality Act*, Article 3, Water Quality, as amended (W.S. 35-11-301 through 35-11-311)
Wyoming Department of Environmental Quality - Air Quality Division (WDEQ-AQD)	Permits to construct and permits to operate	*Clean Air Act*, as amended (42 U.S.C. 7401 et seq.); *Wyoming Environmental Quality Act*, Article 2, Air Quality, as amended (W.S. 35-11-201 through 35-11-212)
Wyoming Department of Environmental Quality - Land Quality Division (WDEQ-LQD)	Mine permits, impoundments, and drill hole plugging on state lands	*Wyoming Environmental Quality Act*, Article 4, Land Quality, as amended (W.S. 35-11-401 through 35-11-437)

Table 1.1 (Continued)

Agency	Permit, Approval, or Action	Authority
Wyoming Department of Environmental Quality - Solid Waste Division (WDEQ-SWD)	Construction fill permits and industrial waste facility permits for solid waste disposal during construction and operations	*Wyoming Environmental Quality Act*, Article 5, Solid Waste Management, as amended (W.S. 35-11-501 through 35-11-520)
Wyoming Department of Transportation (WDOT)	Permits for oversize, overlength, and overweight loads	Chapters 17 and 20 of the Wyoming Highway Department Rules and Regulations
	Access permits to state highways	Chapter 13 of the Wyoming Highway Department Rules and Regulations
Wyoming Oil and Gas Conservation Commission (WOGCC)/Wyoming Board of Land Commissioners/Land and Farm Loan Office	Approval of oil and gas leases, ROWs for long-term or permanent off-lease/ off-unit roads and pipelines, temporary use permits, and developments on state lands	Public Utilities, W.S. 37-1-101 et seq.
WOGCC	Permit to drill, deepen, or plug back (APD process)	WOGCC Regulations, Chapter 3, Operational and Drilling Rules, Section 2 Location of Wells
	Permit to use earthen pit (reserve pits)	WOGCC Regulations, Chapter 4, Environmental Rules, Including Underground Injection Control Program Rules for Enhanced Recovery and Disposal Projects, Section 1, Pollution and Surface Damage (Forms 14A and 14B)
	Authorization for flaring or venting of gas	WOGCC Regulations, Chapter 3, Operational and Drilling Rules, Section 45 Authorization for Flaring or Venting of Gas
	Permit for Class II underground injection wells	Underground Injection Control Program: Criteria and Standards, as amended (40 C.F.R. 146); State Underground Injection Control Programs, State-administered program - Class II Wells, as amended (40 C.F.R. 147.2551)
	Well plugging and abandonment	WOGCC Regulations, Chapter 3, Section 14, Reporting (Form 4); Section 15, Plugging of Wells, Stratigraphic Tests, Core, or Other Exploratory Holes (Form 4)
	Change in depletion plans	*Wyoming Oil and Gas Act*, as amended (W.S. 30-5-110)
Wyoming State Engineer's Office (WSEO)	Permits to appropriate ground water (use, storage, wells, dewatering)	W.S. 41-3-901 through 41-3-938, as amended (Form U.W. 5)
Wyoming State Historic Preservation Office (SHPO)	Cultural resource protection, programmatic agreements, consultation	Section 106 of *National Historic Preservation Act of 1966*, as amended (16 U.S.C. 470 et seq.) and Advisory Council Regulations on Protection of Historic and Cultural Properties, as amended (36 C.F.R. 800)

[1] This list is intended to provide an overview of the key regulatory requirements that would govern project implementation. Additional approvals, permits, and authorizing actions may be necessary.

A tiered approach to environmental review is used by the BLM in the leasing, exploration, and development of mineral resources. Initial environmental review occurs during BLM land use planning, during which appropriate lease stipulations for development are identified with public input. Accordingly, the federal minerals within the SRPPA that have been leased to Dudley carry a contractual commitment to allow for their development in accordance with the terms and conditions of the respective leases. During exploration, this EA and site-specific EAs, as necessary, are prepared for each Application for Permit to Drill (APD) and each ROW application for access roads, pipelines, etc., as these applications are submitted, to ensure that significant impacts to surface and subsurface resource values do not occur. If exploration results in the discovery of economically recoverable quantities of natural gas such that development beyond that described in this EA is proposed, additional NEPA analysis would be required to assess the direct, indirect, and cumulative impacts to the human and natural environment that may result from such development.

The BLM has the authority to deny individual APDs and ROW applications; however, the lessee's right to drill and develop somewhere within the leasehold cannot be denied. Pursuant to the *Federal Land Policy and Management Act of 1976* (FLPMA), the BLM also has the authority and responsibility to protect the environment within federal oil and gas leases; therefore, restrictions may be imposed on lease terms. However, mitigation measures that would render a proposed operation uneconomical or unfeasible are not consistent with the lessee's rights and cannot be required unless they are included as a lease stipulation or are necessary to prevent unnecessary and undue degradation of public lands or resources (BLM Instruction Memorandum 92-67).

All mineral actions would comply with established goals, objectives, and resource restrictions (mitigations) required to protect natural resource values in the planning area. Resources, impacts, and associated mitigation and monitoring measures on federal, state, and private lands within the SRPPA are addressed in this EA.

Use authorizations for roads, power lines, pipelines, and well site facilities would be processed through the BLM APD and Sundry Notice permitting process as long as the facilities remain

on-lease and are owned and operated by Dudley. Any facility located off-lease would require an individual ROW authorization.

Some leases within the SRPPA include special stipulations regarding occupancy in addition to standard lease terms. These special stipulations are designed to protect surface resources such as soils, water, and wildlife by restricting periods of activity and areas of disturbance. Application of these lease stipulations will be handled on a case-by-case basis for each APD submitted to the BLM.

1.3 LAND AND RESOURCE MANAGEMENT ISSUES AND CONCERNS

A number of issues were identified during scoping for this project by the BLM and other entities. A scoping notice was sent to approximately 350 government agencies, news outlets, organizations, and individuals in June 2000 to solicit comments on the proposed project. In addition, an open house was held at the BLM Rawlins Field Office (RFO) on June 26, 2000, to answer questions regarding the proposed project. Sixteen comment letters were received, five from individuals, two from environmental organizations, five from state agencies, and four from federal agencies. Issues identified by respondents and/or by the BLM are listed in Appendix A.

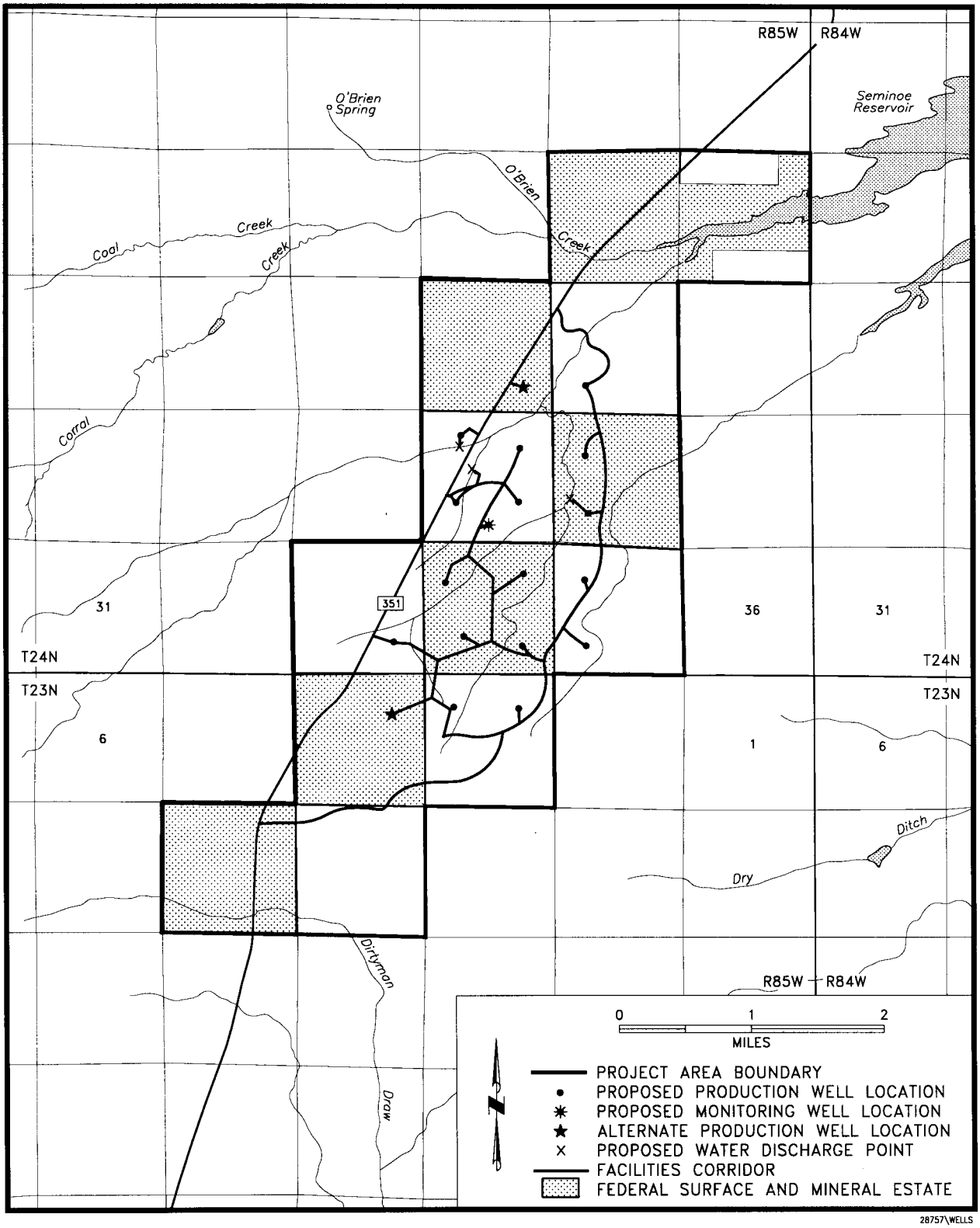
2.0 THE PROPOSED ACTION AND ALTERNATIVES

Two alternatives are evaluated in this EA: 1) the Proposed Action (six additional wells and associated facilities on approximately 3,840 federal acres) (Section 2.1); and 2) the No Action Alternative (no further federal land development--two existing/authorized wells and associated facilities on federal lands) (Section 2.2). Additional alternatives were considered but rejected and are discussed in Section 2.3.

2.1 THE PROPOSED ACTION

Dudley proposes a pilot CBM project located in Townships 23 and 24 North, Range 85 West, Carbon County, Wyoming, approximately 25 mi northeast of Rawlins and 20 mi north northeast of Sinclair, Wyoming (see Map 1.1). Access is from Sinclair along Carbon County Road 351 (Seminoe Road). The SRPPA encompasses approximately 8,320 acres, 3,840 acres (46%) of which are federal surface and mineral estate. The pilot project consists of drilling, casing, completing, and producing 18 CBM wells for evaluation (including two alternative well locations that may or may not be developed) and one centrally located monitoring well (19 total wells) (Map 2.1). Eight of these wells would be on federal lands administered by the BLM, whereas the 11 remaining wells would be on private lands. The 11 wells on private land have been approved and permitted by the Wyoming Oil and Gas Conservation Commission (WOGCC), and all these wells have been drilled. Two of the wells on federal lands have been authorized and are currently being developed (No Action Alternative). Further development of the six remaining wells on federal lands (Proposed Action) would begin in the spring of 2001. All wells would be located to minimize potentially adverse environmental impacts. Production wells would be spaced at 160 acres or four wells per section.

Field development of 19 wells would require the construction of a maximum of 10.0 mi of parallel road/gas and produced water pipelines/power line corridors (facilities corridors), and the location of these corridors are shown on Map 2.1. Approximately 3.0 mi of existing undeveloped road would be upgraded, and 7.0 mi of new road would be built. Natural gas gathering pipelines, produced water pipelines, and electrical power distribution systems would



Map 2.1 Project Location Map, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.

be constructed within the SRPPA. Externally generated power would be brought to the field with standard overhead transmission lines. A summary of the types and acreage of disturbance associated with the Proposed Action is presented in Table 2.1.

It is anticipated that it would take approximately 10 days to drill, log, and case each well utilizing a conventional rotary drilling rig and associated rig equipment. Six to eight additional days would be required to run a bond log, perforate, and set a pump with a completion rig. Road construction would occur concurrently with well drilling and testing, and although some level of activity would be continual, peak drilling and construction would be scheduled for the spring and summer of 2001. Produced water pipelines would be constructed from well locations to water discharge facilities (see Appendix B). Natural gas pipelines would be constructed only after a well(s) has been determined to be productive.

The anticipated life-of-project (LOP) would be from 5 to 30 years, depending upon the success of the pilot project. Additional NEPA analyses would be conducted if additional facilities are required for project development.

2.1.1 Construction and Drilling Operations

All activities at each well on federal lands in the SRPPA would follow procedures approved by the BLM in the APDs and their attached *Conditions of Approval*. Sufficient topsoil to facilitate revegetation would be segregated from subsoils during all construction operations and would be replaced on the surface upon completion of operations as part of the reclamation and revegetation program. Topsoil stockpiles would be stabilized with vegetation as necessary until used for reclamation. For development activities on private surface, Dudley would make appropriate reclamation arrangements with the landowner.

2.1.1.1 Road and Well Pad Construction

Proper authorizations would be obtained for all roads and all roads required for the proposed project would be constructed following guidelines specified in the BLM *Road Standards*

Table 2.1 Types and Approximate Acreage of Proposed Surface Disturbance, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.

	Initial Disturbance Area (acres)				Life-of-Project (LOP) Disturbance Area (acres)			
	Public Land				Public Land			
Type of Disturbance	Existing (No Action)	Proposed (Proposed Action)	Private Land	Total (Cumulative Actions)	Existing (No Action)	Proposed (Proposed Action)	Private Land	Total (Cumulative Actions)
Well pads[1]	5.0	15.0	27.5	47.5	2.0	6.0	11.0	19.0
Facilities Corridors[2]	10.2	30.6	56.2	97.0	5.1	15.3	28.1	48.5
Water discharge facilities[3]	0	0.5	1.0	1.5	0	0.5	1.0	1.5
Total	15.2[4]	46.1	84.7[4]	146.0	7.1	21.8	40.1	69.0

1 Assumes initial disturbance of 2.5 acres for each of 19 well pads and LOP disturbance of 1.0 acre per well pad.

2 Assumes 10.0 mi of new or improved road with parallel gas gathering pipeline, water discharge line, and power line (80-ft average disturbance width). All disturbance except for the estimated 40-ft wide road travelway and adjacent ditches would be reclaimed for the LOP.

3 Assumes three facilities with 0.5-acre disturbance each.

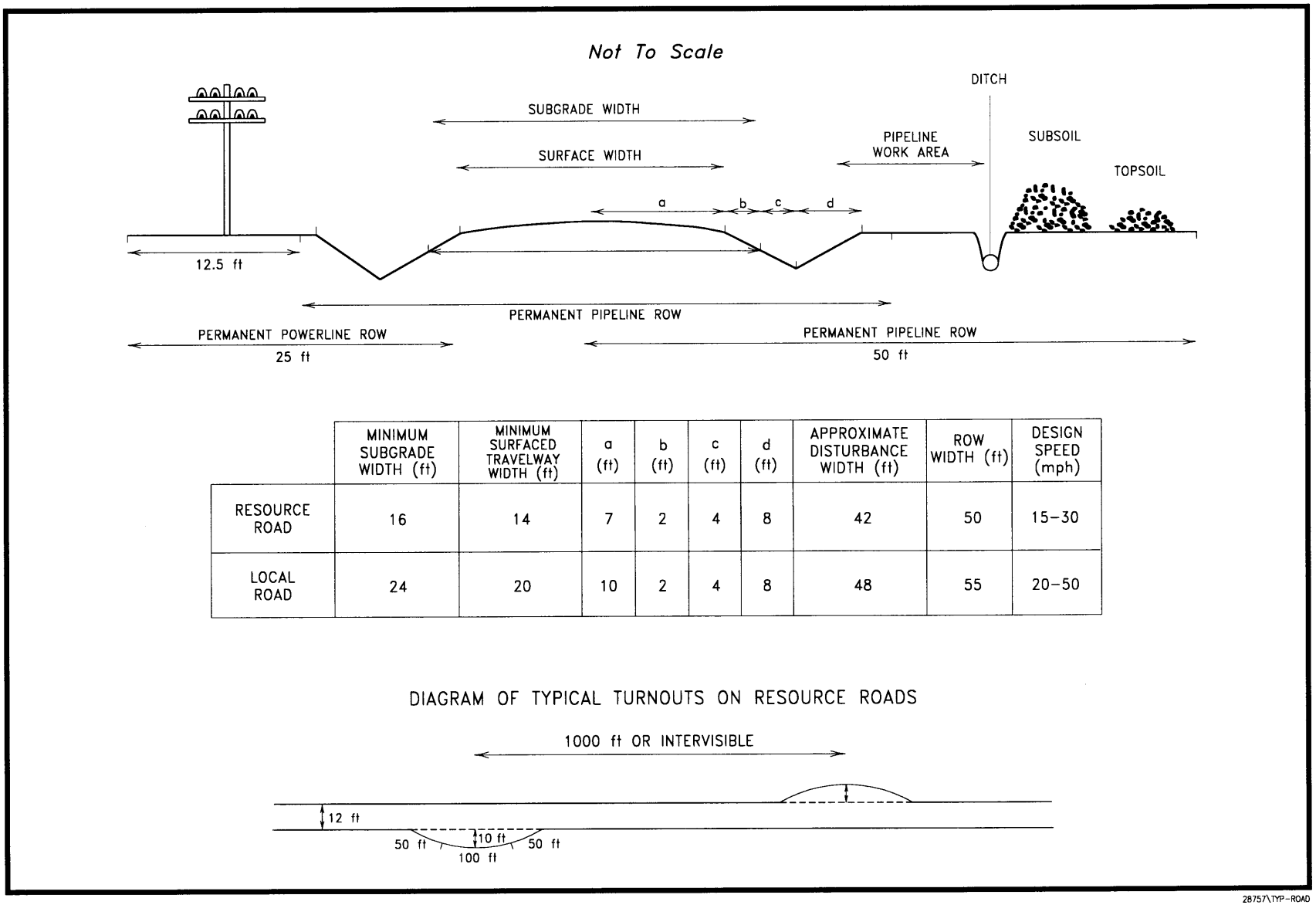
4 This disturbance has already occurred.

Manual, Section 9113 (BLM 1985). Road authorization and use would be coordinated with other area users (i.e., appropriate easements/agreements would be established with private landowners). Figure 2.1 illustrates a typical road cross section with parallel natural gas and water pipelines and power line. The average travel surface width for gravel-surfaced local and resource roads would be 24 ft and 16 ft, respectively, with turnouts as necessary (100 ft long with 50-ft tapers spaced intervisibly at 1,000 ft), and all surface disturbance would be contained within authorized ROWs. Ungraveled local and resource roads would typically be 24 ft and 16 ft wide, respectively, and surface disturbance would average 48 ft within a 55-ft ROW. Approximately 3.0 mi of existing developed road would be upgraded, and approximately 7.0 mi of new road would be built, for a total of 10.0 mi of new or upgraded roads (see Map 2.1). However, if existing developed roads cannot be adequately upgraded, new roads may be built at alternate locations to minimize potential adverse impacts, and existing developed roads may be closed and reclaimed. For the analysis of project impacts in this EA, all roads are considered local roads (Figure 2.1). Because roads, pipelines, and power lines primarily would be constructed within a single corridor, the entire 55-ft road ROW to productive wells is assumed to be disturbed at some time during project construction.

Construction of well pads and access roads would require a maximum of three workers for a period of approximately 3 days per location. These workers would include both heavy equipment operators engaged in construction of the road and well pad and truck drivers hauling heavy equipment to and from locations. Construction workers would likely be hired locally and contracted by Dudley or its agents. Well pads and road ROWs would be cleared of vegetation, along with topsoil which would be removed and stockpiled for future reclamation. Well pads would be leveled and road ROWs constructed using standard cut-and-fill construction techniques and machinery.

Approximate road locations within the SRPPA are presented on Map 2.1. Local roads would provide the internal access network, whereas resource roads would be the spur roads that provide access to individual wells from local roads. Roads would be located to minimize disturbance and to avoid sensitive resources such as raptor nests and cultural resources. Primary access to the SRPPA would be via the Seminoe Road (i.e., Carbon County Road 351), which

Figure 2.1 Typical Parallel Road/ Pipeline/ Power Line Cross Section with Width Specifications for the Proposed Road Type, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.



	MINIMUM SUBGRADE WIDTH (ft)	MINIMUM SURFACED TRAVELWAY WIDTH (ft)	a (ft)	b (ft)	c (ft)	d (ft)	APPROXIMATE DISTURBANCE WIDTH (ft)	ROW WIDTH (ft)	DESIGN SPEED (mph)
RESOURCE ROAD	16	14	7	2	4	8	42	50	15–30
LOCAL ROAD	24	20	10	2	4	8	48	55	20–50

DIAGRAM OF TYPICAL TURNOUTS ON RESOURCE ROADS

28757\TYP-ROAD

traverses the SRPPA. Topsoil on road ROWs would be salvaged, stored in elongated piles within road ROWs, and seeded to prevent erosion as necessary. Topsoil would be respread over approximately 10-12 ft of both backslopes of all roads, and the backslopes would be revegetated as soon as possible after power line and pipeline installation. If a well is determined to be unproductive, the entire road ROW would be reclaimed as soon as practical using stockpiled topsoil and appropriate seeding techniques. Total surface disturbance from road ROWs (including disturbance for adjacent pipelines and power lines) is estimated at 97.0 acres (40.8 acres on public land) initially and 48.5 acres (20.4 acres public land) for the LOP (see Table 2.1).

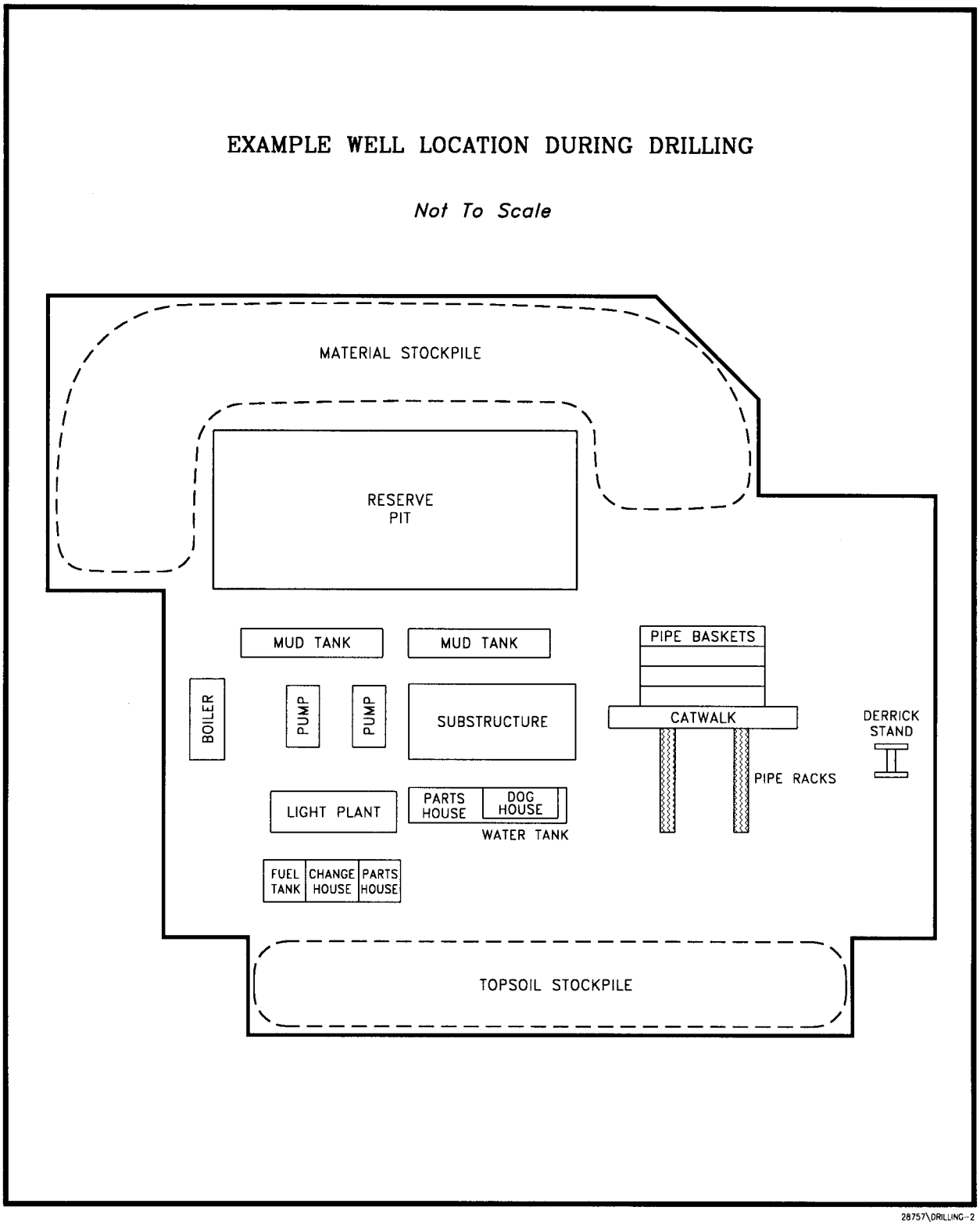
All roads on federal lands would be surfaced with appropriate locally available materials according to BLM guidelines. Dudley or its agents would acquire appropriate access permits from the Carbon County Road and Bridge Department (CCRBD).

2.1.1.2 Drilling Operations

Following construction of the access road and well pad, a rotary drilling rig would be transported via truck to the well pad and erected on site. Approximate well pad locations within quarter sections are shown on Map 2.1, and a typical drilling layout is shown in Figure 2.2. The level area of the wellpad required for initial drilling and completion operations would be approximately 215 x 300 ft, including a reserve pit approximately 65 x 145 ft and 10 ft deep. Maximum disturbance at each location would be approximately 2.5 acres, including the area required for cut/fill slopes and topsoil/subsoil stockpiles. Site-specific NEPA compliance would be completed for each well site on federal lands.

Approximately 10 days would be required to drill, log, and case each well using a conventional rotary drill rig and associated rig equipment. Wells would be drilled to the Mesaverde Group at depths of approximately 6,000 ft. Cuttings and all drilling fluids would be contained in the reserve pit, and drilling fluids would be recovered and reused whenever practical. The reserve pit would be lined, as specified in APDs, to prevent loss of drilling fluids through seepage. If necessary, the reserve pit would first receive a layer of bedding material (e.g., clay, sand)

Figure 2.2 Example Well Location Layout During Drilling, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.



sufficient to prevent contact between the liner and any exposed rocks. The reserve pit would be fenced to protect livestock and wildlife until the pit is reclaimed.

In the event undesirable materials (e.g., hydrocarbon liquids) are inadvertently discharged to a reserve pit, they would be removed immediately and disposed of in accordance with Wyoming Department of Environmental Quality (WDEQ) requirements. If any oil in the pit (as evidenced by a sheen on the water surface) is not immediately removed, the pit would be flagged or netted to prevent waterfowl use as directed by the BLM.

Approximately 7,000 42-gal barrels (bbl) of water would be required to drill each well (294,000 gal/well; 5,586,000 gal or 17.1 total acre-ft for all wells), and this water would be obtained from the water produced during drilling. Water used to drill one well also may be reused for drilling subsequent wells.

No abnormal temperatures or pressures or hydrogen sulfide are anticipated to be encountered during drilling. Any shallow water zones encountered would be reported and adequately protected.

Drilling rigs would be contracted by Dudley from third parties and would typically employ four workers per 8-hour shift, with one crew on shift and two crews off. These crews would reside at their own homes or other living quarters in nearby towns (e.g., Rawlins, Sinclair). A number of additional personnel may be required to be on location during various stages of the drilling operation, including a geologist, a mud logger, and other service personnel. In some cases, these individuals would be required to remain on location 24 hours a day during drilling operations, and trailers would be provided on-site for their use. It is estimated that a typical well would take 10 days to drill, log, and case the wellbore and would require 120 worker-days per well (see Section 2.1.10).

If any spills of oil, gas, or other noxious fluids occur, Dudley would immediately contact the BLM and any other regulatory agencies as necessary and cleanup efforts would be initiated.

These actions would occur at any stage of drilling, completion, operation, or abandonment of facilities.

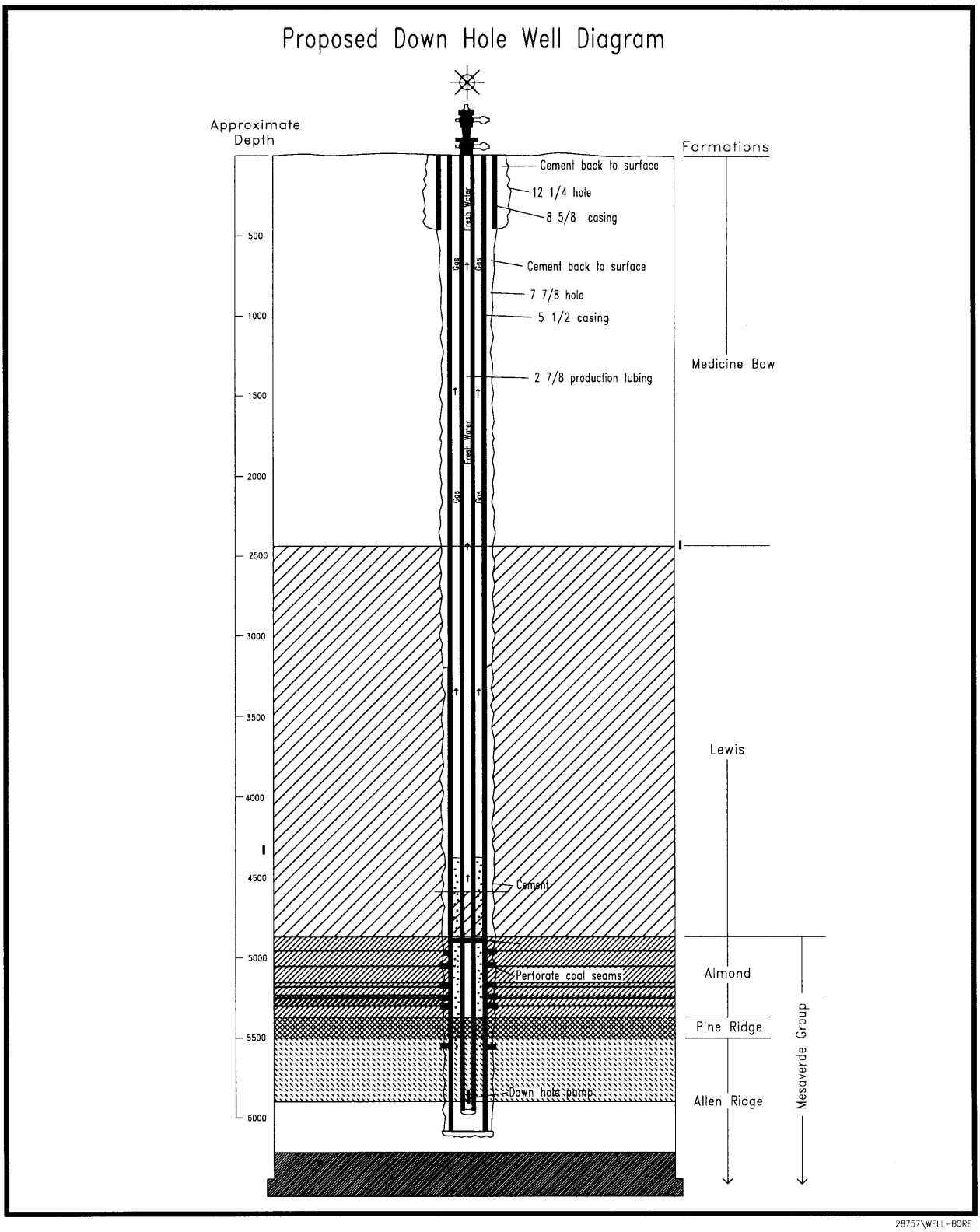
During drilling and subsequent operations, all equipment and vehicles would be confined to access roads, well locations, and other areas specified in the approved APD, except in emergency situations.

Fresh-water aquifers and potentially minable coal blocks would be protected by running casing--steel pipe--into the open borehole and cementing the casing into place. Cementing would also isolate all other formations in the hole and would effectively eliminate the possibility of contamination between hydrocarbon zones and/or water aquifers and other mineral resources. A typical wellbore diagram is shown in Figure 2.3. The quality of the primary cement job would be evaluated by running a wireline acoustical geophysical log (cement bond log or "CBL") through the production casing after the primary cement job has had sufficient time to set. When cement is adequately bonded to both the casing and the formation, a favorable acoustic coupling is developed. The degree of bonding within cemented intervals can be determined from the signature of the cased hole acoustic log (i.e., the cement bond log). Dudley intends to use sufficient cement volumes to obtain full returns of cement to the surface and to run cement bond logs in all wells completed for production. Whenever partial or incomplete cement bonding is indicated within 100 ft above or below production zones, the casing would be perforated and additional amounts of cement would be pumped into the annulus casing to isolate the productive zones. A second cement bond log would then be run to determine the effectiveness of the additional cementing, and this procedure would be repeated as necessary to ensure adequate bonding.

2.1.2 Completion Operations and Production Testing

Following the casing and cementing of the wellbore, the well would be prepared for production testing. Potentially productive coal seams of the Almond and Allen Ridge Formations would be perforated and tested to determine the ability of each to produce methane at commercially acceptable rates. Coal seams ("stringers") average 2-12 ft in individual thickness, and the total

Figure 2.3 Typical Wellbore Diagram, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.



per well coal interval averages are 60-70 ft. During preparation for production testing, the rig used to drill the well would be replaced with a smaller service rig that would operate only during daylight hours. Testing would be accomplished by perforating the steel casing across potentially productive zones. Smaller diameter (2 f-inch) tubing would then be placed in the cased hole and pumping equipment set below the perforated intervals. Water would be pumped from the completed zone using sucker rod pumping units or submersible pumps (see Section 2.1.3) until methane flow is established. This procedure may require 90 days or more of pumping to initiate diagnostic gas flow rates. Pursuant to WOGCC regulations and BLM Notice to Lessee (NTL) 4A as appropriate, gas flows would be measured at the surface and noncommercial volumes of gas would be temporarily flared or vented under controlled conditions at the well site. Produced water would flow through pipelines buried below frostlines to discharge points (see Section 2.1.7). Each well likely would be production tested for an estimated 6-12 months to evaluate the commercial feasibility of further development.

Based on the results of this initial production test, the coals may be further studied by petroleum engineers to determine if gas flow rates may be augmented through fracture stimulation ("a frac"). A frac is designed to improve gas or fluid movement from the reservoir to the wellbore ("permeability"). In the course of a frac, fresh water or other water-based fluids are pumped down the wellbore and through the casing perforations under sufficiently high pressure to physically fracture the formation rock. Sand grains or other similar proppants are carried in suspension in fluids into the fractures. As the wellhead is opened at the surface, frac fluid flows back into the wellbore and is discharged at the surface into the reserve pit. Successfully fractured formations will close on the proppants, leaving open channels for gas and liquid to be produced to the wellbore. Excess frac fluid would be evaporated or removed from the site for disposal at an authorized location outside the SRPPA or possibly re-used at another well.

Reclamation of disturbed areas no longer needed for production would be undertaken and completed. Upon completion, each producing location typically would occupy an area of approximately 1.0 acre.

Within 365 days after termination of drilling and completion activities, the liquid contents of the reserve pit, if any, would be removed and disposed of at an approved waste disposal facility. If adverse weather conditions prevent removal of the fluids from the reserve pit within 365 days, an extension may be granted by the BLM. If necessary under special circumstances, reserve pit contents would be removed and disposed of at an appropriate facility and in a manner which satisfies all relevant state and federal regulations and stipulations. The reserve pit would be reclaimed by filling it with the spoil removed during initial pit construction, spreading previously stored topsoil, and reseeding according to BLM or surface owner specifications. Filling and reseeding of the reserve pit would not normally occur until after completion operations, since the pit is generally used to hold liquids during such operations.

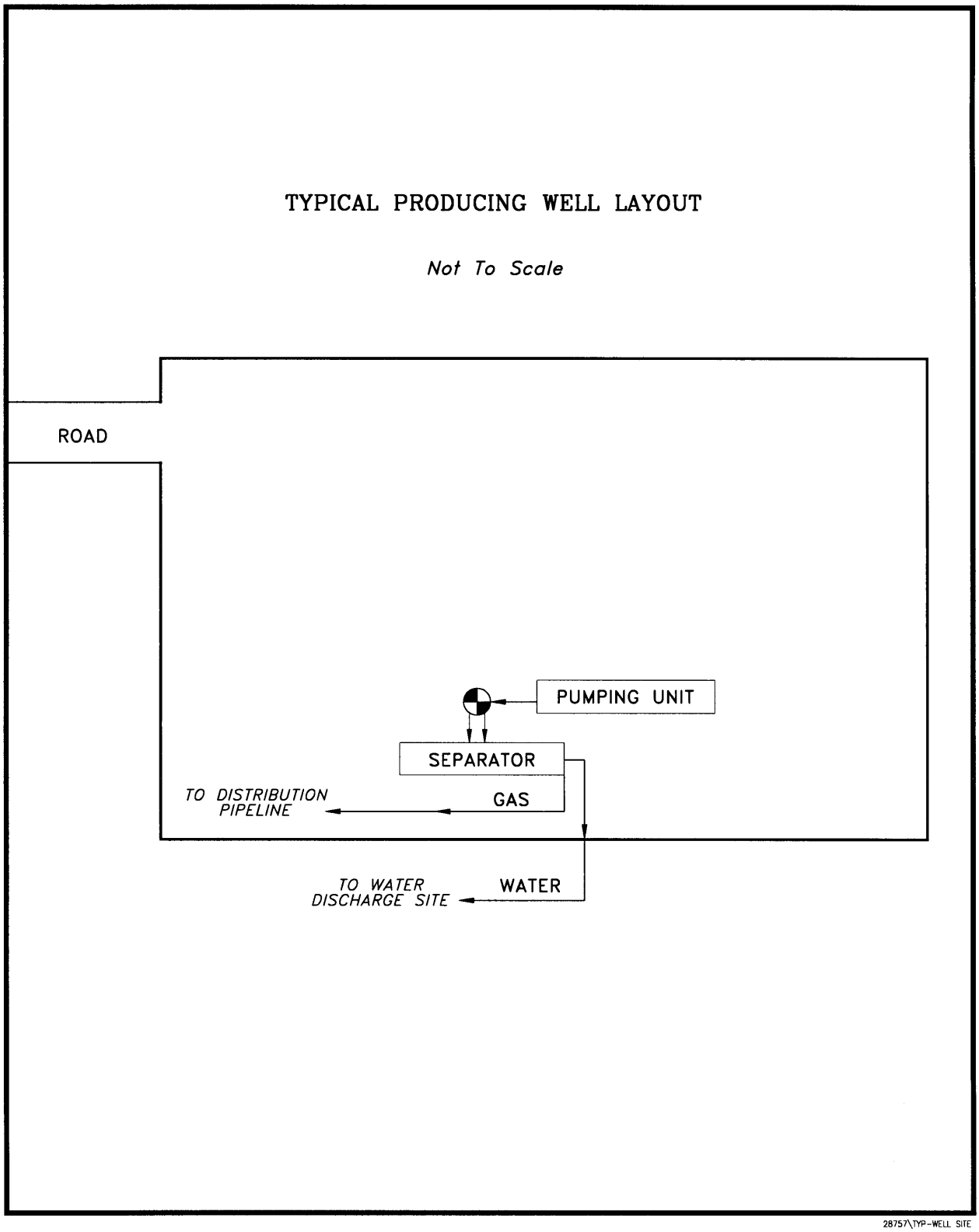
Completion would, on average, require 3 workers for 6-8 days (i.e., an average of 21 worker-days) (see Section 2.1.10)..

2.1.3 Production Operations

While natural gas production from wells may not occur for some time, some well site production facilities would be installed once wells have been completed to facilitate dewatering (see Section 2.1.7.2). Figure 2.4 is a schematic of a typical producing well. In accordance with 43 C.F.R. 3164, a *Well Completion Report* would be filed with the BLM no later than 30 days after completion of the well. A schematic facilities/site security diagram would be filed with the BLM within 30 days of installation. The operator would adhere to all site security regulations as specified in *Onshore Oil and Gas Order No. 3*.

Rod-type pumping units or submersible pumps (powered by a propane-fueled generator until produced gas becomes available or newly constructed power lines) would be used to dewater the wells. Each well location may include a propane tank of a size sufficient for continuous operations--most likely a 1,000-gallon tank--or may have a power line installed. Produced water and gas would be separated at the wellhead. Water would be delivered from each well to the discharge system in pipelines (see Section 2.1.7 and Appendix B, Water Management Plan). Gas

Figure 2.4 Typical Producing Well Layout, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.



exiting the wellbore would be transported from the well through a pipeline gathering system to the distribution pipeline and compression station (see Section 2.1.4).

Dudley anticipates initial production of less than 50 thousand cubic feet of gas per day (mcfgpd) from each well, which may require well site compressors. On-location compressors would be located and muffled to minimize noise and would comply with all applicable WDEQ, Air Quality Division (AQD) permitting requirements, as necessary. Dudley would evaluate on-location compression needs as the pilot project develops.

A propane/natural gas or electrical engine would mechanically drive the downhole pump at each well. Once natural gas production levels are sufficient to fuel the engines or the well is electrified, natural gas produced on-site or electricity would be used to provide on-site fuel requirements, and propane tanks would be removed.

In the event that the well sites are electrified, no notable emissions or noise emanations would occur at well locations. In the event well sites are not electrified, no power lines would be developed.

All wells would be operated in a safe manner according to standard industry operating procedures. Routine maintenance of the producing wells would be necessary to maximize performance and to detect operational difficulties. Each well site would be monitored daily to ensure operations are proceeding safely and efficiently. This visit would include, but would not be limited to, checking gauges, valves, fittings, and other on-site facilities. Routine on-site equipment maintenance would also be performed as necessary. All roads and well sites would be regularly inspected and maintained (e.g., regraded, resurfaced, watered) to minimize dust and erosion and to assure safe operations.

2.1.4 Compressor Station

If the pilot project proves successful, a methane compression facility may be constructed contiguous to the SRPPA. Methane from the SRPPA would be delivered to the compressor

station via underground pipelines. Once the methane reaches the compressor station, dehydration units would remove residual water from the gas, and this water would be evaporated. The methane gas would be transported from the SRPPA by a gathering system designed to deliver marketable gas to an existing larger sales pipeline south or west of the SRPPA. All of the applicant-committed practices applied to the proposed project would also be applied to the construction and operation of the compressor station. In the event a compressor station and associated transmission pipeline are formally proposed, additional NEPA analysis would be conducted (see also Section 2.1.6).

Dudley would adhere to all applicable Wyoming Ambient Air Quality Standards (WAAQS), National Ambient Air Quality Standards (NAAQS), and permit requirements (including preconstruction testing, and operating permits), and other regulations, as required by the WDEQ-AQD.

2.1.5 Workovers

Workovers are periodically necessary to correct downhole problems in a producing well to return the well to production. Workovers are implemented on an as-needed basis and are undertaken to increase or maintain production from the current downhole producing zone; to recomplete in a new zone; to lower operating costs by reducing water and/or sand production; or to return the well to its production objective by pulling and replacing leaking tubing or pulling and repairing lift equipment. Workovers normally take 3 to 4 days and would be scheduled to minimize potential adverse effects to sensitive environmental resources.

2.1.6 Natural Gas Pipelines

Gas collection pipelines for in-field gas collection (gathering system) would be installed to bring methane from individual well sites to the distribution pipeline and associated compression facility. Gathering system pipelines would generally be located adjacent to roads, and all necessary authorizing actions for pipelines would be addressed prior to installation. The maximum width of gathering system pipeline ROWs and disturbance area would be

approximately 50 ft, with approximately half of the width within road ROWs (see Figure 2.1). A total of approximately 10.0 mi of gathering system pipeline would be installed.

Depending upon the success of the pilot project, gas would be transported from the SRPPA through a new transmission pipeline connecting the field with an interstate gas pipeline south or west of the area. Since the need for and potential location of the transmission gas pipeline cannot presently be determined, it is not further considered as a component of the Proposed Action. Once the need for this pipeline and associated compression facilities is established, potential locations would be evaluated and further NEPA analyses performed.

Sufficient topsoil to facilitate reclamation would be removed from pipeline ROWs and stockpiled before construction; however, ROWs that do not require major excavation may be stripped of vegetation to ground level (scalped) by mechanical cutting, leaving topsoil intact and root masses relatively undisturbed. Scalping, coupled with ripping of compacted soils, would facilitate vegetation reestablishment.

All of the applicant-committed practices identified in Section 2.1.13 would be applied to the construction and operation of pipelines.

2.1.7 Water Supply and Disposal

2.1.7.1 Water for Drilling

Water for drilling wells would come from produced water from existing wells. Water used to drill one well would be reused to drill subsequent wells where practical.

2.1.7.2 Dewatering Operations

More than 90% of methane stored in coal is adsorbed onto coal surfaces or absorbed within the coal (Jones and DeBruin 1990). The Cretaceous coals of the western Hanna Basin are water-bearing, and desorption of methane gas occurs when the formation hydrostatic pressure

is reduced by pumping water out of the coalbed through a wellbore. As hydrostatic pressure drops, the physical bond between carbon (coal) and methane molecules is broken, and methane bubbles form and flow in a water solution towards the zone of lower pressure at the wellbore. Therefore, to create favorable conditions for the release of methane gas, water must be produced prior to and during methane extraction, especially during initial coalbed dewatering. Dudley would file for the appropriation of the water rights for all produced waters, and dewatering permits would be obtained from the Wyoming State Engineer's Office (WSEO). If these waters are of sufficient quality and quantity, they may be made available to local users.

Based on limited data from one test well (Dudley UPLRC #4-35-24-85), the maximum theoretical initial water discharge rate from each well would be about 1,500 barrels per day (bpd) (0.097 cubic feet per second [cfs]) (see Appendix B, Water Management Plan). The water discharge rate per well is expected to decrease to a steady-state rate of about 900 bpd (0.058 cfs) after 30 days of pumping and thereafter decline at an approximate rate of 10-15% annually. Actual discharge values may be less depending on geologic conditions, pumping equipment limitations, interference of adjacent wells, and reservoir enhancement methods.

Pumping equipment used for the dewatering phase of the proposed project would be the same type generally used by the petroleum industry to lift oil and/or water (i.e., rod-type pumping units and/or electric submersible [downhole] pumps). Rod-type pumping units are the most commonly used lifting equipment for conventional oil field operations and employ a walking beam-type surface pumpjack, sucker rods inside a tubing string, and an engine powered by an electric generator or propane. These pumpjacks would be selectively employed within the SRPPA and likely would be propane-powered during the early phases of development; however, if the field is suitable for commercial production, power lines may be installed and the field electrified (see Section 2.1.8).

The rod-type pumping unit most likely used would be a Lufkin Model 320, which employs a 40 horsepower (hp) engine and is capable of pumping a daily maximum rate of about 1,500 bpd (63,000 gal). To move larger volumes of water and/or to minimize visual impacts in a given area, electric submersible pumps would be employed. Electric submersible pumps would be used

at well sites that could produce water at rates of 1,800 bpd or greater. These units are designed to be submerged in the wellbore below the standing fluid level at the bottom of the tubing string and below the intervals at which the coals are perforated. Electric power would be supplied at each well site by a propane-powered generator until or unless the site is serviced by commercial electric power. Under proper conditions, submersible pumps can lift substantially higher volumes of water than beam pumps. Submersible pumps may be replaced by beam pumps at some well sites as water production rates decline--probably in the second year of production.

2.1.7.3 Disposal of Produced Water

The methods proposed for disposing of produced water are detailed in Appendix B (Water Management Plan) and Appendix C (draft National Pollutant Discharge Elimination System [NPDES] permit) of this EA. In summary, produced water would be transported from well locations via buried water pipelines (see Figure 2.1), and would be discharged primarily to the surface at three 0.5-acre locations (one on public land and two on private land). Produced water pipelines generally would be located between natural gas pipelines and roads, and would require a 30-ft wide ROW. Each water discharge facility would include an outfall structure designed to dissipate the energy of the water flow and to minimize erosion, and may include treatment facilities for compliance with the NPDES permit. All discharge points would be located in low-gradient non-eroding sections of drainages downstream from head-cutting areas. Produced water would flow from the drainages to Seminoe Reservoir. The Water Management Plan (Appendix B) is designed to minimize peak water discharge volumes. Production wells would be scheduled to go online successively to flatten the peaks in the water production curve. During production activities, the maximum cumulative discharge rate for all wells in the SRPPA would be about 17,380 bpd (1.13 cfs), whereas the steady state rate would be approximately 16,200 bpd (1.05 cfs). Water quality of the discharge water would be monitored and regulated pursuant to a WDEQ, Water Quality Division (WQD) NPDES permit (see Appendix C). Additionally, if approved by WDEQ-WQD, small quantities of suitable quality produced water may be used on project-required roads for dust suppression.

2.1.8 Field Electrification

Electrification of the proposed project is unlikely to occur until after the project is determined to be commercially feasible. At that point, electric power may be brought to each well pad through overhead power lines routed parallel to well pad access roads (i.e., within the facilities corridor) (see Map 2.1 and Figure 2.1). Power line ROW widths would be 25 ft wide, with half of the permanent power line ROW included within the existing road ROW. Approximately 10.0 mi of power line would be required for full-field electrification, and electricity for the field would likely come from an existing Pacific Power and Light Company (Western Area Power Authority [WAPA]) power line located within the SRPPA adjacent to the Seminoe Road. All power lines would be built using standard industry procedures and following guidelines established to prevent potential adverse impacts to raptors from electrocution (Avian Power Line Interaction Committee [APLIC] 1996). Furthermore, all overhead power lines would be equipped with antiperching devices.

2.1.9 Hazardous Materials

Dudley would maintain files containing current *Material Safety Data Sheets* (MSDS) for all chemicals, compounds, and/or substances that would be used during the course of construction, drilling, completion, and production operations. Dudley has reviewed the EPA's *Consolidated List of Chemicals Subject to Reporting Under Title III of the Superfund Amendments and Reauthorization Act of 1986* (SARA), as amended, to identify any hazardous substances proposed for use in this project, as well as the Environmental Protection Agency's (EPA's) *List of Extremely Hazardous Substances* as defined in 40 C.F.R. 355, as amended. Substances that may be used or produced by this project are listed in Appendix D.

Dudley and its contractors would comply with all applicable hazardous material laws and regulations existing or hereafter enacted or promulgated. Dudley and its contractors would locate, handle, and store hazardous substances in an appropriate manner that prevents contamination of soil and water resources or otherwise sensitive environments. Any release of hazardous substances (leaks, spills, etc.) in excess of the reportable quantity as established by

40 C.F.R. Part 117 would be reported as required by the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA), as amended. If the release of a hazardous substance in a reportable quantity occurs, a copy of the report would be furnished to the BLM and all other appropriate federal and state agencies.

Dudley would evaluate its overall field operations and prepare and implement Spill Prevention, Control, and Countermeasure (SPCC) Plans, as necessary. The plans would include accidental discharge reporting, cleanup, and maintenance procedures. Copies of all plans would be available to all appropriate Dudley personnel, contractors, and field workers. Copies would also be kept at Dudley's Denver, Colorado, office, together with a Hazardous Communication Program. SARA Title III (community right-to-know) information would be submitted annually as required, with copies kept in Dudley's office. A waste minimization plan would not be required since Dudley does not generate hazardous waste; however, Dudley would employ measures to minimize the amount of all wastes generated.

Hazardous chemicals contained in diesel fuel, gasoline, and coolant (ethylene glycol) would not be stored in floodplains or near live water, nor would any vehicle refueling occur in such areas. Fuels and coolants that may enter floodplains would be contained in the fuel tanks of vehicles or other equipment, and the chance of a spill would be negligible.

2.1.10 Workforce Requirements

Table 2.2 presents an estimate of the workforce requirements for the proposed project. A total of approximately 72.1 worker-years would be required over the LOP.

2.1.11 Field Camps

No field camps are proposed for the project. Personnel would commute to the project site daily, most likely from the Rawlins - Sinclair area.

Table 2.2 Estimated Workforce Requirements, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.[1]

Assignment	Worker-days Per Well[2]	Total Worker-years for Project[2]
Well Construction and Development		
Construction (3 days x 3 workers)	9	0.7
Drilling (10 days x 4 workers x 3 shifts)	120	8.8
Completion (7-day average x 3 workers)	21	1.5
Operations and Maintenance		
Production (30-year LOP)	821[3]	60.0[3]
Abandonment (Reclamation) (5 days x 3 workers)	15	1.1
Total	986	72.1

1 Assuming that all 19 wells are drilled and completed as producers.
2 1 worker-day = 8 hours; 260 worker-days = 1 worker-year.
3 Two full-time equivalents for production.

2.1.12 Abandonment and Reclamation

Reclamation would be conducted on all disturbed public land areas in compliance with the BLM *Wyoming Policy on Reclamation* (BLM 1990b). The short-term goal of the reclamation program is to stabilize disturbed areas as soon as possible after disturbance to protect sites and adjacent undisturbed areas from degradation. The long-term goal is to return the land to conditions approximating those that existed prior to disturbance.

Reclamation would occur during two phases of the proposed project. Initially, well pads and facilities corridors would be partially reclaimed after well testing and production/ancillary facilities are installed. This initial reclamation would reduce the amount of disturbed area to only that necessary for production operations. Final reclamation, at the end of the LOP would involve reclamation of all remaining disturbed areas. In addition, all unproductive well sites and the ROWs to these sites would be reclaimed as soon as practical during the LOP.

2.1.12.1 Initial Reclamation

After installation of production equipment, the well pad needed for a producing well would be reduced from approximately 2.5 acres to approximately 1.0 acre. Drilling and other fluids contained in reserve pits would be evaporated and covered in place as authorized by the BLM and/or WOGCC. If necessary, the material would be removed from pits and disposed of at an authorized location outside of the SRPPA (e.g., existing lined evaporation ponds or injector wells). The unused portion of the pad would be recontoured and reseeded within 1 year. Reclamation specifications, including methods and seed mixes, would be developed by Dudley in consultation with the BLM or the private landowner. Reseeding would also be performed on all portions of roads, pipeline/power line ROWs, and well pads that do not need to remain in a disturbed state during production. The entire pad and resource road for all unproductive locations would be reclaimed according to BLM or private landowner specifications as soon as possible after testing. Wells would be plugged and abandoned as authorized by BLM and/or WOGCC. Alternative WDEQ-, WOGCC-, BLM-, and Mine Safety and Health Administration-(MSHA-) approved plugging procedures may be employed at specific public land locations and within specific coal seams to ensure that minable coal seams are protected.

2.1.12.2 Final Reclamation/Abandonment

At the end of the pilot project's life (from 5 to 30 years), additional NEPA analyses would be conducted for project continuance or Dudley would obtain the necessary authorizations from the appropriate regulatory agencies or private landowners to abandon facilities. Wells would be permanently or temporarily plugged or shut-in until decisions are reached regarding future production options. Pipelines would be purged of all combustible products and retired in place or removed, based on authorizing agency or landowner specifications. All aboveground facilities would be removed, and all unsalvageable materials would be disposed of at authorized sites. Roads would be reclaimed or left in place based on authorizing agency or landowner preference. Reclamation procedures would be based on site-specific requirements and techniques commonly employed at the time the area is reclaimed. Regrading, topsoiling, and revegetation of disturbed lands would be completed. Abandoned ROWs would revert to the private landowner or

appropriate agency control. Compacted areas would be thoroughly ripped to a depth of 12-18 inches before topsoil is replaced. A seed mix approved by the BLM or private landowner would be broadcast or drill seeded.

2.1.13 Applicant-Committed Environmental Practices and Protection Measures

Dudley proposes to implement the following mitigation measures, design features, and procedures throughout the SRPPA to avoid or mitigate project impacts. The BLM may waive mitigation measures and design features if after a thorough analysis BLM determines that the resource(s) for which the measure was developed would not be impacted and/or alternative BLM-approved measures or guidance for protecting the resource(s) are developed (e.g., alternate survey methodologies). Further site-specific mitigation measures may be identified during APD and ROW application processes.

2.1.13.1 Preconstruction Planning and Design Measures

With the exception of applicant-committed practices for cultural resources, paleontological resources, and sage grouse, mitigation measures identified in this EA would be adhered to on federal and private lands, subject to landowner preferences or agreements with Dudley. Mitigation for cultural resources, paleontological resources, and sage grouse would be applied on all federal lands and on private lands affected by any federal undertaking unless landowner denial for access is documented in writing.

Well pads and associated access roads and pipelines would be selected and designed to minimize disturbance to areas of high wildlife habitat and/or recreational value, including wetlands and riparian areas.

To allow project activities to proceed in restricted areas and/or during periods of restriction (e.g., mild winters, unused raptor nests or potential sage grouse breeding/nesting sites, etc.), approval from the BLM in consultation with other agency personnel (e.g., Wyoming Game and Fish Department [WGFD], U.S. Fish and Wildlife Service [USFWS], and State Historic

Preservation Office [SHPO]) would be required. This approval would be acquired prior to the initiation of specific project activities (i.e., well pad construction, drilling, completion, and facility installation) on areas requiring federal authorization when sensitive resource constraints are involved.

2.1.13.2 Disposal of Sewage, Garbage, and Other Waste Material

Portable self-contained chemical toilets would be provided for human waste disposal. Upon completion of operations, or as required, toilet holding tanks would be pumped and their contents disposed of at an approved sewage facility in accordance with applicable rules and regulations regarding sewage treatment and disposal. Each well site would be provided with one or more such facilities during drilling and completion operations.

All garbage and nonflammable waste materials would be collected in self-contained portable dumpsters or trash cages, and, upon completion of operations or as needed, the accumulated trash would be hauled off-site to an approved sanitary landfill. No trash would be placed in the reserve pit.

As soon as practical after removal of the drilling rig, all debris and other waste materials not contained in the trash cage would be cleaned up, removed from the well location, and disposed of at an approved landfill. No potentially harmful materials or substances would be left on location.

2.1.13.3 Cultural Resources

Class III inventories would be conducted prior to construction in areas where new surface disturbances may be required on public lands (e.g., well pads and facility corridors). Dudley and its contractors would inform their employees about relevant federal regulations protecting cultural resources. If any cultural remains, monument sites, objects, or antiquities subject to the *National Historic Preservation Act of 1966* (as amended) or the *Archaeological Resource*

Protection Act of 1979 are discovered during exploration and/or construction within the SRPPA, activities shall immediately cease and the BLM would be notified.

Dudley would comply with all BLM and SHPO recommendations prior to potential construction activities near known historic sites (e.g., cabins, grave sites) or prehistoric sites within the SRPPA. In addition, Dudley would take the following actions.

1) Dudley would adhere to the Section 106 compliance process (36 C.F.R. 800) or National Cultural Programmatic Agreement (NCPA) and Wyoming State Protocol (WSP) prior to any surface-disturbing activity.
2) Dudley would halt construction activities in potentially affected areas if previously undetected cultural resource properties are discovered during construction. The BLM would be immediately notified, consultation with the SHPO and Advisory Council would be initiated as necessary, and proper mitigation measures would be developed pursuant to the WSP under the NCPA or 36 C.F.R. 800.11. Construction would not resume until a Notice to Proceed is issued by the BLM.
3) If areas of religious importance, Traditional Cultural Properties, or other sensitive Native American areas are identified in affected areas, BLM, affected tribes, and Dudley would identify potential impacts and determine appropriate mitigative treatments on a case-by-case basis.
4) Dudley would pay the costs of BLM-required mitigation for cultural resources.

2.1.13.4 Paleontological Resources

If paleontological resources are uncovered during ground-disturbing activities, Dudley would suspend all operations that may further disturb such materials and immediately contact the BLM, who would arrange for a determination of significance and, if necessary, would recommend a recovery or avoidance plan. Mitigation of paleontological resources would be on a case-by-case basis, and Dudley would incur costs associated with BLM-required mitigations. Surface-disturbing activities would not resume until a Notice to Proceed is issued by the BLM.

2.1.13.5 Vegetation/Noxious Weeds

Dudley would control noxious weeds along ROWs and at wellpads, as well as on areas where the weeds originate on the ROW and invade adjacent areas. A list of noxious weeds would be obtained from the BLM or Carbon County Weed and Pest Office. On BLM lands, an approved Pesticide Use Proposal would be obtained before the application of herbicides or other pesticides for the control of noxious weeds.

Herbicide applications would be kept at least 500 ft from known special status plant populations.

Removal or disturbance of vegetation would be kept to a minimum through construction site management by utilizing previously disturbed areas, using existing ROWs, designating limited equipment/materials storage yards and staging areas, and other appropriate means.

Vegetation and soil removal would be accomplished in a manner that would minimize erosion and sedimentation.

Dudley would seed and stabilize disturbed areas in accordance with BLM-approved reclamation guidelines and/or private landowner specifications.

Dudley would evaluate all project facility sites for occurrence of waters of the U.S., special aquatic sites, and wetlands according to U.S. Army Corps of Engineers' (COE's) requirements. Efforts would be made to locate all project activities outside of these sensitive areas. If wetlands, riparian areas, streams, and ephemeral/intermittent stream channels are likely to be disturbed, COE Section 404 permits would be obtained as necessary, and appropriate mitigation measures would be taken.

2.1.13.6 Road Construction/Transportation

Existing roads would be used to the maximum extent possible and upgraded as necessary. To decrease potential impacts, the number and mileage of roads would be limited by discouraging

development of looped roads and by accessing wells from short resource roads off local roads. All roads would be constructed for the specific purpose of field development. Site-specific analysis under standard BLM procedures would be conducted for all roads during development.

All roads would be constructed with adequate drainage and erosion control structures (i.e., relief culverts, drainage culverts, wing ditches, etc.).

Roads would be built, surfaced, and maintained to provide safe operating conditions at all times as determined by the BLM, and all roads in areas of rough terrain or high erosion potential would be designed and monitored during construction by a professional engineer. The area disturbed would be minimized to reduce impacts and to reduce the area requiring reclamation.

All development activities along approved ROWs would be restricted to areas authorized in approved ROWs.

Available topsoil (up to 12 inches) would be stripped from all road corridors prior to commencement of construction activities, would be stockpiled, and would be redistributed and reseeded on backslope areas of the borrow ditch after completion of road construction activities. Borrow ditches would be reseeded in the first appropriated season after initial disturbance.

All project-related roads not required for routine operation and maintenance of producing wells or ancillary facilities would be closed and reclaimed as soon as possible as directed by the BLM or private landowner. As necessary, these roads would be permanently blocked, recontoured, reclaimed, and revegetated by Dudley, as would disturbed areas associated with permanently plugged and abandoned wells.

Dudley would be responsible for maintenance of roads in the SRPPA and for closure of roads following production activities.

Dudley would maintain roads in a safe usable condition. A regular maintenance program would include, but not be limited to, blading, ditching, culvert and cattleguard

maintenance/replacement, and surfacing, as needed. Design, construction, and maintenance of roads would be in compliance with the standards contained in BLM Manual, Section 9113 (Roads), and in the "Gold Book," *Oil and Gas Surface Operating Standards for Oil and Gas Exploration and Development, Third Edition* (BLM and U.S. Forest Service 1989). Vehicles would remain on roads at all times--no off-road travel would occur, except in emergency situations.

During drilling and operation, traffic would be restricted to Carbon County Road 351 and roads developed for the project. Use of unimproved roads would be allowed only in emergency situations. Speed limits would be set commensurate with road type, traffic volume, vehicle types, and site-specific condition, as necessary, to assure safe and efficient traffic flows. Signs would be placed along roads, as necessary, to identify speed limits, travel restrictions, and other standard traffic control information. In addition, newly developed or improved roads through crucial wildlife areas would be gated and locked as directed by the BLM to prevent unnecessary wildlife disturbances.

Dudley would comply with existing federal, state, and county requirements and restrictions to protect road networks and the traveling public.

Special arrangement would be made with the Wyoming Department of Transportation (WDOT) to transport oversize loads to the SRPPA. Otherwise, load limits would be observed at all times to prevent damage to existing road surfaces.

2.1.13.7 Hazardous Materials

Dudley and its contractors would manage all hazardous materials in full compliance with all federal, state, and local regulations. A SPCC plan would be in place and would be followed in the event of a spill. Dudley would prepare a field-wide SPCC Plan and, after each well is drilled and determined to be suitable for production, would prepare a SPCC Plan specifically for that well. Copies of the SPCC Plans would be given to all appropriate Dudley personnel,

contractors, and field personnel, and would also be available at Dudley's Denver, Colorado office.

2.1.13.8 Air Quality

Dudley would adhere to all applicable WAAQS, NAAQS, and permit requirements, including preconstruction testing, operating permits, and other regulations, as required by the WDEQ-AQD.

Dudley would initiate immediate abatement of fugitive dust by application of water, chemical dust suppressants, or other measures on federal lands and during times of high use (i.e., construction, drilling, and work over operations) when air quality, soil loss, or safety concerns are identified by the BLM or the WDEQ-AQD. These concerns include, but are not limited to, potential exceedences of applicable air quality standards. The BLM would approve dust control measures, locations, and application rates. If watering is the approved control measure, Dudley would obtain water from BLM-approved sources, including the water produced from existing CBM wells.

2.1.13.9 Topography and Physiography

Areas with high erosion potential and/or rugged topography (i.e., steep slopes, stabilized sand dunes, floodplains, unstable soils) would be avoided where possible. Special mitigation measures to control erosion would be applied to such areas if they are disturbed.

Upon completion of construction and/or production activities, Dudley would restore the topography to near pre-existing contours at well locations, facilities corridors, pipelines, and other facility sites.

2.1.13.10 Soils

Sufficient topsoil to facilitate revegetation would be segregated from subsoils during all construction operations and returned to the surface upon completion of operations. Topsoil stockpiles would be seeded or otherwise protected to prevent erosion and to maintain soil microflora and microfauna.

Dudley would keep the area of disturbance to the minimum necessary for drilling activities and subsequent production activities while providing for safety.

Dudley would restrict off-road vehicle activity by employees and contract workers.

Dudley would minimize project-related travel during periods when soils are saturated and excessive road rutting (e.g., > 4 inches) may occur.

Where practical, Dudley would locate pipelines immediately adjacent to roads or other pipelines and cluster pipeline and all other buried utilities in the corridor to avoid creating additional areas of disturbance.

Surface disturbance and/or occupancy would not occur on slopes in excess of 25%, nor would construction occur with frozen or saturated soil material or when watershed damage is likely, unless an adequate plan is submitted to the BLM that demonstrates potential impacts would be mitigated.

Temporary erosion control measures such as mulch, jute netting, or other appropriate methods would be used on unstable soils, steep slopes, and wetland areas to prevent erosion and sedimentation until vegetation becomes established.

Dudley would minimize disturbance to vegetated cuts and fills on new and existing roads.

Dudley would replace topsoil or suitable growth materials over all disturbed surfaces prior to revegetation.

Dudley would revegetate all disturbed sites as soon as practical following disturbance.

2.1.13.11 Water Resources

Dudley would adhere to the mitigation and monitoring measures identified in the Water Management Plan (see Appendix B) and associated WDEQ-WQD water discharge permits (see Appendix C). All project actions would be conducted in compliance with the *Clean Water Act.*

Dudley would follow all practical alternatives and designs to limit disturbance within drainage channels, including ephemeral and intermittent draws.

Surface disturbance within 500 ft of perennial surface water and/or wetland and riparian areas would be avoided, where practical.

Intermittent and ephemeral drainages would be protected from surface disturbance within 100 ft of the channel, where practical.

Where wetlands and riparian areas, stream, river, or ephemeral drainage channels must be disturbed, the following measures would be employed.

1) Wetland areas would be crossed during dry conditions (i.e., late summer, fall, or dry winters). Winter construction activities would only occur prior to soil freezing or after soils have thawed.
2) Streams, wetlands, and riparian areas disturbed during project construction would be restored as near as practicable to preproject conditions. If impermeable soils contributed to wetland formation, soils would be compacted to re-establish impermeability.
3) Perennial water crossings and facilities construction adjacent to such waters would not be constructed during important fish spawning periods in those waters.
4) Streams would be crossed perpendicular to flow, where practical.

5) Wetland topsoil would be selectively handled.
6) Recontouring and BLM-approved native species would be used to revegetate the banks to aid in soil stabilization.
7) Revegetation operations would begin on impacted areas in the first appropriate season after completion of project activities.

The discharge of all water (stormwater, produced water) would occur in conformance with WDEQ-WQD, BLM, and WOGCC rules and regulations (WDEQ 1978; *BLM Onshore Oil and Gas Order No. 7*) (see also Appendices B and C).

Current water uses on and adjacent to the SRPPA would be protected (see Appendix B, Water Management Plan), and project activities would be conducted to prevent adverse effects on water quality and quantity as required by federal and state regulations.

BLM/WOGCC casing and cementing criteria would be adhered to in order to protect all subsurface mineral- and water-bearing zones in accordance with standard oil-field practice.

2.1.13.12 Noise and Odor

Noise and odor on the SRPPA would be minimized by keeping all internal combustion engines muffled and maintained.

2.1.13.13 Wildlife and Fisheries

Reserve pits or other project-related impoundments potentially hazardous to wildlife would be adequately protected (e.g., fenced, netted) to prohibit wildlife access as directed by the BLM and to ensure protection of migratory birds and other wildlife.

Dudley would implement policies designed to control poaching and littering and would notify all employees (contract and company) that conviction of a major game violation may result in

disciplinary action. Contractors would be informed that any intentional poaching or littering within the SRPPA may result in dismissal.

Dudley would internally enforce existing drug, alcohol, and firearms policies.

Construction and drilling activities on crucial big game winter range designated in this EA would be curtailed during critical winter periods (November 15 through April 30) unless exceptions are granted by the BLM. Proposed facilities located within crucial winter range would be scheduled for development outside of the November 15-April 30 time period, unless exceptions are granted by BLM pursuant to their rules, regulations, and policies.

ROW fencing associated with the project would be kept to a minimum, and any necessary ROW fences would meet BLM and WGFD approval for facilitating wildlife movement. Wildlife-proof fencing would be constructed around areas potentially hazardous to wildlife (e.g., reserve pit, toxic materials storage location) as deemed necessary by the BLM and around reclaimed areas if it is determined that wildlife species are impeding successful reestablishment of vegetation.

Any power line construction would follow recommendations by the APLIC (1994, 1996) to avoid collisions and electrocution of raptors and other avifauna.

Proposed disturbance within 0.5 to 1.0 mi of identified raptor nests would require survey by a qualified biologist to determine nest activity status prior to commencement of drilling and construction during the raptor nesting period. If an active raptor nest is identified within 0.5-1.0 mi (depending on species and line of sight) of a proposed site, Dudley would restrict construction during the critical nesting season for that species.

Known active sage grouse leks and adjacent public land areas (2.0-mi radius from lek centers) would be avoided during the breeding and nesting season (March 1 through June 30), and no construction activities would occur on public lands within 0.25 mi of known active sage grouse lek sites. Construction activities on public lands in sage grouse nesting habitat within 2.0 mi of active sage grouse leks would not occur without a BLM-approved biologist first surveying for

sage grouse nests, and if a nest is found, the area would be avoided until after nesting is complete.

2.1.13.14 Threatened, Endangered, Proposed, Candidate, and Sensitive Animal and Plant Species

All Species

1) To ensure construction activities occur commensurate with identified mitigations, Dudley would have a BLM-approved biologist on-site during construction as deemed appropriate by the BLM and as identified during APD and ROW application processing.

2) Pipelines, roads, well pads, and ancillary facilities would be located and designed to minimize disturbances to areas of high wildlife habitat value (e.g., prairie dog colonies, areas of suitable mountain plover habitat, sage grouse leks, cushion plant communities [i.e., mountain plover nesting habitat], playa lakes, wetlands, and riparian areas).

3) Areas with high erosion potential and/or rugged topography (steep slopes, stabilized sand dunes, floodplains, unstable soil) would be avoided, where practical.

4) Removal or disturbance of vegetation would be minimized through construction site management (e.g., by utilizing previously disturbed areas, using existing ROWs, designating limited equipment/materials storage yards and staging areas, scalping), and Dudley would develop and implement detailed reclamation specifications including stabilizing and revegetating disturbed areas to minimize impacts from project-related activities.

5) To minimize wildlife mortality due to vehicle collisions, Dudley would advise project personnel regarding appropriate speed limits on designated access roads as identified

by BLM. Potential increases in poaching would be minimized through employee and contractor education regarding wildlife laws. If violations are discovered, the offending employee or contractor would be disciplined and may be dismissed by Dudley and/or prosecuted by the WGFD and/or USFWS.

6) Areas potentially hazardous to wildlife (e.g., reserve pits, evaporation pits, hazardous material storage areas) would be adequately protected (e.g., fenced, netted) to prevent access by wildlife and to ensure protection of migratory birds and other wildlife as deemed necessary by the BLM.

7) Firearms and dogs would not be allowed on-site by project employees. Dudley would enforce existing drug, alcohol, and firearms policies.

8) To protect plant populations and wildlife habitat, project-related travel would be restricted to designated access roads--no off-road travel would be allowed except in emergencies.

9) Wildlife-proof fencing would be utilized on reclaimed areas if it is determined that wildlife species and/or livestock are impeding successful vegetation establishment.

10) Potential impacts to fisheries would be minimized by using proper erosion control techniques (e.g., water bars, jute netting, rip-rap, mulch) and adherence to the Water Management Plan (see Appendix B). Construction within 500 ft of open water and 100 ft of intermittent or ephemeral channels would be avoided unless otherwise authorized by BLM. Channel crossings requiring trenching would be constructed when flows are not expected (late summer or fall). All necessary crossings would be constructed nearly perpendicular (at right angles) to flow.

11) Dudley would finance site-specific surveys for threatened, endangered, proposed, and candidate (TEP&C) and other sensitive plant species (e.g., Blowout [Hayden's] penstemon) prior to any surface disturbance occurring after October 15, 2000, in

areas determined by the BLM to contain potential habitat for such species (BLM Directive USDI-BLM 6840). These surveys would be completed by a qualified botanist as authorized by the BLM, and this botanist would be subject to BLM's special status plant survey policy requirements. Data from these surveys would be provided to the BLM, and if any sensitive plant species are found they would be avoided or if their habitats are found BLM/USFWS recommendations for avoidance or mitigation would be implemented. Project facilities would be relocated to avoid TEP&C and other sensitive plant species and/or their habitat.

12) Herbicide applications would be prohibited within 500 ft of known sensitive plant populations.

13) Site-specific surveys for TEP&C (e.g., black-footed ferret, mountain plover) and other sensitive animal species would be conducted prior to surface disturbance in areas determined by the BLM to contain potential habitat for such species pursuant to BLM Directive USDI-BLM 6840. These surveys would be completed by the BLM and/or a BLM-authorized Dudley-financed biologist prior to disturbance occurring after October 15, 2000. Surveys would focus on those TEP&C species known to occur on the SRPPA, as well as those potentially occurring in the area. If TEP&C or other sensitive animal species are found on the SRPPA, construction activities would be delayed, the BLM and USFWS would be notified, and appropriate avoidance and/or protection measures would be implemented as determined necessary during conferencing and consultation. Habitats where TEP&C and other sensitive animal species are found or are likely to occur would be avoided, where practical, through relocation of project facilities.

14) Pursuant to the *Endangered Species Act*, Dudley would adhere to all survey, mitigation, and monitoring requirements identified in the Biological Assessment (BA) and USFWS Biological Opinion (BO) for this project.

Mountain Plover

1) Dudley and its contractors would be shown how to identify mountain plover and would be provided information about its habitat requirements, natural history, status, threats, and possible impacts of gas development activities. Incidental observations of mountain plovers would be solicited from all field personnel.

2) During the period of May 1-June 15 throughout the LOP unless otherwise approved by the USFWS, mountain plover surveys would be conducted by the BLM or a Dudley-financed BLM-approved biologist in accordance with existing or revised USFWS guidelines (USFWS 1999).

3) If an active nest and/or mountain plover are found within 200 m of proposed facilities, informal conferencing would occur with the USFWS.

4) If an active nest is found in the survey area, planned activities would be delayed 37 days, or 1 week post-hatching, or if a brood of flightless chicks is observed, activities would be delayed at least 7 days.

5) Where access roads and/or well locations have been constructed prior to the mountain plover nesting season (April 10 - July 10) and use of these areas has not been initiated for development actions prior to April 10, a BLM-approved biologist would conduct surveys of these disturbed areas prior to use to determine whether mountain plover are present. In the event plover nesting is occurring, Dudley would delay development activities until nesting is complete.

6) During the LOP, unless otherwise approved by the USFWS, mountain plover nest density, success, and productivity within the SRPPA would be monitored by a Dudley-financed BLM-approved biologist. Reports would be submitted to the BLM and USFWS Wyoming Field Office annually.

7) Construction of ancillary facilities (e.g., compressor stations, processing plants) would be avoided within 0.25 mi of known mountain plover concentration areas, where practical.

8) If nesting habitat is disturbed, these disturbed areas would be reclaimed to approximate original conditions (topography, vegetation, hydrology, etc.) after completion of activities in the area, in part to ensure suitable mountain plover breeding habitats are present on the reclaimed landscape. Seed mixes and application rates for reclamation would produce stands of vegetation suitable for plover nesting in suitable plover habitat, while meeting the BLM's requirements for stabilizing soil and controlling weeds. Seed mixes and application rates for reclamation would be designed to produce stands of sparse low-growing vegetation suitable for plover nesting in previously suitable mountain plover habitat. Reclamation would attempt to return the plant community to the pre-existing condition as soon as possible.

9) To minimize destruction of nests and disturbance to breeding plovers from construction and reclamation activities, grading, seeding, or other ground-disturbing activities would not occur from April 10 to July 10 unless surveys within 200 m of project facilities consistent with USFWS-approved methods find that no plovers are nesting in the area.

10) Because adults and broods may forage along roads, particularly at night (0.5 hour after sunset to 0.5 hour before sunrise), traffic speed and volume would be limited during the breeding season (April 10 - July 10) in identified plover habitat, where practical. Wherever possible, road construction through plover habitat would be avoided. Within 0.25 mi of identified concentration areas, speed limits would be posted at 25 mph on resources roads, and 35 mph on local roads during the brood-rearing period (June 1 - July 10), where practical. Traffic would be minimized by car-pooling and organizing work activities to limit trips on roads within 0.25 mi of known plover concentration areas between June 1 and July 10, where practical.

11) Project-related features that increase the population levels or hunting efficiency of predators of the mountain plover would be limited. Creation of hunting perches or nest sites for avian predators within 0.25 mi of identified concentration areas would be avoided where practicable by including perch-inhibitors in their design and by using the lowest practicable structures for fences and other elevated structures, where necessary. Road-killed animals would be promptly removed from areas within 0.25 mi of identified concentration areas to avoid attracting avian and mammalian predators and supplementing their natural food supplies.

12) Plugged and abandoned wells within 0.25 mi of mountain plover nesting aggregation areas would be identified with markers 4 ft tall that have perch inhibitors on top to avoid creation of raptor hunting perches. This is the lowest structure that is in compliance with existing regulatory requirements of the State of Wyoming.

13) All suspected observations of mountain plover adults, eggs, chicks, or carcasses on the SRPPA, however obtained, would be reported within 24 hours to:

Wildlife Biologist, BLM
(307) 328-4200
Rawlins Field Office
P.O. Box 2407
1300 North Third Street
Rawlins, WY 82301; and

Field Supervisor or Designee, USFWS
(307) 772-2374
Wyoming Field Office
4000 Airport Parkway
Cheyenne, WY 82001.

Observations would include a description including what was seen, time, date, exact location, and observer's name, address, and telephone number. Carcasses or other suspected plover remains would be collected by the BLM or USFWS employees and deposited with the USFWS, Wyoming Field office.

Black-footed Ferret

1) Dudley and its contractors would be shown how to identify black-footed ferret and their sign and would be provided with information about its habitat requirements, natural history, status, threats, possible impacts of gas development activities, and ways to minimize these impacts.

2) All white-tailed prairie dog towns/complexes would be mapped within the SRPPA, and associated burrow densities on potentially affected towns would be determined pursuant to Biggens et al. (1993) or other BLM- and USFWS-approved technique during 2000 and every 3-5 years thereafter throughout the LOP to determine whether the criteria established in the USFWS (1989) guidelines for black-footed ferret habitat are met.

3) If prairie dog towns/complexes suitable as black-footed ferret habitat are present, attempts would be made to locate all project components at least 50 m (164 ft) from these towns/complexes to avoid direct impacts to the towns.

4) Surface-disturbing activities in potential black-footed ferret habitat (i.e., prairie dog colonies or complexes greater than 200 acres in extent and having more than eight open burrows per acre) would not be conducted unless the area has been surveyed within the previous 12 months (surveys would again be required after August 29, 2001) for black-footed ferret pursuant to USFWS guidelines (1989) or other BLM- and USFWS-approved methodology.

5) In the event a black-footed ferret or its sign is found, the BLM Authorized Officer would stop all action on the application in hand and/or action on any future application that may directly, indirectly, or cumulatively affect the colony/complex and would initiate Section 7 review with the USFWS. No project-related activities will be allowed to proceed until the USFWS issues its BO. The USFWS BO will

specify when and under what conditions and/or prudent measures the action could proceed or whether the action will be allowed to proceed at all.

6) Dudley and its and contractors would prohibit project employees from having dogs on the SRPPA.

7) Observations of black-footed ferrets, their sign, or carcasses would be reported within 24 hours to the BLM, Rawlins Field Office, and the USFWS.

8) All suspected observations of black-footed ferrets, their sign, or carcasses on the SRPPA and the location of the suspected observation, however obtained, would be reported within 24 hours to:

Wildlife Biologist, BLM
(307) 328-4200
Rawlins Field Office
P.O. Box 2407
1300 North Third Street
Rawlins, WY 82301; and

Field Supervisor or Designee, USFWS
(307) 772-2374
Wyoming Field Office
4000 Airport Parkway
Cheyenne, WY 82001.

Observations would include a description including what was seen, time, date, exact location, and observer's name, address, and telephone number. Carcasses or other suspected ferret remains would be collected by the BLM or USFWS employees and deposited with the USFWS, Wyoming Field office.

Swift Fox

If a swift fox den is encountered during construction or other development activities, potentially disruptive actions to denning swift fox as identified by the BLM would not occur from March 1 to July 31 to protect denning areas.

2.1.13.15 Socioeconomics

Dudley would implement hiring policies that encourage the use of local or regional workers.

2.1.13.16 Livestock/Grazing Management

Dudley would coordinate project activities with ranching operations to minimize conflicts with livestock movement or other ranch operations and would maintain all fences, cattle guards, and other livestock-related structures required for their transportation network.

In areas of high livestock use, fencing of reclaimed areas would occur as necessary to ensure successful revegetation.

2.1.13.17 Land Status/Use

Roads, power lines, and pipelines would be located adjacent to existing compatible linear facilities wherever practical.

All abandoned wells would be plugged utilizing BLM, WOGCC, and WDEQ procedures designed to protect subsurface aquifers; procedures may also include MSHA/WOGCC-approved techniques designed to facilitate future surface and subsurface coal mining operations at specific public land locations and in specific coal seams as deemed appropriate by the BLM.

2.1.13.18 Recreation

Dudley would post appropriate warning signs and require project-related traffic to adhere to appropriate speed limits on project-related roads. Dudley would inform their employees, contractors, and subcontractors that long-term camping (greater than 14 days) on federal lands or at federal recreation sites is prohibited.

2.1.13.19 Visual Resources

All surface facilities within the SRPPA would be designed to minimize disturbance, to preserve the viewshed from Seminoe Road and Seminoe Reservoir, and to conform to standards for the applicable Visual Resource Management (VRM) class (Class II or III). Facilities would be painted with standard environmental colors to blend with the surrounding landscape.

2.2 NO ACTION ALTERNATIVE

A No Action Alternative is considered in this NEPA document and provides a benchmark, enabling decision-makers to compare the magnitude of environmental effects of the alternatives. Under the No Action Alternative, the BLM would deny the current proposal on federal lands in the SRPPA as currently proposed by Dudley in the Proposed Action, while allowing existing land uses to continue. Denial of the current proposal is not, however, a denial of all natural gas development in the area. The decision of the BLM to deny an APD is not available without a No Surface Occupancy (NSO) stipulation in the lease; however, the BLM can impose "reasonable" mitigation measures on the lease if unnecessary or undue environmental degradation would occur. An oil and gas lease grants the lessee the "right to drill for . . . extract, remove, and dispose of all oil and gas deposits" from the leased lands, subject to the terms and conditions of the respective leases (BLM Form 3100-11). The denial of the right to develop a valid lease would violate the lessees' contractual rights, as well as result in the loss of federal royalties. Because the Secretary of the Interior has the authority and responsibility to protect the environment within federal oil and gas leases, restrictions are imposed on the lease terms. Although a given APD can be denied, the right to drill and develop somewhere on the leasehold

cannot be denied by the BLM. To deny all activity would constitute a breach of contract of an Operator's rights to conduct development activities on the leased lands. Authority for complete denial can be granted only by Congress (which can order the leases forfeited subject to compensation). The BLM, therefore, can only suspend the lease pursuant to Section 39 of the *Mineral Leasing Act* pending consultation with the Congress for a grant of authority to preclude drilling and provide compensation to the lessee.

For the purpose of this analysis, project developments within the SRPPA considered as components of No Action are limited to the disturbances associated with two existing authorized well locations on federal land (5.0 acres initial and 2.0 acres LOP disturbance) and associated access (approximately 1.1 mi and 10.2 acres initial disturbance [80-ft disturbance width] and 5.1 acres LOP disturbance). Total initial and LOP disturbance under the No Action Alternative would be approximately 15.2 acres and 7.1 acres, respectively (see Table 2.1). Under the No Action Alternative, development of the Proposed Action on federal lands would not be implemented (e.g., six additional wells and associated features would not be constructed) and other existing public and private land uses (e.g., CBM exploration, livestock grazing, wildlife habitat, recreation) would continue in the SRPPA. There is no other development proposed at this time, nor are any anticipated in the reasonably foreseeable future, although it is acknowledged that, given the natural gas reserves potentially available within the SRPPA, projects to identify and potentially recover these resources are likely to be proposed in the future. If and when such projects are proposed, they would be subjected to analysis under NEPA.

A No Action decision (i.e., a Finding of No Significant Impact [FONSI] is not made) would be considered if any of the following conditions are met:

1) there were no acceptable means of mitigating significant adverse impacts to stipulated surface resources values, which could trigger denial of leasing permits and ROW applications and require consideration and analysis of another alternative(s); or
2) the USFWS concludes that the Proposed Action would likely jeopardize the continued existence of TEP&C species, in which case the leasing permit and ROW application may be denied in whole or in part.

This EA will help to determine whether the proposed project meets either of these conditions.

Under the No Action Alternative, site-specific NEPA analyses would be conducted for all development activities on public lands or mineral estate; however, the applicant-committed measures identified for the Proposed Action (see Section 2.1.13) may not be implemented. Furthermore, additional developments on non-federal lands may occur. Existing disturbance from private land developments are described in Table 2.1.

2.3 ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

Several other action alternatives were considered but were rejected for various reasons. One alternative would have re-injected the produced water. This alternative was rejected because the suitability of geological conditions for re-injection are presently unknown and because of the high costs associated with geologic evaluation and re-injection. In the event the pilot project proves to be successful, geological investigations to determine whether re-injection is feasible may be implemented.

A second alternative would have had four discharge points for produced water. This was rejected in favor of three discharge points for environmental reasons (i.e., protection of drainages with insufficient flow capacities and/or with existing head cut areas).

A third alternative would have discharged produced water to an evaporation pond. This alternative was rejected for environmental reasons (i.e., the large area of disturbance necessary for an adequate evaporation pond).

A fourth alternative involved alternate numbers and locations of wells. This was rejected because the Proposed Action has the best well configuration for ensuring that a determination can be made from this pilot project regarding the commercial feasibility of coalbed methane development in the SRPPA.

2.4 SUMMARY OF ENVIRONMENTAL IMPACTS

Table 2.3 presents a summary of the environmental impacts of the Proposed Action and the No Action Alternative. A detailed analysis of project impacts and mitigation measures is provided in Chapter 4.0.

Table 2.3 Summary of Environmental Consequences, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming.

Resource	Proposed Action	No Action	Mitigation (Applicant-committed Practices)
Climate	No impacts	No impacts	None
Air Quality	Temporary short-term construction-related increases in dust and exhaust emissions	Same as for Proposed Action but from 2 existing/authorized wells and associated features rather than 6 proposed wells	Dust suppression during construction; proper maintenance of construction equipment; prompt reclamation; WDEQ permit acquisition, as necessary
Topography and Physiography	Some minor LOP changes in topography due to cuts and fills	Same as for Proposed Action but from 2 existing/authorized wells and associated features rather than 6 proposed wells	Avoidance of steep slopes; proper reclamation
Geology and Geologic Hazards	No impacts	No impacts	Minimize disturbance or avoid sensitive areas; appropriate casing, plugging, and well abandonment procedures; prompt reclamation
Paleontology	Possible inadvertent destruction of fossils during construction	Same as for Proposed Action but from 2 existing/authorized wells and associated features rather than 6 proposed wells	Recovery during excavation of significant discoveries, as necessary
Mineral Resources	Depletion of natural gas resources	Same as for Proposed Action but from 2 existing/authorized wells and associated features rather than 6 proposed wells	Efficient recovery of natural gas resources
Soils	Disturbance of 46.1 acres of previously undisturbed soils	Disturbance of 15.2 acres of previously undisturbed soils	Minimize disturbance; implement soil erosion practices until sites are permanently reclaimed; prompt stabilization and reclamation

Table 2.3 (Continued)

Resource	Proposed Action	No Action	Mitigation (Applicant-committed Practices)
Water Resources	No impacts to springs or seeps; pumping and disposal of ground water with increased metals and other constituents to surface; some increased runoff and sediment would likely reach local waterways	Same as for Proposed Action but water discharge volumes and surface disturbance reduced to only that necessary from 2 existing/authorized wells and associated features rather than 6 proposed wells	Avoid channel crossings; construction in channels during periods of no or low flow; prompt stabilization and reclamation; appropriate road and well location design and maintenance; proper disposal of produced water; adherence to Water Management Plan and NPDES permit requirements (see Appendices B and C); WDEQ permit acquisition
Noise and Odor	Temporary construction-related increases in noise; increased odors near wells and roads	Same as for Proposed Action but from 2 existing/authorized wells and associated features rather than 6 proposed wells	Properly muffle all construction equipment; avoid noise-sensitive areas at critical times
Vegetation, Wetlands, and Noxious Weeds	Disturbance of 46.1 acres of previously undisturbed vegetation; potential for spread of noxious weeds on disturbed areas	Same as for Proposed Action, but disturbance of 15.2 acres of previously undisturbed vegetation	Minimize disturbance; noxious weed controls implemented; no disturbance to wetlands; prompt revegetation with native, adapted species
Wildlife and Fisheries	Direct effects from collision-related mortality; direct and indirect effects from 46.1 acres of temporary and 21.8 acres of LOP habitat loss; temporary displacement during construction	Same as for Proposed Action but from 2 existing/authorized wells and associated features rather than 6 proposed wells; 15.2 acres of temporary and 7.1 acres of LOP habitat loss	Comply with all seasonal stipulations and applicant-committed measures for wildlife protection unless otherwise authorized by the BLM; minimize disturbance; prompt reclamation
Threatened, Endangered, Proposed and Candidate, (TEP&C) Species, and Sensitive Animal and Plant Species	Not likely to adversely impact black-footed ferret; will cause loss of 15.5 acres of mountain plover breeding, nesting, and foraging habitat; no impacts to downstream species in the North Platte River	Same as for Proposed Action but from 2 existing/authorized wells and associated features rather than 6 proposed wells	Complete surveys prior to construction; avoid species habitats where practical; adherence to BA requirements (BLM 2000a) and those specified in the USFWS Biological Opinion

Table 2.3 (Continued)

Resource	Proposed Action	No Action	Mitigation (Applicant-committed Practices)
Cultural Resources	Some unidentified sites and artifacts could be disturbed or destroyed	Same as for Proposed Action but from 2 existing/authorized wells and associated features rather than 6 proposed wells	Complete surveys of all areas to be disturbed; avoid NRHP-eligible sites where practical; mitigate possible impacts on a case-by-case basis through the NHPA Section 106 consultation process
Socioeconomics/ Environmental Justice	Temporary beneficial economic impacts to local and state economies during construction; long-term benefits due to increased product availability; no impacts to environmental justice	Loss of positive economic benefits	Hire workers locally as available
Landownership and Use	No change in landownership; temporary loss of grazing, wildlife habitat, and recreation	Same as for Proposed Action but from 2 existing/authorized wells and associated features rather than 6 proposed wells	Prompt stabilization after construction and reclamation of disturbed areas
Aesthetic and Visual Resources	Temporary visual impacts during construction; no long-term impacts requiring re-categorization of existing VRM classification	Same as for Proposed Action but from 2 existing/authorized wells and associated features rather than 6 proposed wells, none of which occur in VRM Class II	Minimize disturbance; prompt stabilization and reclamation of disturbed areas; painting and locating aboveground features to blend with the surrounding landscape and taking other necessary measures to avoid visual impacts to viewsheds from Seminoe Road and Seminoe Reservoir
Hazardous Materials	Possible spills	Same as for Proposed Action but from 2 existing/authorized wells and associated features rather than 6 proposed wells	Implementation of appropriate spill prevention and control measures

3.0 AFFECTED ENVIRONMENT

This chapter describes the existing condition of the physical, biological, cultural, and socioeconomic resources of the SRPPA. The resources addressed were identified during the internal and public scoping processes as having the potential to be affected by project-related activities. Critical elements of the human environment (BLM 1988a), their status in the SRPPA, and their potential to be affected by the proposed project are listed in Table 3.1. Six critical elements (areas of critical environmental concern [ACEC], environmental justice [minority and/or low-income populations], prime or unique farmlands, floodplains, wild and scenic rivers, and wilderness) are not present in the SRPPA; therefore, these six elements are not addressed further in this EA. In addition to the nine remaining critical elements, this EA also discusses topography/physiography; mineral resources; geology and geologic hazards; paleontological resources; soils; noise and odor; wildlife and fishery resources; vegetation; socioeconomics; land use (including livestock/grazing management and recreation); and visual resources. Wild horses do not occur on the SRPPA and are not discussed in this document.

3.1 PHYSICAL RESOURCES

3.1.1 Climate and Air Quality

The SRPPA is located in a semiarid, steppe (dry and cold), midcontinental climate regime typified by dry windy conditions, limited rainfall, and long cold winters. Annual temperature averages 43.3°F (Western Regional Climate Center [WRCC] 2000), and mean daily temperatures range from a low of 10°F in January to a high of 82°F in July. Annual precipitation averages 12.72 inches (WRCC 2000), with the majority falling from April to October; 30% occurs from thunderstorms during the summer months of June through August (Martner 1986). Annual snowfall averages 29.4 inches, with February being the month of greatest accumulation (WRCC 2000). Snow accumulation patterns are determined by the effects of topography and vegetation on windblown snow and have a marked effect on vegetation, wildlife, hydrology, and human activities.

Table 3.1 Critical Elements of the Human Environment[1], Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.

Element	Status on the SRPPA	Addressed in Text of EA
Air Quality	Potentially affected	Yes
Areas of critical environmental concern	None present	No
Cultural resources	Potentially affected	Yes
Environmental justice	None present	No
Farmlands, prime or unique	None present	No
Floodplains	None present	No
Native American religious concerns	Potentially affected	Yes
Noxious weeds	Potentially affected	Yes
Threatened and endangered species	Potentially affected	Yes
Wastes, hazardous or solid	Potentially affected	Yes
Water quality (surface and ground water)	Potentially affected	Yes
Wetlands/riparian zones	Potentially affected	Yes
Wild and scenic rivers	None present	No
Wilderness	None present	No

[1] As listed in BLM *National Environmental Policy Act Handbook H-1790-1* (BLM 1988a) and subsequent Executive Orders.

The SRPPA is located in a region of Wyoming known as the wind corridor, where cold wind from the west and southwest is channeled eastward across the Continental Divide (Martner 1981). Annual wind speeds average 4.5-21.5 mph and are greater during the afternoon and in the winter. The wind corridor has some of the strongest and most persistent winds in the U.S. (Martner 1986). Additional climatological information is provided in Appendix B, Water Management Plan. There would be no impacts to climate from the proposed project, and it is not discussed further in this EA.

Air quality in the region is generally good (BLM 1995). Management for air quality includes the prevention of deterioration of air quality beyond applicable local, state, or federal standards; the enhancement of air resources of high quality where practicable; and the preservation of scenic values that could be impaired by the release of total suspended particulates or other contaminants into the air that would adversely affect visibility (BLM 1988b:60).

The SRPPA is in the Hanna Basin and is part of the Laramie Air Basin (BLM 1987:167-168) which includes much of south-central Wyoming. The basin is bordered by the Wyoming-Colorado state line to the south, the Laramie Mountains to the east, the Granite Mountains to the North, and the Great Divide Basin to the west. Terrain in the Laramie Air Basin is complex. Air transport from the west and southwest dominates in level terrain areas, and dispersion results from unstable conditions induced by surface heating during the day. Stable conditions can be expected at night as the earth cools. In areas with significant terrain features such as the Medicine Bow, Shirley, and Green Mountains, transport is more complex. Typical mountain-valley coupling effects are evident in those areas, along with significant diurnal variations in the local wind field (BLM 1987:167).

The SRPPA is in an area designated a Prevention of Significant Deterioration (PSD) Class II area under the WDEQ-AQD Implementation Plan (BLM 1987:154-169). PSD Class II areas are those that may be developed, and the release of limited concentrations of certain pollutants over Class II PSD increments is permitted so long as NAAQS are maintained and emissions are within the PSD Class II increment (WDEQ 2000a). The nearest PSD Class I area (an area where little air quality deterioration is allowed) is the Savage Run Wilderness, approximately 50 mi south-southeast of the SRPPA. The State of Wyoming manages the Savage Run Wilderness as a Class I wilderness; however, it has not been designated Class I by Congress and thus legally does not have to be managed as a Class I area (BLM 1995). Other Class I areas in the region include the Bridger Wilderness in Wyoming and the Mount Zirkel Wilderness in Colorado.

The *Clean Air Act* mandates that NAAQS, established by the EPA, must be maintained nationwide. NAAQS include standards for six "criteria" pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), "respirable" particulates (PM_{10}), sulfur dioxide (SO_2),

and lead (Pb). Carbon County, Wyoming, is in an attainment area for all NAAQS "criteria" pollutants.

Visibility in the region is very good (generally greater than 70 mi), and particulates--fine particles carried by the wind from natural or manmade sources--are considered to be the main source of visibility degradation (BLM 1998a). Climatic factors such as prevailing winds, atmospheric stability, and mixing heights affect air quality by influencing the ability of air to disperse or dilute particulates and other pollutants. Unstable conditions caused by vertical movement of air heated near the ground during the day combined with moderate to high wind speeds provide conditions conducive to dispersing and diluting particulates and other pollutants and maintaining air quality (BLM 1987). These conditions occur more than 70% of the time throughout most of the region in which the SRPPA occurs (BLM 1998a).

3.1.2 Topography and Physiography

Situated along a series of low rises trending north-northeast by south-southwest, the SRPPA lies roughly 10 mi north-northwest of a distinctive oxbow in the North Platte River where the river has produced a low narrow canyon along the Fort Steele Breaks. The SRPPA is located on a terrace near Seminoe Reservoir and the northeastern portion affords glimpses of Coal Creek Bay, a branch of the reservoir. Elevation within the SRPPA gradually increases from approximately 6,400 ft in the north to 6,700 ft in the south. Trending in a number of directions, the terrace on which the SRPPA is located is characterized by gradual to moderately sloping terrain exhibiting numerous low rises and minor knolls often partially capped with sandstone. The terrain becomes progressively more rugged to the south near the North Platte River (Eggleston 1999). The land form's northern perimeter is dissected by a series of ephemeral and intermittent streams, the majority of which drain into intermittent streams such as Coal Creek, Corral Creek, or O'Brien Creek. The southern portion of the SRPPA includes a drainage divide, with some water flowing south to the North Platte River via Dirtyman Draw and the remainder flowing east directly into Seminoe Reservoir via Dry Ditch.

3.1.3 Geology and Geological Hazards

3.1.3.1 Geology

Geologic maps document the SRPPA to be underlain at the surface by deposits of the Medicine Bow Formation of late Cretaceous age, specifically the lower part of that formation (Love and Christiansen 1985; Love et al. 1993). The Medicine Bow Formation consists of light gray to white very fine- and fine-grained sandstone interbedded with carbonaceous siltstone, shale, and coal that accumulated in marine, brackish water, and terrestrial environments during regression of the epicontinental Lewis (Bearpaw) seaway during the late Cretaceous (Bowen 1918; Gill et al. 1970; Fox 1971; Ryan 1977; Blackstone 1993). Marine deposits dominate the basal part of the formation, whereas terrestrial deposits dominate the upper part of the formation. A generalized cross-section of the geologic strata underlying the SRPPA is provided in Figure 2.3. The proposed project would not affect geology; therefore, geology is not discussed further in this EA.

3.1.3.2 Geological Hazards

The potential for seismic activity in the SRPPA is low, and there are no known or suspected active faults in the area (Case 1990; Case et al. 1990). An earthquake with an epicenter in the northern portion of the Simpson Ridge area (approximately 30 mi to the east-southeast) occurred in 1973 (Case 1986), and three earthquakes with intensities of III and IV on the modified Mercali scale occurred near Medicine Bow (approximately 40 mi to the east) between 1938 and 1955. (Intensity, as measured on the modified Mercali scale, is a qualitative estimate of the perceived amount of ground-shaking.) Earthquakes with intensities of III and IV are noticeable indoors but only barely, if at all, noticeable outdoors. The Seminoe Reservoir area in the northern part of the Hanna Basin experienced five earthquakes with magnitudes of 2.9-3.1 on the Richter scale between 1989 and 1993 (Case 1990, 1994). (The Richter scale is a quantitative measure of the magnitude of an earthquake--the relative amplitude of ground motion caused by seismic waves. Magnitudes of 2.9-3.1 are relatively small.) Because of low seismic activity and

the absence of other geological hazards in the SRPPA, geological hazards would not be affected and are not discussed further in this EA.

3.1.4 Mineral Resources

3.1.4.1 Leasable Minerals

Leasable minerals are those specifically available through a leasing system provided by the *Mineral Leasing Act of 1920*, originally for deposits of coal, phosphate, sodium, oil, oil shale, and natural gas but later amended to include other minerals including helium, trona, carbon dioxide, and sulfur.

Coal. Coals in the Mesaverde Group are the source for coalbed methane in the SRPPA. These Upper Cretaceous coals (e.g., Almond and Allen Ridge Formations) were deposited between 100 million and 65 million years ago and are generally ranked sub-bituminous C to high-volatile C bituminous. The coal seams are often less than 10 ft thick but can be 30-100 ft thick locally (Jones 1991); within the SRPPA, coal seams are generally from 2 to 12 ft thick. The Hanna Basin Coalfield in-place coal resources are estimated at 23.3 billion tons and are valued at approximately $6.7 billion; the SRPPA is located in the western portion of the Hanna Basin. Because coal resources in the SRPPA are at depths that make surface mining uneconomical, the proposed project would not affect coal production, and the subject is not discussed further in this EA.

Oil and Gas Resources. The RMP objective for management of oil and gas resources is to provide for leasing, exploration, and development of oil and gas while protecting other resource values. Leases are issued with surface disturbance restrictions to protect various natural resources (BLM 1988b:51). BLM management is consistent with national policy that energy resources should be available for development and with the principle of multiple-use management of public lands. Availability of lands for oil and gas leasing does not mean that other resource values do not receive full consideration; such resources and values are adequately protected by the restrictions that apply to oil and gas leasing (BLM 1988b:52).

Oil and gas development has played a major economic role in Wyoming, which continues to lead the Rocky Mountain Region in combined oil and gas production with nearly 100 million barrels of oil and over 960 billion cubic feet of natural gas (Wyoming Internet Map Server [WIMS] 2000). The SRPPA occurs in an area of moderate oil and gas potential (BLM 1987:125), and currently contains 13 existing or authorized CBM exploration wells and associated ROWs (see Table 2.1). Two of these wells occur on public lands (N1/2 Section 34, T24N, R85W), whereas the remaining 11 wells are on private lands (see Map 2.1).

3.1.4.2 Locatable Minerals

Federal minerals, except those specifically available through lease or sale, are available by location under the *General Mining Law of 1872*. The only known economically recoverable deposits of locatable minerals near the SRPPA are located north of the area in the Seminoe District--an area of approximately 22,480 acres--that contains iron, copper, gold, asbestos, and jade (WIMS 2000). No locatable mineral occurrences occur within the SRPPA (BLM 1987:126); therefore, locatable minerals are not discussed further in this EA.

3.1.5 Paleontological Resources

Geologic maps document the SRPPA to be underlain by deposits of the Medicine Bow Formation of late Cretaceous age, specifically the lower part of that formation (Love and Christiansen 1985; Love et al. 1993). The Medicine Bow Formation is known to produce vertebrate fossils of scientific significance near the SRPPA, and for that reason the formation in the area is classified as Condition 2 (H8270-1 General Guidance for Paleontological Resource Management). Condition 2 triggers formal analysis of existing data prior to authorizing land-use actions involving surface disturbance. However, review of orthophoto quadrangle maps indicates that the Medicine Bow Formation is not well exposed over the SRPPA except along the shoreline of Seminoe Reservoir where no project developments are proposed.

Fossils known from the Medicine Bow Formation include the remains of terrestrial plants, marine and freshwater invertebrates, and terrestrial vertebrates. Plants known from the formation

include microfossil (pollen) and megafossil (leaf and stem imprints, and petrified and carbonized wood) remains. Well-preserved fossil leaf floras have been described from the formation by Dorf (1942). Invertebrates fossils include marine foraminifers and brackish-water gastropods and bivalves, represented by at least 21 species (Gill et al. 1970). Dinosaur bone fragments from the ceratopsian Triceratops have long been known from the lower part of the formation (Bowen 1918; Lull 1933; Breithaupt 1985, 1994), and the formation has also produced the remains of a small number of mammals of Lancian (Latest Cretaceous) age (Lillegraven 1993, 1995). The lower part of the Medicine Bow Formation is apparently not very productive for finding vertebrate fossils because of its marine nature (Winterfeld 2000).

A search for existing fossil localities at the University of Wyoming revealed one fossil locality (V-93029) on private land within in the SRPPA that produced four nonmammalian fossil specimens (Winterfeld 2000).

3.1.6 Soils

Soils in the SRPPA are classified as Torriorthents, shallow-Torriorthents Association. These soils, occurring in undulating to hilly areas of the Hanna Basin, are developing in residuum on uplands underlain by intergraded sandstone and clay shales. Vegetation is desert-shrub, and grazing and wildlife habitat are the principle uses. The association consists primarily of Ustic and Typic Torriorthents. Ustic Torriorthents are shallow and moderately deep soils that generally have grass-shrub cover, and representative soil series are Blazon and Delphill. Typic Torriorthents are moderately deep soils of the drier part of the association and generally have grass-shrub cover.

Range sites occurring within the SRPPA include: Sandy, Shallow sandy, Saline upland, and Shale. Range sites are categorized by formation (i.e., parent material), soil types and soil characteristics, vegetation, and topography. Range site characteristics and associated soil types in the SRPPA are described in Table 3.2.

Table 3.2 Description and Soil Characteristics of Soil Units Within the Seminoe Road Coalbed Methane Pilot Project Area, Carbon County, Wyoming.[1]

Map Unit	Range Sites	Soil Characteristics	Formation	Soil Composition in this Unit	Native Vegetation
336 Horsley - Haterton alkaline - Haterton loams, 8-30% slopes; found on rolling and hilly residual uplands	Horsley soil is found in shale range sites; Haterton alkaline soil is found in saline upland range sites; Haterton loams are found in shallow loamy range sites	Horsley soil is very shallow and excessively drained; Haterton alkaline and Haterton loams are shallow and well drained	Horsley soil formed in residuum derived dominantly from shale and loamstone; Haterton alkaline and Haterton loams formed in residuum derived from strongly alkaline shale	• 35% Horsley, 8-30% slopes; 25% Haterton alkaline 8-20% slopes; 20% Haterton loams, 8-20% slopes • Rock Outcrop, Huguston, Youjay, and Jansley on ledges, ridges, and hilltops, 8-30% slopes • Kandaly loamy fine sand in pockets and smalls valleys, 8-30% slopes • Terada, Garsid, Piomoses, Bittercreek, and Sagecreek on toeslopes and hillslopes	Bottlebrush squirreltail, Indian ricegrass, bud sagebrush, Gardner saltbush, big sagebrush
436 Teagulf - Pepal fine sandy loams, 0-6% slopes; found on nearly level to sloping uplands	Teagulf and Pepal soils are found in sandy range sites	Teagulf soil is moderately deep and well drained; Pepal soil is deep and well drained	Teagulf and Pepal soils formed in residuum and alluvium derived dominantly from calcareous sandstone	• 60% Teagulf, 0-6% slopes; 20% Pepal, 0-6% slopes • 20% Sandbranch, saline upland sites; Kandaly, sands range sites, on dunes; Sagecreek Tresano and Bittercreek, loamy range sites; McCullen and Zirkel, shallow loamy range sites; Huguston and Tasselman, shallow sandy and very shallow range sites on knolls and ridges that are shallow to sandstone	Threadleaf sedge, Indian ricegrass, needle-and-thread grass

Table 3.2 (Continued)

Map Unit	Range Sites	Soil Characteristics	Formation	Soil Composition in this Unit	Native Vegetation
438 Piomoses - Haterton strongly alkaline complex, 2-10% slopes; found on gently sloping to sloping residual uplands	Piomoses soil is found on saline upland range sites on gentle slopes, depressions, and drainages; Haterton, strongly alkaline soil is found in saline upland range sites on low ridges and knolls	Piomoses soil is moderately deep and well drained; Haterton alkaline soil is shallow and well drained	Piomoses soil formed in residuum derived from shale; Haterton alkaline soil formed in residuum derived dominantly from alkaline shale	• 50% Piomoses, 2-10% slopes; 25% Haterton, strongly alkaline, 2-10% slopes • 25 % Horsley soils on ridges, 5-8% slopes, shale range sites; Westvaco soils on sideslopes of 2-5% slopes and saline upland range sites; Pepal, shallow sandy range sites; McCullen, shallow loamy range site; Sagecreek, Fraddle, and Tresand on loamy range sites	Bottlebrush squirreltail, Indian ricegrass, western wheatgrass, Gardner saltbush
446 Horsley - Haterton alkaline complex, 1-8% slopes; found on nearly level to gently sloping residual uplands dissected by rocky ravines and short steep scarps	Horsley, 1-8% slopes and Haterton alkaline, 1-8% slopes, are found on ridges and sideslopes in shale range sites	Horsley, 1-8% slope soils are very shallow and well drained; Haterton alkaline, 1-8% slope soil is shallow and well drained	Horsley soil formed in residuum derived dominantly from shale; Haterton alkaline, 1-8% slopes formed in residuum derived from alkaline shale	• 50% Horsley; 30% Haterton alkaline • 20% Winton soils on short steep sideslopes, very shallow range sites; rock and shale outcrops throughout the area; Piomoses in depressions, saline upland range sites; Boltus on ridges, saline upland range sites	Bud sage, Gardner saltbush, bottlebrush squirreltail, Indian ricegrass, western wheatgrass
452 Huguston - Teagulf complex, 3-8% slopes; found on gently sloping to rolling uplands	Huguston soil is found on ridges and knolls on slopes of 3-8% in shallow sandy range sites; Teagulf soil is found on sideslopes on slopes of 3-8% in sandy range sites	Huguston soil is shallow and well drained; Teagulf soil is moderately deep and well drained	Huguston soil formed in thin calcareous, moderately coarse textured material derived dominantly from soft sandstone and loamstone; Teagulf soil formed in calcareous residuum and alluvium derived dominantly from sandstone	• 50% Huguston; 25% Teagulf • 25% Dunkle, Sagecreek, Terada, and Pepal in depressions, sand and shallow sandy range sites; Haterton on ridges, shallow loamy range sites	Threadleaf sedge, needle-and-thread, thickspike wheatgrass, big sagebrush

Table 3.2 (Continued)

Map Unit	Range Sites	Soil Characteristics	Formation	Soil Composition in this Unit	Native Vegetation
466 Huguston - Rock Outcrop - Terada complex, 6-30% slopes; found on residual uplands	Huguston soil is found on sideslopes, 10-20% slopes in shallow sandy range sites; Rock Outcrop is exposed shale and sandstone on 20-30% slopes and is not considered a range site; Terada soil is found on lower slopes of 6-15% in shallow sandy range sites	Huguston soil is shallow and well drained; Terada soil is moderately deep and well drained	Huguston and Terada soils formed in residuum derived dominantly from sandstone	• 40% Huguston sandy loam; 20% Rock Outcrop; 20% Terada • 20% Winton, Leckman, and Kandaly soils; Winton soils are on ridgetops, and in very shallow range sites; Leckman soils are on alluvial fans in sandy range sites; Kandaly soils are on stabilized dunes in sandy range sites	Big sagebrush, needleandthread, Indian ricegrass, thickspike wheatgrass
467 Horsley - Huguston - Rock Outcrop complex, 8-30% slopes; found on hilly residual uplands	Horsley soil is found on shale beds, 8-30% slopes in shale range sites; Huguston soil is found on soft sandstone beds, 8-30% slopes in shallow sandy range sites; Rock Outcrop is exposed shale and sandstone on 8-30% slopes	Horsley soil is very shallow and excessively drained; Huguston soil is shallow and well drained	Horsley soil formed in residuum derived dominantly from shale and loamstone; Huguston soil formed in residuum derived dominantly from sandstone	• 35% Horsley, 8-30% slopes; 20% Huguston, 8-30% slopes; 20% Rock Outcrop • 25% Winton, Teagulf, Youjay, and Haterton soils; Winton soils are on sandstone and are in very shallow range sites; Teagulf soils are on sideslopes and are in shallow sandy range sites; Youjay soil is on shale beds and is on saline upland range sites; Haterton soil is on shale beds and is on shallow loamy range sites; also included are deep loamy soils in drainages with loamy or sandy range sites	Bud sagewort, Gardner saltbush, Indian ricegrass, bluebunch wheatgrass, thickspike wheatgrass, big sagebrush

Table 3.2 (Continued)

Map Unit	Range Sites	Soil Characteristics	Formation	Soil Composition in this Unit	Native Vegetation
468 Kandaly - Huguston - Teagulf complex, 3-15% slopes; found on undulating to hilly uplands with intermittent sand dunes	Kandaly soil occurs as dunes throughout the unit on 3-15% slopes and is in sandy range sites; Huguston soil is found on upland breaks and knolls on 3-15% slopes and is in shallow sandy range sites; Teagulf soil is found on undulating uplands on 3-8% slopes in sandy range sites	Kandaly soil is very deep and somewhat excessively drained; Huguston soil is shallow and well drained; Teagulf soil is moderately deep and well drained	Kandaly soil formed in aeolian sands; Huguston soil formed in residuum derived dominantly from sandstone; Teagulf soil formed in residuum derived dominantly from calcareous sandstone	• 40% Kandaly loamy fine sand; 20% Huguston fine sandy loam, 20% Teagulf fine sandy loam • 20% Rock Outcrop; Winton on sandstone beds on ridges, very shallow range sites; Pepal on undulating uplands, sandy or shallow sandy range site; Haterton on shale beds on ridges, shallow loamy range sites; Dunkle in depressions, sandy range sites	Needle-and-thread, thickspike wheatgrass, bluebunch wheatgrass, spiny hopsage, big sagebrush
470 Leckman - Kandaly - Terada complex, 2-8% slopes; found on undulating uplands	Leckman soil is found on undulating uplands in sandy range sites; Kandaly soil occurs as dunes throughout the unit and is in sandy range sites; Terada soil is on undulating uplands and is in shallow sandy range sites	Leckman soil is very deep and well drained; Kandaly soil is very deep and somewhat excessively drained; Terada soil is moderately deep and well drained	Leckman soil formed in alluvium derived dominantly from sandstone; Kandaly soil formed in aeolian sands; Terada soil formed in residuum derived dominantly from sandstone	• 40% Leckman fine sandy loam, 2-6% slopes; 30% Kandaly loamy fine sand, 3-10% slopes; 20% Terada fine sandy loam, 2-6% slopes • 10% Haterton loam and Huguston fine sandy loam on upland breaks and knobs, 4-8% slopes, and Pepal and Teagulf soils on undulating uplands, 2-4% slopes. Haterton is in shallow loamy range sites, Huguston is in shallow sandy range sites, and Pepal and Teagulf are in shallow sandy or sandy range sites	Big sagebrush, spiny hopsage, needle-and-thread, thickspike wheatgrass, Indian ricegrass

Table 3.2 (Continued)

Map Unit	Range Sites	Soil Characteristics	Formation	Soil Composition in this Unit	Native Vegetation
483 Sandbranch sandy loam, 0-3% slopes; found on nearly level alluvial fans, terraces, and bottom lands	Sandbranch soil is found on nearly level alluvial fans, terraces, and bottom lands in saline upland range sites	Sandbranch soil is deep and well drained	Sandbranch soil formed in alluvium derived dominantly from sandstone and shale	• Included in this unit are small areas of Westvaco soils on residual uplands, Thayer fine sandy loams on alluvial fans and terraces, both in saline upland range sites • A few areas of Sandbranch soil in areas that receive extra moisture have are found in saline subirrigated range sites.	Western wheatgrass, birdsfoot sagebrush, bud sagewort, Gardner saltbush, bottlebrush squirreltail, Indian ricegrass
1412 Kandaly Variant - Vible complex, 3-20% slopes; found on uplands with broad rolling dunes	Kandaly Variant soil is found on dunes and in shallow sandy range sites; Vible soil is in depressions and basins between dunes and is in sandy range sites	Kandaly Variant soil is deep and somewhat excessively drained; Vible soil is deep and well drained	Kandaly Variant and Vible soils formed in aeolian sands	• 60% Kandaly Variant, 3-20% slopes; 20% Vible, 3-20% slopes • 20% Pepal and Tresano on broad rolling uplands and dunes, shallow sandy range sites; typically Kandaly on lee side of dunes, sandy range sites; Leckman and Dunkle, shallow sandy range sites when on dunes and uplands, sandy range sites when in depressions	Big sagebrush, rubber rabbitbrush, Indian ricegrass, threadleaf sedge, needle-and-thread

[1] Source: BLM (2000b).

3.1.7 Water Resources

3.1.7.1 Surface Water

Northern portions of the SRPPA are located within two small watersheds--Pool Table Draw and Ayers Draw. Both drainages are ephemeral and flow only in response to storm events or snowmelt, with discharge rates dependent upon precipitation frequency-duration relationships and watershed characteristics. Both drain directly into Seminoe Reservoir. Prior to the filling of Seminoe Reservoir, both drainages discharged into O'Brien Springs Draw (O'Brien Creek), an intermittent stream, and then into the North Platte River. Pool Table Draw has two minor unnamed tributaries which, for the purpose of this EA, will be referred to as the East Fork and West Fork of Pool Table Draw. The Pool Table Draw watershed has an area of 10,046 acres, an average gradient of 1.8%, and drainage channel elevations ranging from 7,280 to 6,420 ft. Ayers Draw has a watershed area of 2,967 acres, an average gradient of 1.3%, and drainage channel elevations ranging from 6,660 to 6,340 ft. The ephemeral drainages have widths ranging from several feet to more than 20 ft, with an average width of approximately 4 ft, and are incised to depths of up to approximately 6 ft. Minor head cutting occurs at several locations along the drainage channels where the gradient is greatest (see Appendix B, Water Management Plan). The southern portion of the SRPPA is separated by a drainage divide, with water flowing south to Dirtyman Draw and east to Dry Ditch. Dirtyman Draw is a tributary to the North Platte River, whereas Dry Ditch drains directly into Seminoe Reservoir.

All drainages on the SRPPA are classified as Class 4 surface waters and receive protection for agricultural uses and wildlife watering (WDEQ 2000b:7; BLM 1987:36). Seminoe Reservoir is a Class 2 surface water, as is the North Platte River flowing into and out of the reservoir. Average daily flow rates in the North Platte River above Seminoe Reservoir are 1,146 cfs, with a maximum flow of 14,800 cfs and a minimum of 70 cfs (see Appendix B, Water Management Plan). Below the reservoir at Alcova, the average daily flow is 1,298 cfs, with a maximum of 13,400 cfs and a minimum of 3 cfs. Both Seminoe Reservoir and the North Platte River support significant fisheries.

Water quality samples collected from Seminoe Reservoir near the mouth of Pool Table Draw in May, June, and November of 2000 indicate calcium bicarbonate water with a pH of 8.19-9.06 and total dissolved solids (TDS) of 248-304 mg/l. The water generally has low concentrations of trace constituents with the exception of aluminum, copper, iron, manganese, lead, and zinc (see Appendix B, Water Management Plan).

For more detailed information on surface water in the SRPPA, see Appendix B, Water Management Plan.

3.1.7.2 Ground Water

The SRPPA is in the Hanna, Shirley, and Laramie ground water basin system (BLM 1987:149), which is a structural basin containing a high plains aquifer. This aquifer is very extensive, can be more than 5,000 ft thick, and generally yields less than 50 gal/minute.

In the vicinity of the SRPPA, ground water is a more dependable source for watering livestock and wildlife than is surface water. Ground water is obtained from developed wells and springs for livestock and wildlife watering. Several local unconfined wells exist in the shallow ground water-bearing zone at depths ranging from approximately 100 ft to more than 500 ft (see Appendix B). Shallow ground water flow generally follows topography and travels from west to east toward the North Platte River and Seminoe Reservoir. A major fault located west of Seminoe Road may act as a regional barrier to ground water flow. Recharge to this system is from direct precipitation and infiltration and from surface flows at surface outcrops in the Haystack Mountains located approximately 5 mi west of the SRPPA.

Based on limited drilling data and observation of several wells and springs, the ground water system in the SRPPA consists of several ground water-bearing zones. A shallow ground water-bearing zone occurs in the upper coals and sandstone beds of the Medicine Bow and Fox Hills Formations, whereas a deeper ground water zone occurs in the coals and sandstone of the Upper Mesaverde Group. No water wells or springs occur in the SRPPA.

Shallow ground-water quality in the SRPPA and vicinity as identified from samples collected at area wells and springs show area waters to be calcium sulfate/bicarbonate or calcium bicarbonate type (see Appendix B, Water Management Plan). TDS concentrations range from 608 to 1,220 mg/l, and pH ranges from 6.9 to 8.3. Ground water from the wells and springs has low concentrations of trace constituents, with the exception of slightly elevated concentrations of iron and manganese.

The deep ground water zone occurs in the coals and sandstones of the Upper Mesaverde Group, and the overlying Lewis Shale and underlying Steel Shale Formations effectively isolate the Mesaverde water-bearing system from other aquifers (Lowry et al. 1973). Dudley test well UPLRC #4-35-24-85 is more than 6,000 ft deep and perforates coals in the Almond and Allen Ridge Formations at depths ranging from about 5,000 ft to 5,650 ft. The water level in this well is about 163 ft below ground surface. No known water wells in the vicinity of the SRPPA are completed in the Mesaverde.

Using Wyoming NPDES test parameters for CBM producers, water samples collected in May, October, and November 2000 and January 2001 from Dudley test well UPLRC #4-35-24-85 indicated the produced water to be a sodium chloride type with a slightly alkaline pH (7.7 to 8.3) and a TDS concentration of 1,300 to 1,970 mg/l. The water had low concentrations of trace metals, with the exceptions of iron, manganese, and barium, and a relatively high sodium absorption ratio (SAR) of 24.6 as compared to the Wyoming agricultural standard of 8.0.

A search of records at the WSEO that included an area more than 6 mi from the SRPPA disclosed no water wells or springs occurring within the SRPPA. The water well with ground water rights that occurred closest to the project is the Coal Creek Bay #1 well owned by Miller Estate Company. This well is approximately 3.0 mi northeast of the SRPPA, near Seminoe Reservoir.

Three surface water rights exist on Pool Table Draw Reservoir which occurs in the SRPPA and is fed by Pool Table Draw. Four water rights occur on Ayers Draw outside the SRPPA, and

several other surface water rights occur within a 5-mi radius of the SRPPA. Most surface water rights in the area are associated with Seminoe Reservoir.

A study to determine the connectivity of the deep ground water system (i.e., produced water) with shallow ground water and area surface water resources using carbon 14, tritium, oxygen 18/16, and deuterium methods found the deep ground water to be over 5,000 years old. The age of this water shows that it is stagnant, with little or no connectivity to shallow ground water-bearing zones or area surface waters (see Appendix B).

For more information on ground water and ground water quality, please refer to Appendix B, Water Management Plan.

3.1.8 Noise and Odor

Ambient noise levels throughout the SRPPA are generally rural in nature with the only appreciable noise being wind, traffic, recreational off-road vehicles (ORVs), boats using Seminoe Reservoir, an occasional aircraft, and animals. The predominant noise source within the SRPPA is the wind, and ambient noise levels are strongly correlated with wind speed (BLM 1995). Average hourly wind speeds increase throughout the morning, peak in early afternoon, and decrease in late afternoon. Ambient noise levels follow a similar pattern, increasing from 30 to 40 dBA in the morning, increasing to 50 to 60 dBA during the afternoon, and then decreasing to 30 to 40 dBA in the evening. These levels correspond to the noise levels of a soft whisper (30 dBA), a quiet office (50 dBA), and a normal conversation (60 dBA). Noise-sensitive areas in the SRPPA include sage grouse leks during the breeding season, occupied raptor nests, and crucial winter range for pronghorn during critical winter periods.

No specific data are available for odors in the SRPPA; however, odors other than the natural odors of vegetation, wildlife, and livestock are likely associated with existing CBM wells, the Sinclair refinery, coal mines, and roads. Occasional vehicular emissions and livestock concentration areas may also contribute to odors. Most odors are likely to be quickly dispersed by the wind.

3.2 BIOLOGICAL RESOURCES

3.2.1 Vegetation

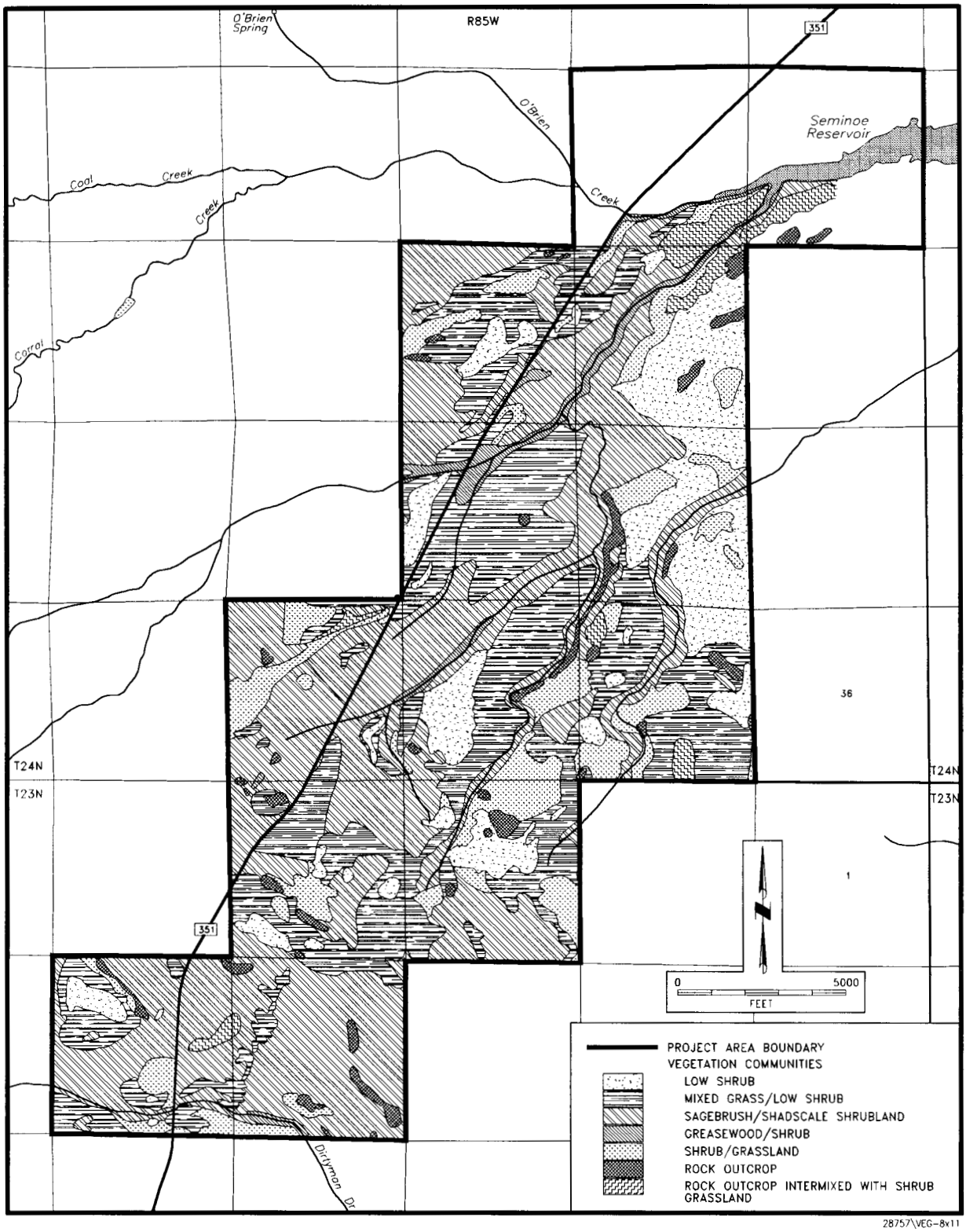
3.2.1.1 Plant Communities

A map of the vegetation types on the SRPPA is included as Map 3.1. The SRPPA is vegetated almost entirely with a mix of Wyoming big sagebrush steppe and desert shrub cover types. Generally found on rolling uplands with flat to moderately steep slopes, these cover types may be interrupted by small patches (<250 acres) of other vegetation types (Wyoming Natural Diversity Database [WNDD] 2000). Wyoming big sagebrush steppe consists of shrub-dominated or grass-dominated vegetation in which Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) contributes at least 25% of the vegetative cover. The average species composition within the sagebrush shrubland community is 30-40% grasses, 5-10% forbs, and 50-65% shrubs (BLM 1987:169). The dominant graminoids in this cover-type are blue grama (*Bouteloua gracilis*), prairie Junegrass (*Koeleria macrantha*), threadleaf sedge (*Carex filifolia*), western wheatgrass (*Elymus smithii*), and needle-and-thread (*Stipa comata*). Sagebrush may be distributed throughout, but often grows in patches interspersed with areas of sagebrush-free grassland.

Desert shrub cover type is generally a mixture of shrubs dominated by shadscale (*Atriplex confertifolia*). Other common species are Gardner saltbush (*Atriplex gardneri*), greasewood (*Sarcobatus vermiculatus*), and Wyoming big sagebrush. Knight (1994) lists common species which dominate the desert shrub cover type as greasewood, shadscale, fourwing saltbush (*Atriplex canescens* spp. *Nuttall*), Gardner saltbush, winterfat (*Kraschenninikovia lanata*), spiny hopsage (*Grayia spinosa*), and kochia (*Kochia americana; Kochia scoparia*). Various grasses grow in the understory.

In late summer 2000, vegetation within the SRPPA was mapped by traversing the area using four-wheel-drive trucks, all-terrain vehicles, and/or on foot. Four primary vegetation types occur within the SRPPA (Map 3.1). Sagebrush/shadscale shrublands (2,968 acres) occur

Map 3.1 Vegetation Types, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming.



primarily on north- and northeast-facing slopes and along drainages. Shrub cover in this type is generally greater than 40%, and total vegetative cover is approximately 80-100%. The shrub/grassland (743 acres) community is similar in composition to the sagebrush/shadscale shrubland but is characterized by less than 40% shrub cover. The mixed grass/low shrub community (1,818 acres) is dominated by grasses (e.g., Indian ricegrass [*Oryzopsis hymenoides*] and western wheatgrass) and low shrubs (i.e., Gardner saltbush and birdsfoot sagebrush [*Artemisia pedatifida*]), intermixed with scattered forbs. Vegetative cover in this type is generally greater than 40%. The low shrub plant community (938 acres) is composed primarily of Gardner saltbush and birdsfoot sagebrush, with sparse short grasses and forbs. Vegetation in this type is generally less than 6 inches high, and total vegetative cover is less than 40%. In addition to the abovementioned vegetative communities, small scattered rock outcrops (350 acres) exist along low ridges and topographic high points, and a narrow band of a greasewood (*Sarcobatus vermiculatus*)/shrub community (160 acres) occurs along some of the well-established drainages. Both the mixed grass/low shrub and the low shrub plant communities (2,756 acres), as well as small inclusions within the shrub/grassland community types, are suitable nesting habitat for mountain plover (see Section 3.2.2.8).

On summer ranges, or when there is an abundance of other forage plants, sagebrush is often considered undesirable for livestock grazing. The herbaceous understory vegetation is preferred when accessible and provides the majority of forage for livestock; however, sagebrush is important for many wildlife species (e.g., mule deer, pronghorn, sage grouse).

3.2.1.2 Wetlands/Riparian Areas

Wetlands and riparian areas within the SRPPA follow stream drainages whose flows originate in surrounding mountains and springs or occur as a result of seasonal precipitation events. A total of 26 wetlands, classified as semipermanently, seasonally, or temporarily flooded, was identified from National Wetlands Inventory maps in the SRPPA (Table 3.3).

Table 3.3 Wetlands Occurring Within the Seminoe Road Coalbed Methane Pilot Project Area, Carbon County, Wyoming[1].

Location	Symbol	System	Subsystem	Class	Water Regime	Special Modifiers
T23N R85W						
Section 3	PEMA	Palustrine		Emergent	Temporarily flooded	
	PABFh	Palustrine		Aquatic bed	Semipermanently flooded	Diked/Impounded
	PUSCh	Palustrine		Unconsolidated shore	Seasonally flooded	Diked/Impounded
Section 8	PUSA	Palustrine		Unconsolidated shore	Temporarily flooded	
	PUSC	Palustrine		Unconsolidated shore	Seasonally flooded	
	R4SBA	Riverine	Intermittent	Streambed	Temporarily flooded	
Section 9	PUSA	Palustrine		Unconsolidated shore	Temporarily flooded	
T24N R85W						
Section 13	PUSA	Palustrine		Unconsolidated shore	Temporarily flooded	
	PEMC	Palustrine		Emergent	Seasonally flooded	
Section 14	PEMA	Palustrine		Emergent	Temporarily flooded	
	PEMC	Palustrine		Emergent	Seasonally flooded	
Section 22	PEMC	Palustrine		Emergent	Seasonally flooded	
Section 23	R4SBA	Riverine	Intermittent	Streambed	Temporarily flooded	
	PEMC	Palustrine		Emergent	Seasonally flooded	
Section 26	R4SBA	Riverine	Intermittent	Streambed	Temporarily flooded	
	PEMC	Palustrine		Emergent	Seasonally flooded	
Section 27	PEMC	Palustrine		Emergent	Seasonally flooded	
	PABFh	Palustrine		Aquatic Bed	Semipermanently flooded	Diked/Impounded
Section 33	R4SBA	Riverine	Intermittent	Streambed	Temporarily flooded	
Section 34	R4SBA	Riverine	Intermittent	Streambed	Temporarily flooded	
	PABFh	Palustrine		Aquatic bed	Semipermanently flooded	Diked/Impounded
	PEMC	Palustrine		Emergent	Seasonally flooded	
	PEMA	Palustrine		Emergent	Temporarily flooded	
Section 35	PEMC	Palustrine		Emergent	Seasonally flooded	
	PUSCh	Palustrine		Unconsolidated shore	Seasonally flooded	Diked/Impounded
	PEMA	Palustrine		Emergent	Temporarily flooded	

[1] United States Department of the Interior, USFWS, National Wetlands Inventory; Maps: Ferris Lake 1994; Seminoe S.W. 1990.

3.2.1.3 Noxious Weeds

No significant infestation of noxious weeds was noted on the SRPPA during vegetation mapping or other site visits. Although some small areas of noxious weed invasion likely occur on the SRPPA, they are not widespread.

3.2.2 Wildlife and Fisheries

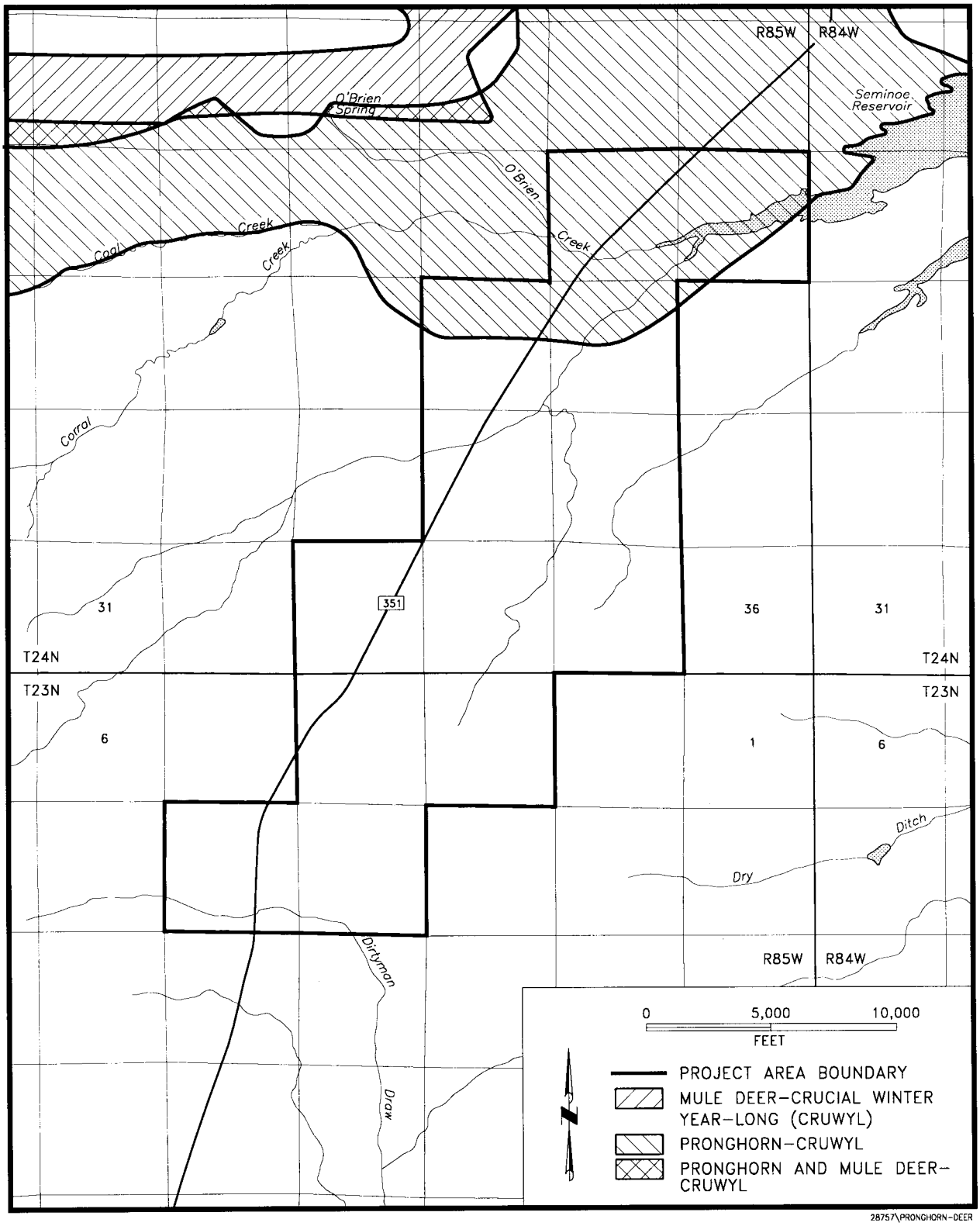
3.2.2.1 Big Game Animals

Four big game species--pronghorn, mule deer, elk, and bighorn sheep--occur within or immediately adjacent to the SRPPA. Pronghorn are the only common residents within the area. The population data for big game animals that follow are based upon *Annual Big Game Herd Unit Reports - 1999* (WGFD 2000).

Pronghorn. Pronghorn in the SRPPA are part of the South Ferris Herd Unit (637) and Hunt Area 62. The WGFD population objective for this herd is 6,500, and the estimated posthunt population in 1999 was 6,125 animals, or 94% of objective. Because of generally poor fawn production since 1988, the herd is below objective size; however, production has increased in recent years. The South Ferris Herd Unit includes 730.5 mi^2, with 711.5 mi^2 of occupied range and 176.8 mi^2 of crucial winter/yearlong range (WGFD 1996). (Crucial winter/yearlong range is defined as winter/yearlong range that has been documented as the determining factor in a population's ability to maintain itself at a desired level over the long-term [WGFD n.d.]). Approximately 2.4 mi^2 of crucial winter yearlong pronghorn range (1.4% of such range in the herd unit) occurs in the northern portion of the SRPPA (Map 3.2). The remainder of the SRPPA is winter/yearlong pronghorn range. (Winter/yearlong range is range that is used yearlong but which, during winter, has a substantial influx of animals from other seasonal ranges.)

Pronghorn antelope occur throughout the SRPPA yearlong. Fences continue to pose barriers to antelope movements throughout much of the herd unit and are suspected of contributing to low summer fawn survival in a few pastures with limited water sources.

Map 3.2 Location of Crucial Winter/Yearlong Mule Deer and Pronghorn Range.



Mule Deer. Mule deer in the SRPPA are part of the Ferris Herd Unit (647), which includes a total area of 1,222.1 mi^2, 658.2 mi^2 of occupied habitat, 150 mi^2 of crucial winter/yearlong habitat (WGFD 1996). The WGFD population objective for the Ferris Herd Unit is 5,000, with an estimated 1999 posthunt population of 2,525, or 51% of objective. Crucial winter/yearlong range occurs close to the SRPPA to the north and west (Map 3.1), but the SRPPA is out of occupied mule deer range.

Elk. The SRPPA is part of the 1,247-mi^2 (334 mi^2 of occupied habitat) Ferris Herd Unit (639) and the Seminoe Hunt Area (111). The WGFD population objective for the Ferris Herd Unit is 350, and the estimated posthunt 1999 population was 460, or 131% of objective. The SRPPA is out of occupied elk range.

Bighorn Sheep. Bighorn sheep occur north of the SRPPA in the Ferris/Seminoe Mountains; however, the area is closed to hunting and bighorn sheep do not occur in the SRPPA.

3.2.2.2 Other Mammals

Based on field observations (WGFD 1997; WNDD 2000) and range and habitat preference (Clark and Stromberg 1987; WGFD 1997), approximately 80 mammal species are known to occur, likely to occur, or have available habitat within the SRPPA or adjacent areas. Predator species known to occur or potentially occurring in the SRPPA include coyote, swift fox, red fox, raccoon, ermine, long-tailed weasel, mink, badger, western spotted skink, striped skunk, and bobcat. Other mammals include various species of bats, shrews, hares and rabbits, squirrels, and rats and mice.

3.2.2.3 Raptors

Twenty-five ferruginous hawk nests occur in the SRPPA, and an additional 12 nests occur within 1.0 mi of the SRPPA boundary, based on BLM files and observations made during year 2000 surveys. None of these nests were known to be active in 2000 (Map 3.3). In addition, two burrowing owls were observed on the area in 2000 during prairie dog town surveys, as was one

great horned owl nest. At least one burrowing owl nest was active in 2000 (three fledglings observed). One prairie falcon nest is known to occur approximately 0.5 mi east of the SRPPA. Golden eagles were observed during sage grouse lek surveys. Additionally, short-eared owls were observed in the area during black-footed surveys conducted in September 2000. Nesting by golden eagle and short-eared owl is not known from the SRPPA.

3.2.2.4 Upland Game Birds

Sage grouse is the only species of upland game bird that occurs on the SRPPA throughout the year. Two sage grouse leks were identified in the vicinity of the SRPPA during a lek inventory (aerial investigation) conducted on the SRPPA and a 2.0-mi buffer during early May 2000 (see Map 3.3). Both leks were located approximately 1.5 mi from the SRPPA boundary--one to the east and one to the west. Both were active in late April/early May 2000. No habitat is present for sharp-tailed grouse or blue grouse. Mourning dove may occur on the area during the summer and during spring and fall migrations, but little habitat is available for nesting.

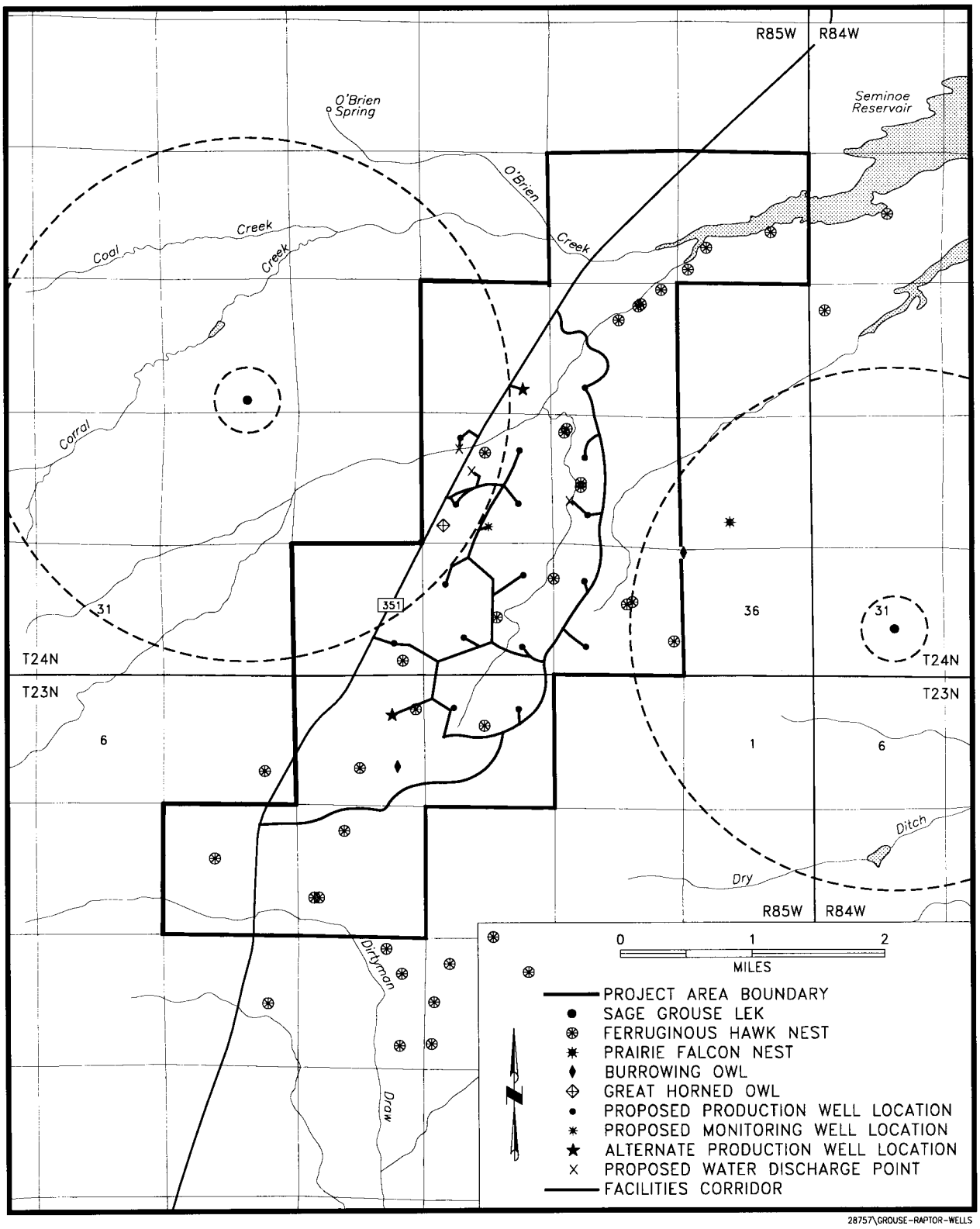
3.2.2.5 Other Bird Species

Numerous other bird species occur on the SRPPA and adjacent lands. Seminoe Reservoir attracts numerous species of waterfowl and shorebirds, and the sagebrush and desert shrub habitat attracts its usual assemblage of song birds.

3.2.2.6 Fisheries

No fisheries occur on the SRPPA. The nearest fisheries are the North Platte River and Seminoe Reservoir. The North Platte River just above Seminoe Reservoir is classified as a Class 2 trout stream (WGFD 1991)--a fishery of statewide importance. Seminoe Reservoir also provides an important fishery, especially for trout and walleye.

Map 3.3 Raptor Nests and Sage Grouse Leks, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.



3.2.2.7 Other Species

Several species of snakes likely occur on the SRPPA and nearby lands, as do tiger salamander, northern leopard frog, eastern short-horned lizard, and northern sagebrush lizard. Turtles likely occur in Seminoe Reservoir.

3.2.2.8 Threatened, Endangered, Proposed, Candidate, and Sensitive Species

Endangered species that could occur in the vicinity of the SRPPA are the black-footed ferret and blowout (Hayden's) penstemon. The bald eagle, a species previously listed as endangered that has been downlisted to threatened also occurs in the area. Mountain plover and black-tailed prairie dog (species proposed for listing as threatened) and swift fox (formerly a candidate species), also may occur in the vicinity of the SRPPA. In addition, species that do not occur in the vicinity of the SRPPA, but may occur downstream in the North Platte River, are briefly addressed. The reader should consult the BA (BLM 2000a) (available at the BLM Rawlins Field Office) prepared for this project for a more inclusive discussion of these species.

Additional TEP&C species known to occur, potentially occurring, and/or potentially affected by actions within the BLM Rawlins Field Office area include: Wyoming toad, boreal toad, Preble's meadow jumping mouse, Canada lynx, Ute ladies' tresses, and Colorado butterfly plant, as well as the Colorado River System fish species humpback chub, razorback sucker, Colorado pikeminnow, and bonytail chub. These species do not occur in the vicinity of the SRPPA, would not be affected by the proposed project, and therefore are not discussed further in this EA.

Black-footed Ferret. Habitat investigations in the SRPPA revealed the presence of numerous white-tailed prairie dog towns (Map 3.4). Subsequent burrow density investigations of towns potentially affected by development actions found many of the towns to be suitable black-footed ferret habitat (i.e., >8 burrows/acre) (Table 3.4). As a result of these findings, black-footed ferret surveys pursuant to USFWS guidelines (USFWS 1989) have been completed on all potentially affected towns on and adjacent to the SRPPA, and no black-footed ferret or its sign were observed (BLM 2000a).

Map 3.4 Location of White-tailed Prairie Dog Towns, Mountain Plover Observations, and Bald Eagle Observations, Seminoe Road Pilot Project, Carbon County, Wyoming.

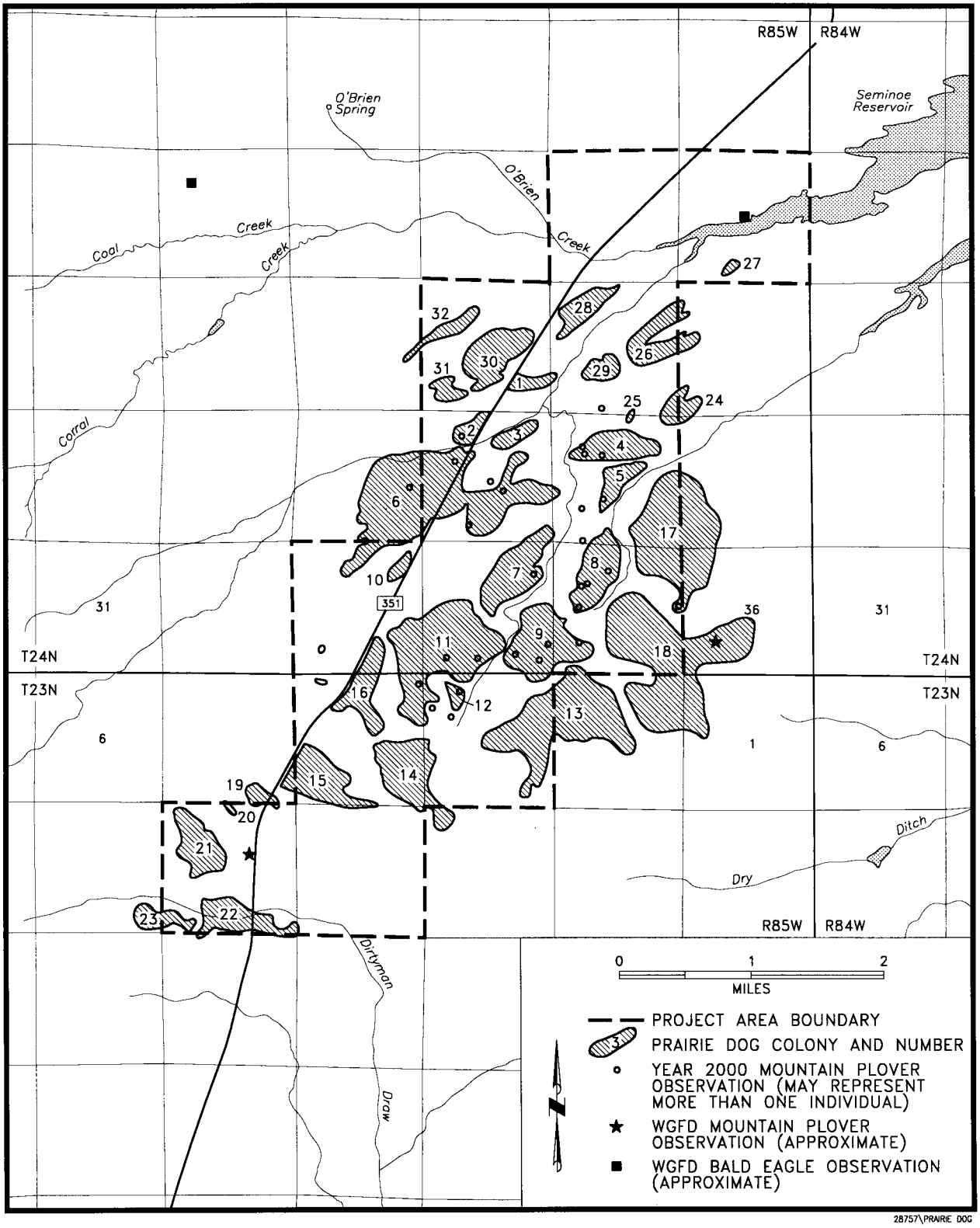


Table 3.4 White-tailed Prairie Dog Towns, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming.[1]

Prairie Dog Town Number [2]	Size (acres)	Burrow Density (open burrows/acre)	Surveyed
1	21.4	10.4	Yes
2	23.2	14.6	Yes
3	25.0	3.7	Yes[3]
4	75.5	20.6	Yes
5	38.6	6.5	Yes[3]
6	432.5	16.0	Yes
7	111.7	3.6	Yes[3]
8	91.9	13.2	Yes
9	144.8	20.1	Yes
10	22.3	7.9	Yes[3]
11	277.9	11.6	Yes
12	11.7	7.9	Yes
13	288.8	8.8	Yes
14	131.3	8.4	Yes
15	102.1	7.8	Yes
16	75.2	12.2	Yes
17	292.2	19.2	Partial
18	396.3	Assumed >8.0	Partial
19	17.5	Unknown	Yes
20	3.1	15.5	Yes
21	77.3	Unknown	No
22	79.5	Unknown	No
23	35.3	Unknown	No
24	35.6	Unknown	No
25	2.5	Unknown	Yes
26	82.4	Unknown	No
27	6.0	Unknown	No
28	48.2	Unknown	Yes
29	27.2	Unknown	Yes
30	97.0	Unknown	Yes
31	21.4	Unknown	Yes
32	31.6	Unknown	Yes

[1] Refer to the BA (BLM 2000a) for further detail.
[2] Refer to Map 3.4 for locations.
[3] Covered during surveys of adjacent suitable habitat.

Black-tailed Prairie Dog. The SRPPA is outside the known range of the black-tailed prairie dog. There would be no impact to this species from the proposed project because no black-tailed prairie dogs occur in the area, and the species is not discussed further in this EA.

Swift Fox. The swift fox has not been observed in the vicinity of the SRPPA (WNDD 2000; WGFD 2000), although individual animals may occasionally pass through the area the potential for impacts is extremely low. As a result, the proposed project would have only negligible additional effects, if any, to existing cumulative effects on swift fox or its habitat in the region, and the species is not discussed further in this EA.

Bald Eagle. The bald eagle is a federally threatened species (downlisted from endangered and now proposed for removal from federal listing). Although bald eagle observations have been made on and adjacent to the SRPPA (WGFD 2000) (Map 3.4), no known bald eagle nests or winter roosts are known to occur within or immediately adjacent to the SRPPA (WNDD 2000; WGFD 2000). Migrating bald eagles and those wintering at locations sufficiently close to the SRPPA may occasionally fly over the area while foraging; however, since no known nests or roosts occur near the SRPPA nor are nests or roosts likely to be established, the proposed project is unlikely to adversely affect bald eagles, and the species is not discussed further in this EA.

Mountain Plover. The mountain plover has been proposed for federal listing as a threatened species by the USFWS. During the spring/summer of 2000, Dudley financed a BLM-approved biologist to implement habitat/community type mapping actions on the SRPPA to identify mountain plover concentration areas (i.e., areas where broods and/or adults have been observed in the current year or documented in at least 2 of the last 3 years). Suitable habitat identification included areas with vegetation less than 4 inches in height and/or active prairie dog towns. Approximately 2,756 acres (33%) of the SRPPA is suitable mountain plover breeding habitat (i.e., low shrub, mixed grass/low shrub) (BLM 2000a) [see Map 3.1].

During surveys conducted in spring and summer 2000, 29 mountain plover sightings were reported within the SRPPA (Map 3.4). Twenty sightings were lone adults, five were pairs of

adults, and four were adults with chicks. Although no mating displays were observed, breeding and nesting did occur on the SRPPA. Mountain plover are well documented in Carbon County southeast of the area (TRC Mariah Associates Inc. 1999; Western EcoSystems Technology, Inc. 1998).

North Platte River Water Depletions. Since 1978, the USFWS has consistently taken the position in its Section 7 consultations that federal agency actions resulting in water depletions to the Platte River system may affect the endangered whooping crane, interior least tern, pallid sturgeon, and eskimo curlew, as well as the threatened piping plover, bald eagle, and western prairie fringed orchid. No Platte River depletions would occur from this project (see Section 3.1.7.2 and Appendix B, Water Management Plan).

Blowout Penstemon. Blowout penstemon is not known to be, nor likely to be, present within the SRPPA due to the absence of suitable sand dune habitat. Therefore, the proposed project is unlikely to adversely affect the species, nor is it likely to contribute to regional cumulative effects to the species, and blowout penstemon is not discussed further in this EA.

A list of BLM sensitive species potentially occurring on the SRPPA is provided in Table 3.5.

State-Sensitive Species. Three state-sensitive mammal species potentially occur within /or adjacent to the SRPPA: Townsend's big-eared bat, white-tailed prairie dog, and dwarf shrew (Table 3.5). Of these, only the white-tailed prairie dog has been documented within or immediately adjacent to the SRPPA (WGFD 1999; WNDD 2000).

The white-tailed prairie dog occupies grass, shrub-grass, and desert-grass communities in Wyoming (Clark and Stromberg 1987). Habitat investigations in the SRPPA identified numerous prairie dog towns (see Map 3.4). These prairie dog colonies may provide a prey base and habitat for a variety of state sensitive raptor species, such as the ferruginous hawk and burrowing owl and other area wildlife.

Table 3.5 BLM Wyoming Animal and Plant Species of Concern (Draft) Documented or Potentially Occurring on or in the Vicinity of the Seminoe Road Coalbed Methane Pilot Project Area, Carbon County, Wyoming, 2001.[1]

Species		Other Designation and Ranking: Wyoming Natural Heritage Program; U.S. Forest Service (FS) Regions 2 and 4; Wyoming Game and Fish Department (NSS)[2]	Documented on or in Vicinity of the SRPPA[3]	Habitat Type(s)[4]
Common Name	Scientific Name			
Townsend's big-eared bat	*Corynorhinus townsendii*	G4/S1B, S2N FSR2, FSR4, NSS2	No	UB
White-tailed prairie dog	*Cynomys leucurus*	G4/S2S3, NSS3	Yes[5]	UB
Dwarf shrew	*Sorex nanus*	G4/S2S3, FSR2, NSS3	No	P/R, RO, SS, GW/S
Long-billed curlew	*Numenius americanus*	G5/S3B, SZN FSR2, NSS3	Yes	LS/G, SS, GW/S, SG, P/R
Northern goshawk	*Accipiter gentilis*	G5/S23B, S4N, FSR2, FSR4, NSS4	Yes[5]	FT
Peregrine falcon	*Falco peregrinus*	G4/T3/S1B, S2N, FSR2, NSS4	Yes	FT
Ferruginous hawk	*Buteo regalis*	G4/S3B, S3N, FSR2, NSS3	Yes[5]	UB
Burrowing owl	*Athene cunicularia*	G4/S3B, SZN, FSR2, NSS4	Yes[5]	LS/G, LS, SS, GW/S, SG
Sage grouse	*Centrocercus*	G5/S3	Yes[5]	UB
Brewers sparrow	*Spizella breweri*	G5/S3B, SZN	Yes[5]	UB
Sage sparrow	*Amphispiza billineata*	G5/S3B, SZN	Yes[5]	UB
Sage thrasher	*Oreoscoptes montanus*	G5/S3B, SZN	Yes[5]	UB
Loggerhead shrike	*Lanius ludovicianus*	G5/S4B, SZN, FSR2,	Yes[5]	UB/FT
Northern leopard frog	*Rana pipiens*	G5/S3, FSR2, NSS4	Yes	P/R
Great Basin spadefoot	*Spea intermontana*	G5/S4, NSS4	Yes	SS, SG, GW/S
Boreal toad	*Bufo boreas boreas*	G4T4/S2, FSR2, FSR4	Yes	P/R
Persistent sepal yellowcress	*Rorippa calycina*	G3/S3	Yes	P/Rw2
Gibbon's beardtongue	*Penstemon gibbensii*	G1/S1	No	RO, LS, LS/G

Table 3.5 (Continued)

[1] From Draft Wyoming BLM State Director's Sensitive Species List (Animals and Plants), September 2000.

[2] Rankings:

Wyoming Natural Heritage Program

Uses a standardized system developed by The Nature Conservancy's Natural Heritage Network to assess the global and state wide conservation status of each plant and animal species, subspecies, and variety. Each taxon is ranked on a scale of 1-5, from highest conservation concern to lowest. Codes are as follows:

- G = Global rank: rank refers to the rangewide status of a species.
- T = Trinomial rank: rank refers to the rangewide status of a subspecies or variety.
- S = State rank: rank refers to the status of the taxon (species or subspecies) in Wyoming. State ranks differ from state to state.
- 1 = Critically imperiled because of extreme rarity (often known from five or fewer extant occurrences or very few remaining individuals) or because some factor of a species' life history makes it vulnerable to extinction.
- 2 = Imperiled because of rarity (often known from 6-20 occurrences) or because of factors demonstrably making a species vulnerable to extinction.
- 3 = Rare, or local, throughout its range or found locally in a restricted range (usually from 21-100 occurrences).
- 4 = Apparently secure, although the species may be quite rare in parts of its range, especially at the periphery.
- 5 = Demonstrably secure, although the species may be rare in parts of its range, especially at the periphery.
- H = Known only from historical records. 1950 is the cutoff for plants; 1970 is the cutoff date for animals.
- X = Believed to be extinct.
- A = Accidental or vagrant: a taxon that is not known to regularly breed in the state, or which appears very infrequently (typically refers to birds and bats).
- B = Breeding rank: a state-rank modifier indicating the status of a migratory species during the breeding season (used mostly for migratory birds and bats).
- N = Nonbreeding rank: a state-rank modifier indicating the status of a migratory species during the nonbreeding season (used mostly for migratory birds and bats) ZN or ZB. Taxa that are not of significant concern in Wyoming during breeding (ZB) or non-breeding (ZN) seasons. Such taxa often are not encountered in the same locations from year to year.
- U = Possibly in peril, but status uncertain; more information is needed.
- Q = Questions exist regarding the taxonomic validity of a species, subspecies, or variety.
- ? = Questions exist regarding the assigned G, T, or S rank of a taxon.

U.S. Forest Service

- Region 2 = Rocky Mountain Region.
- Region 4 = Intermountain Region.

Wyoming Game and Fish Department

The Wyoming Game and Fish Department has developed a matrix of habitat and population variables to determine the conservation priority of all native, breeding bird and mammal species in the state. Six classes of native status species (NSS) are recognized, of which classes 1, 2, and 3 are considered to be high priorities for conservation attention. These classes can be defined as follows:

- NSS1 = Includes species with on-going significant loss of habitat and with populations that are greatly restricted or declining (extirpation appears possible).
- NSS2 = Species in which (1) habitat is restricted or vulnerable (but no recent or significant loss has occurred) and populations are greatly restricted or declining; or (2) species with on-going significant loss of habitat and populations that are declining or restricted in numbers and distribution (but extirpation is not imminent).
- NSS3 = Species in which (1) habitat is not restricted, but populations are greatly restricted or declining (extirpation appears possible); or (2) habitat is restricted or vulnerable (but no recent or significant loss has occurred) and populations are declining or restricted in numbers or distribution (but extirpation is not imminent); or (3) significant habitat loss is on-going but the species is widely distributed and population trends are thought to be stable.

[3] Indicates documentation of amphibian, reptile, or bird species in Carbon County (Baxter and Stone 1980; WNDD 2000); documentation of amphibian, mammal, or bird species within latitude 41°, longitude 107° (Dorn and Dorn 1990; WGFD 1999).

[4] FT = fly through, P/R = pond/riparian, UB = ubiquitous, RO = rock outcrop, LS/G = low shrub/grassland, LS = low shrub, SS = sagebrush/shadscale, GW/S = greasewood/shrubland, SG = shrubland/grassland.

[5] Animal species has been documented breeding within latitude 41°, longitude 107° (Dorn and Dorn 1990; WGFD 1999).

Ten state-sensitive bird species have been observed within or adjacent to the SRPPA (Table 3.5). Of these species, eight have been documented breeding within the vicinity of the SRPPA: northern Goshawk, ferruginous hawk, burrowing owl, sage grouse, Brewer's sparrow, sage sparrow, sage thrasher, and loggerhead shrike (Dorn and Dorn 1990; WGFD 1999). Long-billed curlew and peregrine falcon may occasionally use areas within the SRPPA for foraging or as a stopover during migration, but probably remain in the area for only a short period of time. The Brewer's sparrow, sage thrasher, and sage sparrow prefer sagebrush, greasewood, and mountain mahogany habitats. The loggerhead shrike generally prefers open country with scattered trees and shrubs (Dorn and Dorn 1990). Since all these habitats occur within the SRPPA, these species may nest in and adjacent to the SRPPA.

Three state-sensitive amphibian species have been observed within and/or adjacent to the SRPPA (Baxter and Stone 1980; WGFD 1999; and WNDD 2000): northern leopard frog, Great Basin spadefoot, and boreal toad (Table 3.5). The northern leopard frog is found in or near permanent water throughout Wyoming in the plains, foothills, and montane zones. Preferred habitats are cattail marshes on the plains and beaver ponds in the foothills and montane zones. On rare occasions, this frog may be found near temporary ponds several miles from permanent water (Baxter and Stone 1992). Although there are no breeding records for this species within the SRPPA and vicinity, potential breeding habitats may be present around Seminoe Reservoir and in stock ponds in the SRPPA. The Great Basin spadefoot inhabits sagebrush communities west of the continental divide at elevations less than 6,000 ft. Most observations have occurred in the Great Divide and Green River Basins. Since all of the SRPPA is above 6,000 ft in elevation and east of the Continental Divide, the potential for Great Basin spadefoot occurrence is low and this species is not discussed further. The boreal toad generally inhabits riparian habitats above 7,500 ft in foothills, montane, and subalpine life zones (Baxter and Stone 1992). Since this habitat is not present within the SRPPA, this species is unlikely to be present and is not discussed further in this EA.

Two state-sensitive plant species potentially occur within and adjacent to the SRPPA--Gibbon's beard tongue and persistent sepal yellowcress--however, only the yellowcress has been documented in the SRPPA vicinity (Table 3.5). Gibbon's beard tongue inhabits sparsely

vegetated shale or sandy-clay slopes at elevations between 5,500 ft and 7,700 ft (Fertig 1994). Since this habitat is not present within the SRPPA, the potential for Gibbon's beardtongue occurrence is low, and this species is not discussed further in this EA. Persistent sepal yellowcress inhabits river banks and shorelines, usually on sandy soils near high water lines between 4,300 and 6,800 ft (Fertig 1994). Potential habitat may be present along Seminoe Reservoir in the northern portion of the SRPPA.

3.3 CULTURAL RESOURCES

3.3.1 Previous Investigations

A Class I inventory was conducted for the SRPPA through the Wyoming Cultural Records Office (SHPO) internet database on November 30, 2000. Thirteen sections occur within the SRPPA. The principal cultural resource projects and sites recorded within these sections are discussed below.

3.3.2 Cultural Resource Inventories

Fourteen cultural resource inventories have been conducted within the SRPPA, which is located in the Hanna Basin, just east of the eastern rim of the Great Divide Basin (Fenneman 1931). All are intensive Class III surveys. Of these, seven linear surveys have been completed for two seismic lines and five access roads. Five combined block/linear surveys have been conducted for four well pads and access roads and one miscellaneous project. Two block surveys have been conducted for one core hole project and one well pad. These projects were conducted between 1975 and 2000, including four inventories conducted for Dudley in 1999. As a result, less than 1% of the 8,320 acres encompassing the SRPPA has been surveyed.

Existing information from the 14 cultural resource projects within the SRPPA indicates that four cultural resource sites have been recorded in the area to date.

3.3.3 Prehistoric Site Types and Distributions

Three prehistoric sites occur within the SRPPA. Data from the previous cultural resource inventories indicate that two of the sites consist of one open camp and one with cairns, both of which are not eligible for the NRHP. The third site (Site 48CR70) is an open camp with a stone circle that remains unevaluated as to its NRHP eligibility status.

A moderate site density may occur within the SRPPA due to its proximity to the former North Platte River channel and the presence of ephemeral streams within the SRPPA.

3.3.4 Native American Sensitive Sites and Traditional Cultural Properties

From the Protohistoric period through the midnineteenth century, the region encompassing the SRPPA was used predominantly by members of the Shoshone and/or Eastern Shoshone tribes on their seasonal rounds of subsistence, although the Bannock, Ute, and other tribes (e.g., Lakota Sioux and Crow) frequented the Great Divide and Carbon Basins and surrounding areas as well. In prehistoric times, this picture is clouded, as tribal distinctions are difficult, if not impossible, to determine. Both prehistoric sites and more modern Native American use sites are sensitive, or can be considered Traditional Cultural Properties (TCPs).

Sites and properties within this class are protected by numerous laws, such as the *Native American Graves Protection and Repatriation Act*, the *American Indian Religious Freedom Act*, and Executive Orders. Human burials, rock alignment sites, petroglyphs, steatite procurement locales, and modern-day Native American use, extraction, or religious sites are considered sensitive or sacred to modern Native Americans. As yet, there are no positively identified TCPs within the SRPPA, with the possible exception of one site (Site 48CR7445) that consists of prehistoric cairns.

3.3.5 Historic Site Types and Distributions

A single historic site (Site 48CR7264) has been recorded within the SRPPA. It is a transmission line that is not eligible for listing on the NRHP.

There is a paucity of historic sites in the vicinity of the SRPPA. The region experienced sparse settlement after 1868 by the Union Pacific Railroad for coal resource developments and by early settlers primarily for grazing land use (sheep and cattle) during the late nineteenth and early twentieth centuries. Ancillary historic sites which may be expected to occur in the area include remnants of possible coal mining activities such as adits, structures, spoil piles, or dumps or possibly buildings, structures, or debris associated with early homestead activity.

3.4 SOCIOECONOMICS

The SRPPA is in Carbon County, which had a population of 16,659 in 1990 and an estimated population of 15,639 in 2000--a decrease of 6.1% (U.S. Department of Commerce [USDC] 2000; Wyoming Department of Administration and Information, Division of Economic Analysis 2001). Carbon County is the third largest county in Wyoming, covering nearly 8,000 mi^2. The Medicine Bow National Forest covers much of the southern portion of the county. Rawlins, the largest city in Carbon County, is located along Interstate 80 (I-80) in central Carbon County and serves as the county seat and economic hub of the county. Rawlins has built a facility and service structure to accommodate the needs of its residents.

Carbon County's economy is structured around the basic industries of extractive minerals, agriculture, timber, and manufacturing. The mining/oil and gas industry is a major contributor to employment and the general economy; however, employment figures in the mining/oil and gas industry declined from 11.8% of the population in 1990 to 5.5% in 1999. Wages earned in the mining/oil and gas industry averaged $50,421 in 1997--223% of the Carbon County average of $22,574 (Wyoming Department of Employment [WDE] 2000). New technologies to enhance productivity within the mining industry will likely cause a decrease in the rate of job growth within this industry as the industry becomes more mechanized (i.e., capital intensive). In 1998,

there were 17,000 jobs in Wyoming's mining sector, whereas average annual employment in 1999 is forecast at 15,600 jobs--a decrease of 1,400 jobs. However, these industries are very sensitive to changes in commodity prices, and difficult to predict.

The unemployment rate in Carbon County in December 2000 was 4.5%, whereas the statewide unemployment rate at that time was 3.7% (WDE 2001).

Surface transportation in Carbon County is provided by a network of primary, secondary, local, and primitive roads. I-80 is the principle roadway linking Carbon County towns and cities in southern Wyoming and the national highway system. Highway 287, which connects Rawlins and Casper, is approximately 20 mi to the west of the SRPPA.

3.5 LAND USE

Carbon County occupies an area of nearly 8,000 mi^2 and contains a diversity of landscapes. The basic land uses in the county include livestock grazing, wildlife habitat, mining/oil and gas, agriculture, and forestry, and the lands yield a variety of products including wool, beef, timber, trona, jade, clays, oil, gas, and coal. The principle land uses within and adjacent to the SRPPA, although limited, are oil and gas exploration and development (i.e., the current proposal), livestock grazing (Section 3.5.1), wildlife habitat (see Sections 3.2.2.1 and 3.2.2.2), recreation (Section 3.5.2), and transportation (Section 3.5.3). There are no residences or dwellings on or adjacent to the SRPPA.

3.5.1 Agriculture/Rangeland

Agricultural use of the SRPPA is limited to livestock (primarily cattle) grazing. The SRPPA lies within Miller Estate Company holdings and is included in the BLM 157,703-acre Seminoe Allotment (#10218), which supports 18,769 animal unit months (AUMs) (8.4 acres/AUM) (personal communication, February 13, 2001, with Robert Epp, BLM Rawlins).

3.5.2 Recreation

Seminoe State Park, located approximately 7.0 mi north of the SRPPA via County Road 351 (Seminoe Road--a BLM-designated National Back Country Byway [see Section 3.6]), was established in 1965. Its 20,291 acres of water and 180 mi of shoreline offer excellent fishing and camping. Wildlife and waterfowl are abundant in the area. The reservoir is popular with recreational boaters, water-skiers, and an increasing number of windsurfers. The SRPPA and adjacent lands are utilized for hunting, especially for pronghorn, although the checkerboard landownership pattern in the area limits public access (see Map 2.1). In 1999, Hunt Area 62, within which the SRPPA is located, provided 479 hunter days for 237 pronghorn hunters, with a harvest of 222 pronghorns and a success rate of 94% (WGFD 2000). Driving for pleasure is also an important recreational activity in the area.

3.5.3 Land Status and Prior Rights

The 8,320-acre SRPPA includes 3,840 acres (46%) of federal surface and minerals, with the remaining area in private ownership (i.e., checkerboard landownership pattern [see Map 2.1]). Thirteen CBM wells and associated access routes have been approved and developed in the SRPPA, two on public lands and 11 on private, the estimated surface disturbance from these developments is approximately 99.9 acres. Surface or mineral ownership would not change as a result of the proposed project, nor would the rights of existing ROW holders (e.g., County Road 351) be violated, and these subjects are not discussed further in this EA.

3.6 AESTHETICS AND VISUAL RESOURCES

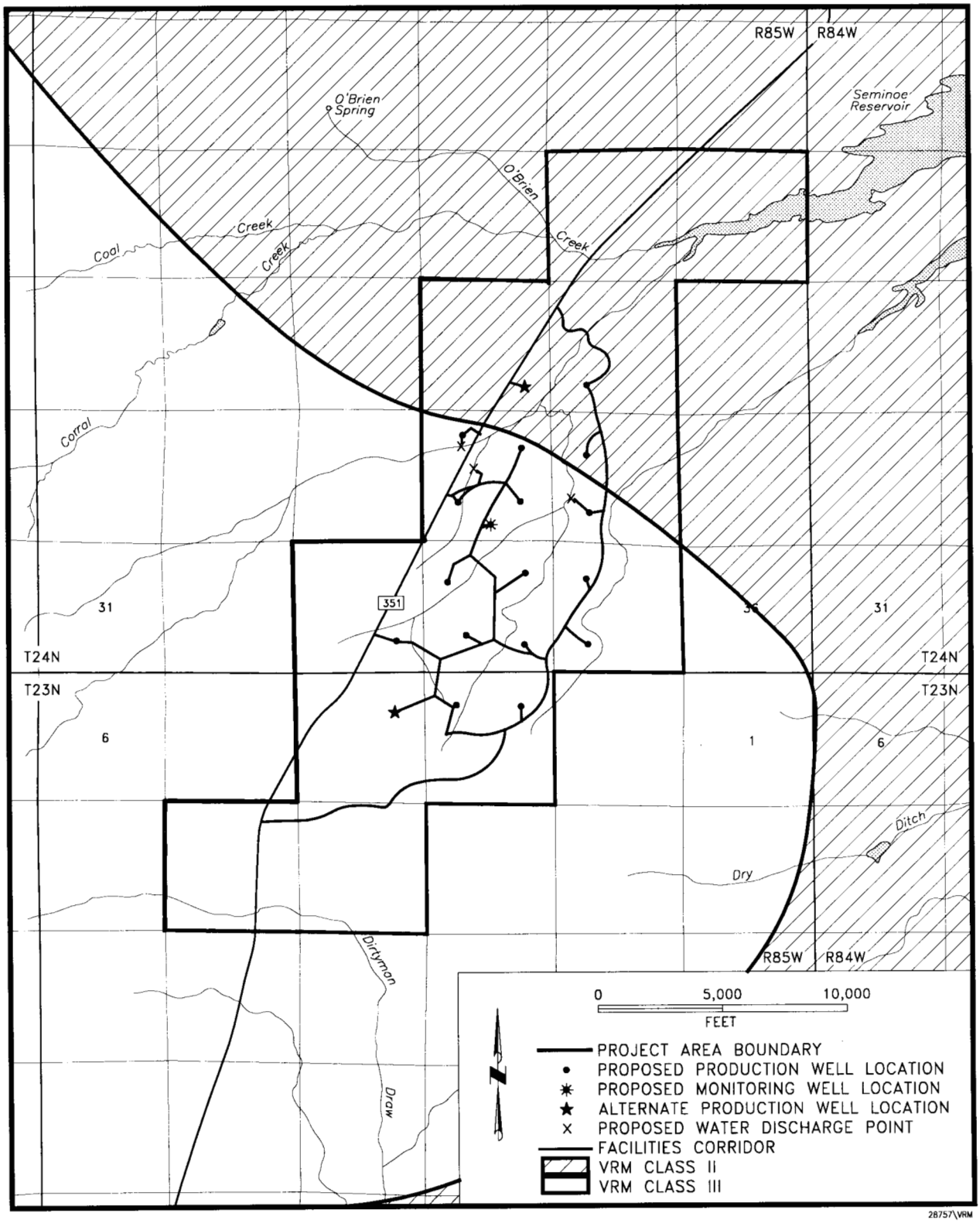
The SRPPA is classified as either VRM Class II or Class III (Map 3.5). The north end of the SRPPA is Class II, whereas the remainder is Class III. Class II areas are those where changes in any of the basic elements caused by management activity should not be evident in the characteristic landscape. In Class III areas, changes in the basic elements of the characteristic landscape may be evident; however, the changes should remain subordinate to the visual strength of the existing character of the landscape. Of particular importance is the preservation of the

view: 1) from the Seminoe Road (i.e., the Seminoe to Alcova Back Country Byway)--an important access road to Seminoe Reservoir and areas to the north and designated as a BLM National Back Country Byway for the scenic quality of the route, and 2) from Seminoe Reservoir--an important recreational resource (see Section 3.5.2).

3.7 HAZARDOUS MATERIALS

Hazardous substances present on the SRPPA include those used and produced in association with natural gas exploration, development, and production as identified in Section 2.1.9. No hazardous materials are known to be present except those being used or produced under state and federal rules and regulations.

Map 3.5 Visual Resource Management Areas, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.



4.0 ENVIRONMENTAL IMPACTS AND MITIGATION

The potential environmental consequences of construction, drilling, completing, operation, and maintenance associated with the Proposed Action (federal land developments--six well locations and associated developments) and No Action (denial of further federal land developments--two existing/authorized well locations and associated developments). Alternatives are discussed for each potentially affected resource. 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 resulting from project-related activities. Impacts can be beneficial or adverse, can be a primary result (direct) or a secondary result (indirect) of an action, and can be permanent or long-lasting (long-term--more than 5 years) or temporary and of short duration (short-term--5 years or less). Impacts can vary in degree from a slightly discernable change to a total change in the environment.

In accordance with CEQ regulation 40 C.F.R. 1502.16, this chapter includes a discussion of the direct and indirect effects of the Proposed Action and No Action Alternatives. Possible conflicts between the Proposed Action and No Action Alternative and the objectives of the BLM RMP (BLM 1987, 1988b, 1990a) as well as state and local land use plans and policies are identified, as are potential additional means to mitigate adverse environmental impacts that go beyond the applicant-committed measures. Potential impacts for this project were quantified where possible. The use of adjectives such as moderate, low, and negligible have been avoided wherever possible because this EA is an analytical document, not a decision document (BLM 1996). The Decision Record for this project will be the decision document. However, when impacts are not easily quantifiable, appropriate adjectives to describe the severity of potential impacts have been used. Impact assessment assumes that applicant-committed measures are successfully implemented. If such measures are not implemented (e.g., state and private lands), additional adverse impacts may occur.

The Proposed Action for this project involves BLM authorization of six wells and associated features on federal lands in the SRPPA. Initial and LOP disturbance associated from the Proposed Action would be approximately 46.1 acres and 21.8 acres, respectively.

Existing/authorized project-required federal land developments within the SRPPA (i.e., No Action Alternative disturbances) consist of those actions associated with the development of two well locations (5.0 acres initial and 2.0 acres LOP disturbance) and associated access routes (approximately 1.1 mi and 10.2 acres initial disturbance [80-ft disturbance width] and 5.1 acres LOP disturbance). Total estimated initial and LOP disturbance under the No Action Alternative are estimated to be approximately 15.2 acres and 7.1 acres, respectively. These existing/authorized federal land developments are considered impact components of the No Action Alternative, and cumulative analyses.

Private land developments within the SRPPA have occurred and consist of 11 wells (27.5 acres initial and 11.0 acres LOP disturbance, respectively) and associated access roads (approximately 5.8 mi; 56.2 acres initial disturbance and 28.1 acres LOP disturbance); total initial and LOP private land disturbances are approximately 84.7 acres and 40.1 acres, respectively (see Table 2.1). Impacts from these developments are considered under cumulative impacts (see Section 4.11) and not as components of the Proposed Action (further federal land developments--six wells and associated features) or No Action (no further federal land development--two existing/authorized wells and assocated access) Alternatives.

4.1 PHYSICAL RESOURCES

4.1.1 Air Quality

Impacts to air quality would be significant if they resulted in violation of federal and/or state air quality attainment standards.

4.1.1.1 The Proposed Action

The effects of natural gas development on air quality in southwestern Wyoming have been studied extensively in recent years, including the Jonah Field II air quality study (BLM 1998b:Appendix G) that modeled the impacts of 450 wells; the Continental Divide/Wamsutter II air quality study (BLM 1999a, 1999b) that modeled the impacts of

3,000 wells; and the Pinedale Anticline air quality study (BLM 1999c) that modeled the impacts of 700 wells. Only the Jonah Field II study found significant cumulative far-field effects to visibility; however, the Jonah Field II study used a screening methodology to estimate far-field effects, whereas the Pinedale Anticline and the Continental Divide/Wamsutter II studies used a more refined approach (i.e., CalPuff dispersion modeling system), and these latter studies found no significant impacts to visibility at nearby wilderness areas.

There would be some temporary deterioration to air quality in the immediate vicinity of project activities (e.g., construction, drilling, completion, testing, and production) due to particulate matter and exhausts from equipment and vehicles; however, these would be localized, temporary, and quickly dispersed by the wind. Impacts would be minimized by the applicant-committed practices included in Chapter 2.0–especially Section 2.1.13.8.

4.1.1.2 The No Action Alternative

Under the No Action Alternative, two wells and associated developments (e.g., facilities corridors) would occur on public surface. The impacts of these facilities on air quality would be proportionately less than that for the six-well Proposed Action.

4.1.1.3 Mitigation

No additional mitigation is recommended.

4.1.2 Topography and Physiography

Impacts to topography and physiography may be significant if they altered the natural environment in such a way that the beauty of natural vistas would be permanently impaired or if drainages would be permanently altered with resultant adverse impacts on natural water courses.

4.1.2.1 The Proposed Action

Impacts to topography and physiography from the Proposed Action (six additional wells and associated facilities on public lands) would occur from the alteration of existing landscape features and potentially increased erosion as a result of road, pipeline, and well location construction. However, Dudley would minimize disturbance in sensitive areas (e.g., steep slopes, drainages) and reclaim all disturbed lands to approximate original conditions upon completion of construction and/or production activities (see especially Sections 2.1.12 and 2.1.13.9). Approximately 46.1 acres (0.6%) of the entire 8,320-acre SRPPA and 1.2% of the 3,840 federal acres in the SRPPA would be initially disturbed, and 21.8 acres (0.3% of the entire SRPPA; 0.6% of the federal SRPPA acreage) would be disturbed for the LOP.

4.1.2.2 The No Action Alternative

Under the No Action Alternative, two wells and associated facilities would occur on public surface (15.2 acres initial and 7.1 acres LOP disturbance). The impacts from these features would be proportionately less than that from the Proposed Action.

4.1.2.3 Mitigation

The BLM may deny all proposed surface disturbances within 500 ft of perennial surface water and/or wetland areas and/or within 100 ft of intermittent and ephemeral drainage channels. Additionally, the BLM may deny activities in areas with high erosion potential and/or rugged topography. Any disturbance in the aforementioned areas will require site-specific mitigations. All roads will be required to be crowned, ditched, and appropriately surfaced (e.g., graveled).

4.1.3 Paleontology

Impacts to paleontological resources may be significant if important fossils would be directly lost or destroyed during construction without proper mitigation or indirectly lost or destroyed due to private collection or vandalism.

4.1.3.1 The Proposed Action

Potential impacts to fossils under the Proposed Action could result from the loss/destruction of fossils during construction and/or from private collection or vandalism due to increased human presence in the area. Impacts would be minimized because: the Medicine Bow Formation is not well exposed throughout most of the SRPPA; there is a relative absence of known fossil localities in the area; and Dudley has committed to the recovery or avoidance of any paleontological resources uncovered during ground-disturbing activities, if such recovery or avoidance were deemed necessary by the BLM (see Section 2.1.13.4). Dr. Jason Lillegraven, Professor of Geology at the University of Wyoming, concurs with this evaluation (Winterfeld 2000).

4.1.3.2 The No Action Alternative

Under the No Action Alternative, two wells and associated facilities would occur on public surface. Potential impacts would be the same as those occurring for the Proposed Action, but proportionately reduced.

4.1.3.3 Mitigation

No additional mitigation is recommended.

4.1.4 Soils

Impacts to soils may be significant if a reduction in soil productivity and/or increased erosion would prevent successful reclamation and revegetation and/or if there is excessive or accelerated soil loss.

4.1.4.1 The Proposed Action

A total of approximately 46.1 acres of public lands (0.6% of the entire SRPPA; 1.2% of all public lands in the SRPPA) would be disturbed in the short-term, and 21.8 acres (0.3% of the entire SRPPA; 0.6% of the federal SRPPA acreage) for the LOP (see Table 2.1). Direct impacts to soils would include removal of 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 may, in turn, result in increased runoff, erosion, and sedimentation into Seminoe Reservoir. The danger of increased surface runoff and erosion would be greatest in the short-term after surface disturbance activities occur and would decline over time due to concurrent reclamation, natural stabilization through particle aggregation, soil structure development, and armoring. Short-term control of surface runoff would be accomplished by implementing reclamation and revegetation efforts described in Surface Use Plans or Plans of Development prepared for each APD and/or ROW application. Reclamation and revegetation procedures would be designed to reduce the susceptibility of disturbed areas to soil erosion in both the short term and for the LOP. The potential for soil contamination due to the accidental spills would be limited by appropriate project implementation procedures and the remedial measures applied as specified in SPCC Plans (see Section 2.1.9). With the implementation of applicant-committed practices designed to protect soils and which include minimizing disturbance, avoidance of steep slopes, and use of best management practices for reclamation and revegetation (see Sections 2.1.12 and 2.1.13.10) impacts to soils would be minimized.

4.1.4.2 The No Action Alternative

Under the No Action Alternative, two wells and associated facilities would occur on public surface. Total soil disturbance under No Action would be approximately 15.2 acres initially, and 7.1 acres for the LOP. Impacts would be similar to those of the Proposed Action, but proportionately reduced.

4.1.4.3 Mitigation

The BLM may deny all proposed surface disturbances within 500 ft of perennial surface water and/or wetland areas and/or within 100 ft of intermittent and ephemeral drainage channels. Additionally, the BLM may deny activities in areas with high erosion potential and/or rugged topography. Any disturbance in the aforementioned areas will require site-specific mitigations. Detailed plans of proposed surface-disturbing actions may be required for developments proposed on slopes and/or in areas where soil or site stability/erodability factors are deemed to be limited by the BLM.

All roads will be required to be crowned, ditched, and appropriately surfaced (e.g., graveled). The BLM may require Dudley to apply gravel or other appropriate road surfacing materials to specific SRPPA roads. Five feet of fill may be required over reclaimed reserve pits. The BLM may also require limited surface disturbance (e.g., no ROW surface grading) during gas and water pipeline construction.

4.1.5 Water Resources

Impacts to water could be significant if:

- water quality declined such that existing water quality standards would be violated;
- existing beneficial uses are adversely affected;
- WDEQ surface water quality class would be downgraded;
- WDEQ-imposed water quality limitations are exceeded;
- violations of the *Clean Water Act* occur; or
- quantities of water would be depleted such that the water rights of existing users would be violated.

4.1.5.1 The Proposed Action

Potential impacts to surface water resulting from the Proposed Action include increased turbidity, salinity, and sedimentation due to increased runoff and erosion from disturbed areas,

accidental spills of petroleum products or other pollutants, and discharge of produced water and/or pipeline test water of poor quality or having alternate chemical make-up (e.g., increased metal content) from that of receiving waters (e.g., Seminoe Reservoir). Rates of wind and water erosion would increase above natural rates until successful reclamation of disturbed areas is achieved; however, the increase would be minimized because of the implementation of applicant-committed practices and mitigation measures. These practices include proper facility siting to avoid riparian areas and floodplains, use of best management practices (see Appendix B, Water Management Plan, and Appendix C, Draft NPDES Permit), and proper reclamation and revegetation (see Sections 2.1.12 and 2.1.13.11). With project adherence to NPDES permit requirements (see Appendix C), the Proposed Action would not result in violations of the *Clean Water Act.*

Springs and seeps in the area may be adversely affected (e.g., reduced flows, possible contamination) where development occurs in source areas. However, proper erosion control, well site location, hazardous material containment, and well casing requirements are anticipated to reduce the potential for impacts to springs and seeps (see also Appendix B, Water Management Plan).

Flood-prone areas would be avoided, where practical, and impacts associated with flooding are not anticipated. There would be no depletion of surface waters associated with the Proposed Action, and with successful reclamation, only a very minor amount, if any, project-related sedimentation would reach Seminoe Reservoir (see Appendix B, Water Management Plan).

Potential impacts to ground water and current ground water wells from the Proposed Action include water consumption during drilling, completion, testing, and production operations; contamination of shallow aquifers from drilling, fracturing fluids, and/or produced water; loss of ground water in existing wells, and cross-aquifer mixing through the well bore. Minimization of these potential impacts would be accomplished by implementing applicant-practices which include cementing of the well bore, implementation of SPCC Plans, and compensation for potential loss of ground water wells (see also Sections 2.1.1.2 and 2.1.13.11; Appendix B, Water Management Plan; and Appendix C, Draft NPDES Permit).

Produced water would meet strict quality control standards prior to being released. A NPDES or other permit would be obtained from WDEQ-WQD prior to release (see Appendix C). Produced water would be treated as required and discharged to ephemeral drainages. Water quality would be monitored (see Appendices B and C). No produced water would be discharged to areas where it would flow through areas with headcutting. Produced water also would supplement flows in the North Platte River and Seminoe Reservoir, potentially benefitting users and the resources of these waters.

4.1.5.2 The No Action Alternative

Under the No Action Alternative, two wells and associated facilities would occur on public surface. Impacts to water would be similar in kind to that for the Proposed Action, but proportionately lower due to the decreased number of wells and the likely reduction in the volume of produced water.

4.1.5.3 Mitigation

The BLM may deny all proposed surface disturbances within 500 ft of perennial surface water and/or wetland areas and/or within 100 ft of intermittent and ephemeral drainage channels. Additionally, the BLM may deny activities in areas with high erosion potential and/or rugged topography. Any disturbance in the aforementioned areas will require site-specific mitigations. Detailed plans of proposed surface-disturbing actions may be required for developments proposed on slopes and/or in areas where soil or site stability/erodability factors are deemed to be limited by the BLM.

All roads will be required to be crowned, ditched, and appropriately surfaced (e.g., graveled). The BLM may require Dudley to apply gravel or other appropriate road-surfacing materials to specific SRPPA roads. Five feet of fill may be required over reclaimed reserve pits. The BLM may also require limited surface disturbance (e.g., no ROW surface grading) during gas and water pipeline construction.

All mitigations recommended in the Water Management Plan (see Appendix B) or required by WDEQ-WQD during NPDES permitting (see Appendix C) would be required by the BLM.

4.1.6 Noise and Odor

Impacts from noise may be significant if long-term project activities exceed the federal 55-dBA standard for noise at residences and/or other noise-sensitive locations such as sage grouse leks during breeding season, raptor nests during breeding and nesting seasons, and big game crucial winter ranges during critical winter periods. Impacts from odor may be significant if they precluded existing uses of the SRPPA.

4.1.6.1 The Proposed Action

Project-generated noise under the Proposed Action area would exceed 55 dBA during construction, drilling, and completing operations; however, such noise levels would be short-term and mitigated (see Section 2.1.13.12) and would not occur at noise-sensitive locations. Applicant-committed practices would prohibit such activities if they would adversely affect wildlife (see Section 2.1.13.13). Project-generated odors would generally be related to the operation of internal combustion engines and other project facility emissions, especially during construction, drilling, and flaring activities. Potential impacts due to odors would be short-term, and any odors would be quickly dissipated by the wind.

4.1.6.2 The No Action Alternative

Under the No Action Alternative, two wells and associated facilities would occur on public surface. Impacts from noise or odor would result from the same actions as described for the Proposed Action but would likely be proportionately less because fewer wells and associated facilities would be developed.

4.1.6.3 Mitigation

The BLM may require that noise level increases be limited to no more than 10 dBA above background levels at sage grouse leks.

4.2 BIOLOGICAL RESOURCES

4.2.1 Vegetation

Impacts to plant communities may be significant if there was a long-term reduction in vegetation productivity or a permanent change in species composition.

4.2.1.1 Plant Communities

The Proposed Action. Vegetation on 46.1 acres of the SRPPA would be disturbed. Of this initial disturbance, all but 21.8 acres would be reclaimed shortly after disturbance. All of the plant communities that would be disturbed are common and widespread in the vicinity of the SRPPA. Reclamation would provide for revegetation with native plant species already common in the area (see Sections 2.1.12 and 2.1.13.5). Areas of short-term disturbance would produce less forage for a few years until revegetation is successful, after which grasses and possibly forbs would become more dominant and likely would be more productive than prior to disturbance. Shrubs would take 20 years or more to reach predisturbance levels. There would be no long-term reduction in vegetation productivity or a permanent change in species composition.

4.2.1.2 The No Action Alternative

Under the No Action Alternative, two wells and associated facilities (15.2 acres initial disturbance) would occur on public surface. Impacts would be similar to those described for the Proposed Action but would occur at a proportionately lower level.

4.2.1.3 Mitigation

The BLM may require limited surface disturbance (e.g., no ROW surface) grading during gas and water pipeline construction. Where new roads are constructed rather than upgrading existing roads/two-tracks, and these new roads make existing roads/two-tracks redundant, the BLM may require reclamation of these existing redundant roads/two-tracks.

4.2.2 Wetlands and Riparian Areas

Impacts to wetlands/riparian areas would be significant if a violation of Section 404 of the *Clean Water Act* or Executive Orders 11988 or 11990 occurred and/or if there is degradation of riparian condition or function.

4.2.2.1 The Proposed Action

Any disturbance to wetlands/riparian areas would be minimal and would result primarily from linear feature crossings of these areas. Disturbances to wetlands/riparian areas would be subject to the applicant-committed practices specified in Section 2.1.13.11, the Water Management Plan (Appendix B), and the WDEQ-WQD NPDES permit (see Appendix C). There would be no net loss of wetlands due to project-related activities. Depending upon produced water constituent concentrations, increased flows in area drainages resulting from produced water discharge may facilitate wetland/riparian area establishment along the receiving channels for the LOP or until produced water is no longer discharged. Any disturbance to wetlands/riparian areas or waters of the U.S. would be appropriately permitted by the COE.

4.2.2.2 The No Action Alternative

Under the No Action Alternative, two wells and associated features would occur on public surface. Impacts to wetlands/riparian areas would be similar in kind to those described for the Proposed Action but proportionately lower.

4.2.2.3 Mitigation

The BLM may deny all proposed surface disturbances within 500 ft of perennial surface water and/or wetland areas and/or within 100 ft of intermittent and ephemeral drainage channels.

4.2.3 Noxious Weeds

Impacts from noxious weeds may be significant if new species of noxious weeds became established and/or if noxious weed abundance increased such that it adversely affected current land uses.

4.2.3.1 The Proposed Action

Habitat suitable for noxious weeds and other undesirable plant species would be created as a result of removal of existing vegetation and noxious weeds could become established and/or more abundant in these areas; however, Dudley would take measures to control undesirable plant invasions (see Section 2.1.13.5), pursuant to BLM and Carbon County Weed and Pest Supervisor guidance.

4.2.3.2 The No Action Alternative

Under the No Action Alternative, two wells and associated facilities would occur on public surface, and less habitat for noxious weeds would be created by disturbance than under the Proposed Action.

4.2.3.3 Mitigation

No additional mitigation is recommended.

4.2.4 Wildlife and Fisheries

Impacts to wildlife resources may be considered significant if they:

- prevent realization of specified population objectives;
- result in the disruption of raptor breeding activities and subsequent reproduction failure;
- result in the continuous disruption of sage grouse breeding activities; and/or
- preclude the use of the SRPPA by wildlife species that currently inhabit the area.

4.2.4.1 The Proposed Action

A total of 46.1 acres of winter/yearlong pronghorn range would be disturbed in the short-term, and 21.8 acres would be disturbed for the LOP (i.e., 24.3 acres of disturbance would be reclaimed shortly after disturbance). Reclaimed areas would produce less forage for a few years until revegetation is successful, after which time grasses and forbs would become more dominant and would likely be more productive than predisturbance vegetation. Shrubs, however, would take 20 years or longer to reach predisturbance condition.

Noise, especially during construction, drilling, and flaring, would reduce use of pronghorn habitat close to such activities. Pronghorn would likely habituate to human presence during other phases of the Proposed Action. Although some level of habitat displacement was noted in pronghorn populations adjacent to oil and gas development in Wyoming, New Mexico, and Texas (Easterly et al. 1991; Gusey 1986; Guenzel 1987). Easterly et al. (1991) found that pronghorn returned to these habitats once the source of the disturbance left the area. Segerstrom (1982) and Deblinger (1988) determined that a large proportion of the pronghorn populations inhabiting surface mine sites in Wyoming were relatively unaffected by mining activities and habituated to the presence of personnel and vehicles. None of the proposed wells would be drilled in crucial big game range.

Increased mortality from vehicle/animal collisions is a potential direct impact that may occur due to increased traffic on and adjacent to the SRPPA for the LOP. Increased access to big game range may also increase legal and illegal harvest (primarily of pronghorn) by providing additional

opportunities for access; however, poaching also may be reduced because of the increased human activity in the area. Dudley would implement policies to control poaching/harassment of wildlife and to minimize vehicle/animal collisions (see Sections 2.1.13.6 and 2.1.13.13).

Raptors would be protected by seasonal restrictions near occupied nests during breeding and nesting seasons (see Section 2.1.13.13), and because less than 1% of the SRPPA would be disturbed for the LOP, any reductions in raptor prey species would be minimal and unlikely to affect raptor populations.

Sage grouse leks are not known to occur on the SRPPA; however, if any leks are discovered they would be protected by avoiding a 2.0-mi radius from the lek during the breeding and nesting season, by restricting any construction within 0.25 mi of a lek, and by surveying nesting areas within 2.0 mi of a lek during the nesting season prior to disturbance and avoiding any nests that may be found in these areas until nesting is complete (see Section 2.1.13.13). Mourning doves would not be affected by the Proposed Action because of the low level of disturbance to their habitat, their inherent mobility, and the continued availability of suitable habitats on undisturbed lands.

Other mammals, birds, reptiles, and amphibian would be minimally affected by the proposed project. Some habitat would be lost due to surface disturbance and human activity, and some small, relatively immobile animals would be killed, especially during construction activities and along roads due to increased traffic. Project impacts to small mammals would likely be masked by natural variations in populations due to weather, disease, and other natural factors. Similar habitats to those affected by the project are common on and in the vicinity of the SRPPA, and many wildlife species have a high reproductive potential that allows them to rebound from the impacts of any direct mortality.

The impacts to fish in the North Platte River and Seminoe Reservoir are unknown. Produced water entering Seminoe Reservoir would be of a small volume and would be required to meet water quality criteria imposed by WDEQ-WQD, BLM, and WOGCC regulations (see

Section 2.1.13.11; Appendix B, Water Management Plan; and Appendix C, Draft NPDES Permit).

Accumulations of metals in the environment may enter foodchains through benthic invertebrates or by fish feeding on sediments (Kruus et al. 1991; Smith 1992). The deposition of metals in sediments may result in persistent metal concentrations within the aquatic ecosystem, and these metals would not biodegrade. Metals tend to be persistent and can accumulate in ecosystems and foodchains. Bioaccumulation of metals (e.g., copper, barium, iron, manganese) in Seminoe Reservoir fish is not anticipated to be augmented as a result of the Proposed Action due to the small volume of produced water discharged to Seminoe Reservoir and its dilution, as well as adherence to NPDES permit discharge limitations mandated in part to prevent adverse bioaccumulation effects.

4.2.4.2 The No Action Alternative

Under the No Action Alternative, two wells and associated features would occur on public surface. Impacts would be similar to those of the Proposed Action in quality but proportionately reduced.

4.2.4.3 Mitigation

The BLM may require that noise level increases be limited to no more than 10 dBA above background levels at sage grouse leks. Sage grouse nest surveys of proposed development areas may be conducted by a BLM-approved, Dudley-financed biologist as directed by BLM. To provide additional protection for sage grouse and other area wildlife, the BLM may require power lines to be buried.

Because the potential for bioaccumulation is unknown, the BLM may require biological monitoring of fish and/or other aquatic species in Pool Table Draw and/or Seminoe Reservoir to determine baseline metal concentrations and whether bioaccumulation is occurring.

4.2.5 Threatened, Endangered, Proposed, Candidate, and Sensitive Species

Any action that would adversely affect or jeopardize TEP&C species or their critical habitat and/or any recovery program for such species would be a significant impact without appropriate consultation with the USFWS and adherence to USFWS BO terms, conditions, and reasonable and prudent measures. Any action that would cause a BLM-sensitive species to become federally listed would be a significant impact.

A BA (BLM 2000a) was prepared for this proposed project and submitted to the USFWS for comment and approval. The following material is a summary of the potential impacts resulting from the proposed project as described in the BA. Formal conferencing (mountain plover) and informal consultation (black-footed ferret) with the USFWS is currently being conducted, and all mitigations identified in the resulting USFWS BO will be adhered to. The BO is anticipated to be available in May 2001, prior to the release of the BLM decision document for this project.

4.2.5.1 The Proposed Action

Dudley has proposed applicant-committed practices to reduce or eliminate impacts to listed species (see Section 2.1.13.14). These mitigation practices were developed with the BLM and USFWS and are included in the BA for this project (BLM 2000a), which is available for review at the BLM Rawlins Field Office.

Based on the results of black-footed ferret surveys, it is concluded that the proposed project is not likely to adversely affect the black-footed ferret if, as proposed, surface disturbance to prairie dog colonies occurs prior to August 29, 2001 (i.e., within 1 year of the date of the latest black-footed ferret survey), and all other applicant-committed measures are implemented (see Section 2.1.13.14).

The direct loss of approximately 15.5 federal acres of mountain plover breeding and foraging habitat (0.5% of all mountain plover habitat on the SRPPA and 0.2% of the entire SRPPA) due to proposed project activities is likely to adversely affect individuals through habitat loss and

displacement from directly affected and adjacent areas; however, with the implementation of applicant-committed measures as well as adherence to BA and BO specifications, the proposed project is unlikely to result in a take of individuals. Furthermore, given the extent of mountain plover use within the SRPPA, the limited and scattered nature of ground disturbance, and the reclamation of habitats to conditions suitable for plover breeding and nesting, the proposed project is unlikely to cause the long-term displacement of plovers from disturbed breeding and nesting areas.

North Platte River depletions are not anticipated as a result of the proposed project due to the depth of ground-water producing formations (approximately 6,000 ft), the age of the ground water produced, and since all produced water would be discharged to the North Platte River surface water system in compliance with the Water Management Plan for this project (see Appendix B) and associated WDEQ-WQD water discharge permits (see Appendix C). A total of approximately 760 acre-ft is estimated to be discharged annually, and 57.8 acre-ft of this total may be lost to evaporation annually primarily from Seminoe Reservoir (see Appendix B, Water Management Plan); therefore, the proposed project may result in an increase to surface water flows in the North Platte River system. The proposed project is unlikely to adversely affect downstream species since all produced water would be discharged to the surface water system.

Project activities that may impact state-sensitive species are similar to those presented for TEP&C and other wildlife species. Most state-sensitive plant and animal species are not anticipated to be adversely impacted by the Proposed Action. Brewer's sparrow, sage thrasher, sage sparrow, and loggerhead shrike would likely be displaced during construction; however, adequate undisturbed habitats remain available on and adjacent to the SRPPA. No adverse impacts are anticipated for the northern leopard frog, since no disturbance is proposed in potential breeding habitat and project-related water discharge would meet water quality criteria imposed by WDEQ-WQD, BLM, and WOGCC regulations. In addition, new breeding habitat may be created as a result of project-related surface-water discharges into area drainages (i.e., potential increased aquatic habitat availability). Areas of potential persistent sepal yellowcress habitat are not proposed for the disturbance, so the species is not anticipated to be impacted. The species most likely to be adversely affected would be the white-tailed prairie dog. However,

since project development and operation would be performed in a manner to minimize disturbance of potential habitat for these species, potential project impacts are not anticipated to jeopardize the continued existence of this species.

Potential impacts to state-sensitive species would be limited since project development feature locations would be surveyed prior to development, and in the event sensitive species are found they would be avoided through facility site relocation (see Section 2.1.13.14).

4.2.5.2 The No Action Alternative

Under the No Action Alternative, two wells and associated features would occur on public surface. Potential impacts would be similar to those for the Proposed Action but proportionately reduced.

4.2.5.3 Mitigation

The BLM may deny all project development actions within areas where TEP&C and other sensitive plant and animal species are found or are likely to occur.

4.3 CULTURAL RESOURCES

Significant impacts to cultural resources may include: 1) the loss of NRHP qualities of cultural resources that are eligible for listing on the NRHP: 2) any surface-disturbing activities within 0.25 mi of a historic trail unless such disturbance would not be visible from the trail or would occur in an existing visual intrusion within the buffer; and 3) disturbance of sites of religious or cultural significance to Native Americans.

4.3.1 The Proposed Action

Potential impacts to specific eligible or unevaluated properties are unknown at this time; however, it is possible that project construction activities may uncover cultural resource sites,

and some of these sites may be NRHP eligible. Potential direct impacts to NRHP-eligible cultural properties would primarily result from construction-related activities; however, since these potential impacts would be mitigated on a case-by-case basis as determined during site-specific APD and ROW reviews, following procedures promulgated under the *National Historic Preservation Act* (NHPA) at 36 C.F.R. 800 and/or the NCPA and WSP, impacts would be reduced.

Some increase in indirect impacts to cultural resources, (e.g., unauthorized collection of artifacts) would occur due to increased access to the area. However, these impacts would be reduced due, in part, to the enforcement of the *Archaeological Resource Protection Act of 1979* (ARPA), and inventories and monitoring would locate most significant sites within and adjacent to disturbance areas.

Consultations with Native American groups would be conducted if religious or culturally important sites are identified within the SRPPA, and the BLM would review the potential impacts on a site-specific basis to determine what measures are necessary to prevent or mitigate significant impacts to religious or culturally important areas. Surveys to determine the presence of eligible cultural resources, mitigations required to comply with regulations and stipulations (see Section 2.1.13.3), and continued consultation with Native American groups, as necessary, would assure that overall impacts to cultural resources from the Proposed Action would be reduced.

4.3.2 The No Action Alternative

Under the No Action Alternative, two wells and associated features would occur on public surface. Impacts would be similar in kind, but proportionately lower in quantity, than for the Proposed Action, and cultural clearances would be completed prior to surface disturbance.

4.3.3 Mitigation

Impacts to cultural resources would be mitigated following procedures as specified in 36 C.F.R. 800 and/or the national programmatic agreement for cultural resources and statewide protocol. Class I and Class III inventories would be conducted prior to disturbance on all federal lands and on state and private lands affected by federal undertakings unless landowner denial for access is documented in writing. Where landowners deny access, alternative cultural resource mitigation resolution methodologies may be applied or the development may be denied. In selected areas identified by the BLM, cultural resource surveys may require testing and/or mitigation to determine significance. All resources identified during these inventories would be evaluated for eligibility for the NRHP by the BLM, and the SHPO would be consulted as necessary under the statewide protocol. In addition, all eligible or listed sites identified in Class I and Class III inventories would be avoided or mitigated, as would areas with high potential for significant cultural deposits--such as aeolian deposits, alluvial deposits along perennial waterways and other major drainages and terraces, and colluvial deposits at the base of low slopes and hills, where possible. If any NRHP (eligible or listed) sites found within proposed disturbance areas cannot be avoided, a data recovery program or other mitigation would be implemented as deemed appropriate by the BLM in consultation with the SHPO, the Advisory Council on Historic Preservation as necessary, and Dudley. Cultural sites identified during inventories would be avoided, where possible.

If a large number of sites cannot be avoided or other adverse effects may occur, a programmatic agreement among the aforementioned parties may be developed. Programmatic agreements would usually be in place when properties are subjected to mitigation through data recovery. Additionally, programmatic agreements and/or discovery plans may be required to be in place prior to approval of APDs or ROW applications in areas with high densities of cultural resource sites which may occur along culturally sensitive areas such as the ephemeral drainages that flow through the SRPPA.

In addition to Class I and Class III inventories, construction activities in areas where the BLM believes there is a high potential for buried cultural deposits may be monitored by a

BLM-permitted archaeologist. If historic or prehistoric materials are discovered on public land by Dudley or its contractors during construction, further surface-disturbing activities at the site (in an area defined by the BLM) would cease immediately, and the BLM would be notified by Dudley to assure proper handling of the discovery by qualified archaeologists. An evaluation would be made by the BLM to determine appropriate actions to prevent the loss of significant cultural resources. Dudley may be responsible for the cost of site evaluation and mitigation; any decision as to proper mitigation (e.g., data recovery) would be made by the BLM after consulting the SHPO, the Advisory Council on Historic Preservation as appropriate, and Dudley.

The BLM would require that all field personnel be informed by Dudley of the importance of cultural resources and the regulatory obligations to protect such resources. Any cultural resource (historic or prehistoric site or object) discovered on public land by Dudley or any person working on their behalf would be immediately reported to the BLM. The BLM would require Dudley to instruct field personnel not to disturb cultural resource sites or collect artifacts and that disturbance and collection of cultural materials from public land is prohibited and against the law.

4.4 SOCIOECONOMICS

Impacts to socioeconomics may be significant if they increased demand for temporary housing or for local government facilities in excess of their availability.

4.4.1 The Proposed Action

Because many of the workers on this project would come from the local workforce, the Proposed Action would contribute to the local economy. Demand for temporary housing is anticipated to be low because of the low level of workforce required (see Table 2.2), and since many workers would come from the local workforce. In addition, various taxes generated by the purchase of equipment and supplies, and development activities and taxes and royalties generated by gas production, would generate additional revenues to the county, state, and federal governments.

A gas stream of 1 million cubic feet per day (mmcfd) would generate $730,000 annually, assuming a gas price of $2.00 per thousand cubic feet (mcf) (Table 4.1). Assuming transportation costs were $0.25/mcf, this 1 mmcfd stream of gas would generate $79,844 in federal royalties, $33,534 in state severance taxes, and $41,918 in county ad valorum taxes annually. Half of the $79,844 in federal royalties would be returned to the state. In addition, property tax revenues would increase due to the increased tax base resulting from capital improvements, and sales tax revenues would increase as local workers spend most of their earnings in local communities.

4.4.2 The No Action Alternative

Under the No Action Alternative, two wells and associated features would be developed on public surface. The same economic benefits associated with the Proposed Action may occur

Table 4.1 Estimated Annual Income and Tax Revenues Resulting from a One Million Cubic Feet Per Day (1 mmcfd) Stream of Natural Gas, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming.

Item	Value ($)
Gross Annual Income[1]	730,000
Annual Transportation Costs[2]	91,250
Gross Annual Income Less Annual Transportation Costs	638,750
Annual Federal Royalties[3]	79,844
Annual State Severance Taxes[4]	38,325
Annual County and Valorem Taxes[5]	41,918

1 Assumes 365 mmcfd gas recovered and sold at $2.00 mcf.
2 Assumes average transportation cost of $0.25 mcf.
3 Assumes 12.5% royalty on gross annual income less annual transportation costs.
4 Assumes 6% rate on gross annual income less annual transportation costs.
5 Assumes 7.5% Carbon County rate on gross annual income less annual transportation costs and federal royalties.

under the No Action Alternative; however, royalties to federal, state, and county governments would be proportionately reduced.

4.4.3 Mitigation

No additional mitigation is recommended.

4.5 LAND USE

Impacts to land use may be significant if other beneficial uses are severely reduced for the long-term (e.g., recreation) or if there is a reduction in livestock use of a magnitude that requires modifications to grazing allotments or other actions that prevent realization of grazing goals.

4.5.1 The Proposed Action

In the long-term, 21.8 federal acres would be disturbed and unavailable for grazing use. An additional 24.3 acres would be disturbed in the short-term but would be reclaimed and revegetated shortly after disturbance. The 21.8 acres of long-term disturbance would result in a loss of approximately 4 AUMs, or 0.02% of the AUMs in the affected allotment. Reclamation after the LOP would return disturbed lands to predisturbance production for livestock grazing. Dudley would coordinate project activities with ranching operations to minimize conflicts and would maintain all fences, cattle guards, etc., required for Dudley's transportation network (see Section 2.1.13.16).

Hunting opportunities for pronghorn on the SRPPA may be reduced for safety and aesthetic considerations, although project-related roads may increase access to the area. Impacts to Seminoe State Park would relate primarily to visual resources and are discussed in Section 4.6.

Existing ROWs would be respected, and ROW holders would be notified before any actions occur within such ROWs.

Upon project abandonment, land uses would revert to those that occurred prior to project initiation.

4.5.2 The No Action Alternative

Under the No Action Alternative, two wells and associated features would occur on public surface. Impacts would be similar to those for the Proposed Action but proportionately less.

4.5.3 Mitigation

No additional mitigation is recommenced.

4.6 VISUAL RESOURCES

Impacts to visual resources would be significant if development activities violate BLM VRM class management objectives.

4.6.1 Proposed Action

Two well locations on federal surface and associated facilities corridors (approximately 15.2 acres of initial disturbance and 7.1 acres of LOP disturbance) are proposed for a VRM Class II area (see Map 3.5). Project facilities would be visible from some locations along the Seminoe Road and from Seminoe Reservoir; however, these facilities are not anticipated to attract an observer's attention. Project development siting and coloration within the VRM Class II area, which is the most restrictive, would be coordinated with the BLM during on-site investigations conducted during APD and ROW application field reviews, and, as such, facilities would be sited, designed, and colored to comply with VRM Class II objectives (see Section 2.1.13.19).

4.6.2 No Action

Under the No Action Alternative, two wells and associated facilities would occur on public surface (none within VRM Class II areas). Potential impacts to visual resources would be similar to, but reduced from, those of the Proposed Action, since no wells would be developed on public lands within the VRM Class II area and appropriate visual resource protection measures (e.g., facility siting, screening, coloration) would still be applied to these project features.

4.6.3 Mitigation

The BLM may require the relocation of project facilities to avoid potential visual resource impacts within the VRM Class II area, which in some instances may require the directional drilling of wells and/or the use of centralized processing facilities. The BLM may also require power lines be buried in Class II areas or that overhead power lines and power line features (e.g., lines, insulators, poles) be non-reflective, sandblasted, and/or nonreflectively painted to a color that blends with the environment. The BLM may require painting of facilities using a custom-mixed paint rather than using a standard environmental color so that facilities do not attract attention in Class II areas. In all cases, the BLM will require the minimization of disturbance in VRM Class II areas. Additionally, and in all areas, the BLM may require that topsoil stockpiles be placed at locations to screen well pad and other facilities from Seminoe Road, and that contours be rounded to blend with the natural environment and not attract a viewer's attention.

4.7 HAZARDOUS MATERIALS

Impacts resulting from hazardous materials would be significant if these materials were produced, used, stored, transported, or disposed of in violation of federal or state law and/or as required by SPCC Plans.

4.7.1 The Proposed Action

Impacts to air, soils, surface water, and wildlife may result from accidental hazardous material spills, pipeline ruptures, and/or exposure to these materials. It is likely that only small amounts of soil would be contaminated and, if this occurred, affected areas would be cleaned up in an appropriate and timely manner. Proper containment of oil and fuel in storage areas, containment of fluids in reserve pits, appropriate pipeline design and construction, proper well casing and cementing, location of wells away from drainages, and adherence to water discharge permits would prevent potential surface- and ground-water contamination (see Section 2.1.13.11 and Appendix B, Water Management Plan). Project operations would comply with all relevant federal and state laws regarding hazardous materials and with directives identified in project- and/or site-specific SPCC Plans. Birds and mammals would be excluded from reserve pits that contain potentially harmful substances by installation of fences and/or netting (see Section 2.1.13.13).

The partial removal of ground water from coal seams during CBM development may make more oxygen available in the dewatered coal seams, thus contributing to conditions suitable for spontaneous coal combustion. However, the coal seams proposed for dewatering are more than 5,000 ft deep, do not outcrop in the SRPPA, and where they do crop out south and west of the area, faults effectively isolate the deeper segments of these seams were dewatering is proposed. At this depth, ground water in the coal seams is under pressure. Water levels in wells completed in the SRPPA coals of interest rise to above the coal layers, creating a hydraulic head in wells. The partial removal of water from coal seams during CBM development depressurizes the coal seam and reduces this hydraulic head, but this action is not likely to leave the coal seams in a condition where oxygen replaces water and results in spontaneous combustion (BLM 1999d).

Methane migration is highly unlikely because of the depth of the coal seams in the SRPPA and their isolation by faults. Methane would also be controlled through APD conditions of approval that address well control, casing, ventilation, and plugging procedures appropriate to site-specific CBM development plans.

4.7.2 The No Action Alternative

Under the No Action Alternative, two wells and associated features would occur on public surface. Potential impacts due to hazardous materials would be similar to those for the Proposed Action but proportionately less likely.

4.7.3 Mitigation

If hazardous materials are present within fracturing fluids, the BLM may deny the discharge of these fluids to reserve pits.

4.8 UNAVOIDABLE ADVERSE IMPACTS

Under the Proposed Action, unavoidable adverse impacts (i.e., impacts that cannot be completely mitigated) include the disturbance of 46.1 acres of federal surface in the short-term and 21.8 acres in the long-term. This disturbance would remove native vegetation, provide habitat for noxious weeds, disturb soils, and result in increased erosion due to wind and water. Some increased runoff and sediments would likely reach local waterways, as would produced water with lower water quality than that of receiving waters. Surface disturbance would also reduce wildlife habitat, would reduce livestock grazing by 4 AUMs in the short-term, and may reduce recreational opportunities. Additional temporary impacts to wildlife would occur due to noise and human activity, especially during construction, drilling, and testing. Some additional particulate emissions would occur in the short-term, especially during construction operations. Some minor changes in topography would occur due to cuts and fills associated with construction of roads and well pads. Some loss of unidentified artifacts and/or fossils may occur, and some loss of visual quality would occur. Some small spills of, or exposure to, hazardous materials could occur. Under the No Action Alternative, some economic benefits would be lost.

4.9 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

An irreversible and irretrievable commitment of resources is defined as a permanent reduction or loss of a resource that, once lost, cannot be regained. The primary irreversible and irretrievable commitment of resources from the proposed project would be the removal and use of the CBM reserves and the loss of ground water from the coal seams. Other irreversible and irretrievable commitments of resources would include soil lost through wind and water erosion; loss of productivity (i.e., forage, wildlife habitat) from lands devoted to project activities during the time those lands are out of production and until they are revegetated; inadvertent or accidental destruction of paleontological or cultural resources during construction and increases in illegal collecting; loss of animals due to mortality during earthmoving activities or by collisions with vehicles; and labor, materials, and energy expended during construction, drilling, production, and reclamation activities associated with the project.

4.10 SHORT-TERM USE OF THE ENVIRONMENT VS. LONG-TERM PRODUCTIVITY

For purposes of this EA, short-term use of the environment is that use during the LOP, whereas long-term productivity refers to the period after the project is completed and the area is reclaimed and revegetated. Short-term use of the environment would not affect the long-term productivity of the SRPPA or adjacent areas. After the project is completed and disturbed areas reclaimed, the same resources that were present prior to the project would be available, except for the gas and water that has been removed. Water resources would slowly recharge in the dewatered coal seams; however, the rate of recharge is currently unknown. It may take 20 years or more after the project is abandoned for some of the reclaimed areas to attain shrub conditions comparable to predisturbance levels; however, reclamation would provide conditions to support wildlife, livestock, and recreation. Use of the SRPPA during the LOP would not preclude the subsequent long-term use of the area for any purpose for which it was suited prior to the project.

4.11 CUMULATIVE IMPACTS ASSESSMENT

Cumulative impacts are those that would result from the incremental impacts of the proposed project added to past, present, and reasonably foreseeable future actions. Cumulative impact assessment areas (CIAAs) vary between resources and are generally based on relevant landscape, resource, project, and/or jurisdictional boundaries. Table 4.2 identifies the CIAAs for this project.

4.11.1 Reasonably Foreseeable Development

Reasonably foreseeable development is that development likely to occur within the SRPPA or the CIAA within the next 5 years. Other than the current Seminoe Road improvement activities, there are no known reasonably foreseeable developments in close proximity, other than the Proposed Action and its possible expansion on and adjacent to the SRPPA if the project proves economically viable. This potential project expansion may include construction of a distribution pipeline from the SRPPA south to an existing interstate natural gas sales pipeline, a compressor station, and additional wells and associated development on and adjacent to the SRPPA. Since these projects are not currently proposed, no quantitative information regarding their potential impacts are identified herein. If these projects are proposed in the future, additional NEPA analyses, including cumulative impact assessments, would be conducted.

4.11.2 Cumulative Impacts

Past actions on or in the vicinity of the SRPPA that continue today and have major influences on the area include the existing 13 CBM wells and associated features; the Seminoe Road (presently being improved) and other roads that allow access to the area; a power line west of the Seminoe Road; a petroleum products pipeline running through the SRPPA; the introduction of livestock grazing; and the construction of Seminoe Reservoir, which flooded several miles of the North Platte River and its associated flood plain and riparian zone. Compared to many other parts of the U.S., however, the SRPPA and vicinity remains relatively undeveloped. Dorn (1986) concludes that the only apparent change in the Fort Steele-Rawlins-Sage Creek area since

Table 4.2 Cumulative Impact Assessment Areas, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming.

Resource	Cumulative Impact Assessment Area (CIAA)
Air Quality	Laramie Air Basin
Topography/Physiography	SRPPA
Geology (general)	
Mineral Resources	SRPPA
Geologic Hazards	SRPPA
Paleontological Resources	SRPPA
Soils	SRPPA
Water Resources	
Surface Water	SRPPA
Ground Water	Project-affected aquifers within the SRPPA
Noise and Odor	SRPPA and 1-mi buffer
Vegetation	
General	SRPPA
Wetlands/Riparian Areas	Project-affected watersheds within SRPPA
Wildlife and Fisheries	
Big Game	Affected herd units
Other Mammals	SRPPA and 2-mi buffer
Sage Grouse	Upland Game Bird Management Area 6
Raptors	SRPPA and 1-mi buffer
Fisheries	North Platte River Watershed
Other Species	SRPPA
Threatened, Endangered, Proposed, Candidate, and Other Sensitive Animal and Plant Species	Range of various species
Cultural Resources	SRPPA and 1-mi buffer
Socioeconomics/Environmental Justice	Carbon County
Landownership and Use	SRPPA
Aesthetics and Visual Resources	SRPPA and the Seminoe Road and Reservoir

reports in the period of 1825 to 1877 is the decline of the buffalo after 1850. Otherwise, the area is much the same except for the absence of buffalo and bighorn sheep. (There is a small herd of bighorn sheep in the Ferris Mountains just north of the SRPPA.) Pronghorn antelope were never mentioned in the early accounts except near Elk Mountain, whereas today they are abundant.

For the purpose of this analysis, quantifiable cumulative disturbance estimates resulting from this proposed project in combination with other past, present, and reasonably foreseeable developments (see Section 4.11.1) include all proposed project developments (i.e., all existing and proposed developments on both public and private lands within the SRPPA) (see Table 2.1). Other than Seminoe Road and Seminoe Reservoir, which have both been present in the area for over 50 years and are not quantified herein, past developments in the area (i.e., a power line and petroleum products pipeline) are considered to be adequately reclaimed. Therefore, total quantifiable initial and LOP cumulative disturbance for this project would be 146.0 acres and 69.0 acres, respectively. Private land developments (11 wells, 84.7 acres initial disturbance, 40.1 acres LOP disturbance) account for approximately 58% of the total cumulative disturbance, and most of this development has already occurred.

4.11.2.1 Air Quality

The Continental Divide/Wamsutter II air quality study (BLM 1999a, 1999b) demonstrated that both short- and long-term total predicted TSP, PM_{10}, SO_2, CO, VOC, hazardous air pollutants (HAPs), and NO_2 concentrations would comply with applicable air quality standards (i.e., WAAQS and NAAQS) as a result of direct, indirect, and cumulative project emissions (including construction and operation). Analyses presented in the Pinedale Anticline air quality studies (BLM 1999c) found no significant impacts to near-field air quality standards at well densities of 16 wells per 640-acre section. Therefore, the proposed project (19 wells), combined with other existing and foreseeable development, is not anticipated to result in the degradation of air quality in the Laramie Air Basin or elsewhere.

4.11.2.2 Topography/Physiography, Soils, Surface Water, and Vegetation

Proposed and reasonably foreseeable actions would require restoration of disturbed areas (146.0 acres) to predisturbance conditions. Reclamation of private lands would be at the discretion of the landowner and, while it is reasonable to believe that the landowner would require the same reclamation and revegetation standards as the BLM, this would be a matter to be decided by Dudley and the affected landowner. Topographic alterations, such as disturbances from well pads and access roads, may remain for several years; however, these changes generally affect a very small portion of the total land surface (1.8% of the SRPPA). Standard stipulations and project- and site-specific construction and reclamation procedures are required on federal lands to maintain surface drainage patterns and these procedures require implementation of reclamation that includes regrading and re-contouring disturbed areas to approximate original conditions, re-establishing appropriate vegetative cover, protecting soils from erosion, and stabilizing reclaimed landscapes. These precautions likely would minimize cumulative impacts to topography, soils, surface water, and vegetation. However, protection of these resources on private lands would be determined by Dudley and the landowner, and all mitigation and applicant-committed practices implemented for the Proposed Action may not be included in agreements between Dudley and the landowner and therefore not implemented on private surface. Weed control on private lands would be implemented by Dudley, pursuant to landowner specifications and state and county regulations governing weed control.

4.11.2.3 Geologic Hazards, Ground Water, Noise and Odors, Land Use, and Hazardous Materials

Cumulative impacts from geologic hazards and to ground water, noise and odor, hazardous materials, and landownership and use generally would be as described for the Proposed Action for these resources. However, since the level of development would be increased to 19 total wells and associated features, the magnitude of these impacts would be increased.

4.11.2.4 Minerals and Socioeconomics

The proposed project would result in a depletion of CBM resources in the area but would not interfere with the potential recovery of other minerals. CBM development would add to the economic well-being of Carbon County, the State of Wyoming, and the U.S. because of increased revenues from job creation, spending, taxes, and royalties.

4.11.2.5 Cultural Resources

Disturbance and/or loss of unidentified sites or artifacts may add to the cumulative loss of information about our heritage in the SRPPA and throughout the region if these resources are not identified, inventoried, and/or appropriately protected or mitigated. However, such losses are not expected since mitigation measures as identified for the Proposed Action (see Section 2.1.13.3) would be implemented under all proposed and potential future regional development projects with federal involvement. In the absence of cultural resource clearances and/or other federally mandated cultural resource protection measures, increased impacts to cultural resources (on private lands) may occur.

4.11.2.6 Paleontology

With the application of appropriate mitigation (see Section 2.1.13.4), cumulative impacts similar to those of cultural resources (see Section 4.11.2.5) are anticipated for paleontological resources. The likelihood of disturbing paleontological resources would remain low; however, any fossils uncovered during construction might not be mitigated on private lands in the same way they would be under the Proposed Action, resulting in a loss of those fossils. In addition, natural erosion and illegal collection would continue at current levels.

4.11.2.7 Wildlife and Fisheries

Impacts to pronghorn would be as described for the Proposed Action yet increased due to private land developments. Pronghorn populations would be affected primarily by climatological

conditions, especially drought and severe winter weather, and by WGFD harvest quotas. Most other mammal and bird populations would similarly be affected primarily by natural forces, especially the weather. Project developments (e.g., wells, roads, pipelines, and power lines) may make management of sage grouse and raptor populations more difficult. However, protection of sage grouse leks and nesting habitat (on public land), as well as raptor nests (on all lands), are strictly enforced and would be applied on future projects to ensure existing populations are maintained. With the proper management of watersheds and produced water discharge (e.g., volume and constituent limitations), cumulative impacts to fish in Seminoe Reservoir and the North Platte River watershed are not anticipated. However, potential bioaccumulation effects are unknown.

The proposed project may contribute some additional impacts (e.g., habitat loss and increased human presence) to the cumulative effects on black-footed ferret habitat from ranching, oil and gas projects, and transportation or on prairie dogs (i.e., black-footed ferret prey base) from non-BLM pest control and recreational shooting, through habitat loss and increased access.

Cumulative impacts to the local mountain plover population, primarily through habitat loss and displacement, as a result of the proposed project are unknown. Although disturbance due to ranching, oil and gas development, and transportation has removed an unknown portion of potential mountain plover breeding and nesting habitat, the relatively small disturbance acreage (49.0 acres) and short-term nature of proposed project disturbances make it unlikely that the proposed project, in combination with other regional actions, would jeopardize plover reproduction. Furthermore, all measures for mountain plover protection resulting from USFWS conferencing and identified in the BO would be applied during project development.

North Platte River depletions are not anticipated as a result of the proposed project. Therefore, the proposed project in combination with other existing and reasonably foreseeable actions would not contribute to current adverse effects to downstream species.

The proposed project may contribute some additional impacts through habitat loss, displacement, and increased human access, to the cumulative effects on state-sensitive species from ranching,

oil and gas projects, and transportation, or on prairie dogs (i.e., raptor prey base and burrowing owl habitat) from pest control and recreational shooting.

4.11.2.8 Aesthetics and Visual Resources

Impacts to visual resources from altered viewsheds (i.e., visible project development features--well locations, roads, power lines, pipeline ROWs--and presence of dust), especially in VRM Class II areas, would become increasingly critical as development occurs.

5.0 RECORD OF PERSONS, GROUPS, AND GOVERNMENTAL AGENCIES CONTACTED

Table 5.1 General Record of Persons, Groups, and Governmental Agencies Contacted.[1]

Company/Agency	Individual	Discipline/Position
Biodiversity Associates/Friends of the Bow	Jeff Kessler	--
Concerned Citizen	Ivan Herold	--
	Shirley I. Herold	--
	Lance Morrow	B.S. Biology
	Jill Morrow	Ph.D. Biochemistry
	Barbara Parsons	--
Dudley & Associates, LLC	David Dudley	Operating Manager - CEO
	Kate Fay	Environmental and Regulatory Specialist
	David Jensen	Operating Manager - COO
	David Loken	GIS Specialist/Geologist
	Ken Morr	Operations and Compliance Specialist
	Tim Schowalter	Exploration Manager/Geologist
	Don Schroeder	Land Manager
Miller Estate Co.	Fred R. Kelly, Jr.	President
U.S. Bureau of Reclamation	John H. Lawson	Area Manager
U.S. Department of Agriculture, Forest Service	Lyle Laverty	Regional Forester
U.S. Department of Transportation, Federal Highway Administration	Leonard G. Swanson	P.E. Safety/Traffic Engineer
U.S. Fish and Wildlife Service	Michael M. Long	State Supervisor
University of Wyoming	D. Jay Lillegraven	Paleontologist
Wyoming Department of Agriculture	Ron Micheli	Director
Wyoming Department of Environmental Quality	Dennis Hemmer	Director
Wyoming Department of Environmental Quality, Water Quality Division	Various	Various
Wyoming Department of State Parks and Cultural Resources, State Historic Preservation Office	Judy K. Wolf	Deputy State Historic Preservation Officer
Wyoming Division of State Parks and Historic Sites	Bill Gentle	Director
Wyoming Game and Fish Department	Jackie Sara	Data from Wildlife Observation System Database
	Bill Wichers	Deputy Director
Wyoming Natural Diversity Database	Walt Fertig	Botanist
	Laura Welp	Special Projects Manager
Wyoming Office of Federal Land Policy	Julie L. Hamilton	Planning Consultant
Wyoming Outdoor Council	Dan Heilig	Attorney/Executive Director
Wyoming State Engineer's Office	Jodee Hopkins	Water Rights Information
Wyoming State Geological Survey	Lance Cook	State Geologist

Table 5.2 List of Preparers.

Firm/Company	Name	EA Responsibility
U.S. Bureau of Land Management (ID Team)	Brenda Neuman	Team Leader
	John Spehar	NEPA Coordinator
	Robert Epp	Range Management
	Krystal Clair	Recreation/Visuals
	Janelle Wrigley	Realty
	Frank Blomquist	Wildlife & T&E
	Kip Purinton	Petroleum Engineer
	Gary DeMarcay	Cultural Resources
	Susan Caplan	Air Quality
	Susan Foley	Soils/Weeds
	Ken Peacock	Water Resources
	Mark Newman	Paleontology & Geology
	Mary Apple	Public Affairs
TRC Mariah Associates Inc.	Pete Guernsey	Project Management, EA Preparation, Quality Assurance/Quality Control
	Roger Schoumacher	EA Preparation, Quality Assurance/Quality Control
	Beth Tebben	EA Preparation/Data Collection
	Genial DeCastro	Document Production, Quality Control
	Joe Frank	Water Management Plan
	Gabriele S. Walsen	Water Management Plan
	James Lowe	Cultural Resources
	Craig Smith	Cultural Resources, Quality Assurance/Quality Control
	Gus Winterfeld	Paleontology (Erathem-Vanir Geological Consultants)
	Jan Hart	Biological Field Survey
	Diane Thomas	Biological Field Survey
	Randy Blake	Biological Field Survey
	Darden Hood	Water Dating
	Amber Travsky	Biological Field Survey
	Larry DeBrey	Biological Field Survey
	Tamara Linse	Technical Editing
	S.L. Tiger Adolf	Document Production

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APPENDIX A:

SCOPING ISSUES AND CONCERNS

SCOPING ISSUES AND CONCERNS

- Potential adverse impacts to big game, sage grouse, raptors, and other wildlife resulting from project-related habitat loss and fragmentation, fence construction, increased vehicular traffic, and noise.
- Potential increases in traffic and associated impacts on existing county, state, and Bureau of Land Management (BLM) roads and highways.
- Potential social and economic impacts to local communities and the State of Wyoming.
- Potential adverse impacts to surface and ground water resources due to the release of poor quality ground water to existing surface water resources, including Seminoe Reservoir and the North Platte River system, with special reference to heavy metal concentrations and sodium adsorption ratio.
- Potential adverse impacts to sensitive soils within the Seminoe Road Pilot Project Area (SRPPA).
- Potential adverse impacts to air quality resulting from emissions associated with additional drilling and production activities and compressor station operation.
- Potential for unsuccessful reclamation of disturbed areas.
- Potential conflicts with agricultural operations, including livestock grazing, in the vicinity of the SRPPA.
- Potential impacts to cultural and historical values within the SRPPA.
- Potential impacts to threatened, endangered, proposed, and sensitive plant and animal species, including those found downstream in the North Platte River.
- Cumulative impacts of drilling and development activities when combined with other proposed and ongoing developments on lands in the vicinity of the SRPPA.
- Potential conflicts between mineral development activities and recreational opportunities.
- Potential adverse impacts to aquatic resources in Seminoe Reservoir and downstream.
- Potential adverse impacts to visual resources, including the viewshed from Seminoe State Park.

- Future need to develop coalbed methane (CBM) resources under Seminoe State Park.
- Increased use of Seminoe State Park by workers associated with CBM development.
- Potential impacts to multiple use of BLM lands, including a reduction in access and aesthetic values for hunters.
- Loss of open space.
- Potential impacts of dewatering coal beds on water levels in wells.
- Potential adverse impacts of overhead power lines and buildings on sage grouse, mountain plover, and other animals because of increased perching areas for raptors.
- Increased likelihood of underground fires in dewatered coal beds.
- Potential for invasion of undesirable plant species, especially cheatgrass.
- Potential for water depletions in the North Platte River.
- Failure of the project to comply with Visual Resource Management class criteria as stated in the Resource Management Plan (RMP).
- Potential for methane contamination of shallow aquifers.
- Potential adverse impacts to Bureau of Reclamation (BOR) waters, lands, and surface and flowage easements.
- Potential impacts to wetlands and riparian areas, including opportunities to create wetlands.
- Protection of paleontological resources.
- Potential air quality impacts to U.S. Forest Service (USFS) wilderness areas.
- Enforcement of BOR stipulations for wells developed on BOR acquired lands.
- Potential use of produced water for irrigation/new cropland development which could adversely affect certain wildlife species.
- Failure of the RMP to consider CBM development.
- Violation of NEPA by BLM by allowing development of two federal wells prior to completion of this EA.
- Potential adverse impacts to the environment from spills, accidents, and impoundment breaches.

- Need for National Pollution Discharge Elimination System (NPDES) discharge and storm water permits.
- Potential adverse impacts to soils due to compaction and accelerated erosion, including that caused by discharge of produced water.
- Estimates of aquifer recharge potential.
- Relationships between Dudley and local landowners.
- Concerns for road design as it relates to safety.

APPENDIX B:

WATER MANAGEMENT PLAN

REPORT

WATER MANAGEMENT PLAN
SEMINOE ROAD
PILOT PROJECT
(ABRIDGED)

Prepared For:

U.S. Bureau of Land Management
Rawlins Field Office

1300 Third Street North
Rawlins, WY 82301

Prepared by:

TRC

Project No. 28757
March 2001
(Revised April 2001)

WATER MANAGEMENT PLAN
SEMINOE ROAD PILOT PROJECT

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LIST OF ACRONYMS AND ABBREVIATIONS

Dudley	Dudley & Associates, LLC
CBM	Coalbed methane
Project	Seminoe Road Pilot Project
bwpd	Barrels of water per day
cfs	cubic feet per second
mcfgpd	Million cubic feet of gas per day
NPDES	National Pollutant Discharge Elimination System
BLM	Bureau of Land Management
APD	Application for Permit to Drill
EA	Environmental Assessment
USGS	U.S. Geological Survey
TDS	Total dissolved solids
SAR	Sodium absorption ration
TSS	Total suspended solids
BMP	Best management practices
ft/sec	feet per second
gpm	gallons per minute

WATER MANAGEMENT PLAN
SEMINOE ROAD PILOT PROJECT

1.0 INTRODUCTION

Dudley & Associates, LLC (Dudley) proposes to develop a pilot scale coalbed methane (CBM) project, known as the Seminoe Road Pilot Project (Project). The Project is located in south-central Wyoming in Carbon County, southwest of Seminoe Reservoir. The Project site elevation is approximately 6,600 feet above sea level. The Project includes 18 test production wells (including two alternate wells) and one pressure monitoring well located in Township 23 North, Range 85 West, and Township 24 North, Range 85 West. The wells will be completed in the coalbeds of the Upper Mesaverde Group (Cretaceous age) at an average depth of 5,413 feet. Well spacing of four wells per section (160-acre drillsite spacing) is planned. The total Project Area is approximately 8,320 acres. Water produced from the wells will be collected and discharged at three points in the ephemeral drainage Pool Table Draw. Pool Table Draw discharges into Seminoe Reservoir. The Project location is shown on Figure 1. The draft National Pollutant Discharge Elimination System (NPDES) permit for this project is included as Appendix C of the environmental assessment (EA).

2.0 PROJECT DESCRIPTION

2.1 DISCHARGE WATER

The coals targeted for the methane production are in the Upper Mesaverde Group, Almond and Allen Ridge Formations. The production wells will be perforated in the main coalbeds in the coal-bearing zone. It will be necessary to lower the water level in the production coals in order to liberate the methane gas. Based on limited data from test well 4-35-24-85, the maximum theoretical initial discharge rate from each well is about 1,500 barrels of water per day (bwpd) or 0.097 cubic feet per second (cfs) (Halliburton, 2000). The discharge rate per well is expected to decrease to a steady state rate of about 900 bwpd or 0.058 cfs after 30 days of pumping. Discharge values were calculated from diagnostic fracture injection test analyses and reservoir simulation techniques (Halliburton, 2000). This is a conservative estimate, and actual discharge values may be less depending on geologic conditions, pumping equipment limitations, interference of adjacent wells, and reservoir enhancement methods.

Other western U.S. CBM projects have shown a classic decline in water production with increasing gas production. The Drunkard's Wash Project in east-central Utah is a good example (Lamarre and Burns, 1997). In this study, 33 CBM wells were producing for 40 months, and the average gas production rate increased from less than 200 million cubic feet of gas per day (mcfgpd) to 692 mcfgpd. During the last 4 months of the study, gas production stabilized. During the same period, the normalized water production declined from about 700 to 251 bwpd. The relationship is illustrated on Figure 2.

Three discharge points are planned for the project and are designated DS-1 through DS-3. Locations of the proposed discharge points and affected drainages are shown on Figure 3. The outfall structures for the discharge will consist of energy dissipaters designed to minimize erosion. A typical outfall structure is illustrated on Figure 4. Discharge points DS-1 and DS-2 will be located in the West Fork of Pool Table Draw, which flows to the permitted Pool Table Draw Reservoir then to the confluence with the East Fork of Pool Table Draw. DS-3 will be in the East Fork of Pool Table Draw. The West and East Forks of Pool Table Draw confluence to

the north and then flow to Seminoe Reservoir. All of the discharge points will be located in low gradient and non-eroding sections of the drainages, downstream of head-cutting areas.

This Water Management Plan is designed to minimize peak water discharge volumes. Production wells will be scheduled to go online successively to smooth the peaks in the water production curve for the Project. The first wells will begin water production in June 2001, and the final well will go into production in September 2001. The maximum cumulative discharge rate for all wells in the Project was calculated to be about 17,380 bwpd or 1.13 cfs, and the steady state rate will be approximately 16,200 bwpd or 1.05 cfs. Figure 5 illustrates the estimated release of water from the discharge points to Pool Table Draw over time. A summary of the discharge data is presented in Table 1.

TABLE 1
DISCHARGE POINT SUMMARY, SEMINOE ROAD PILOT PROJECT

Discharge Point[1]	Location				Drainage	Wells	Steady State Discharge (cfs)
	Township	Range	Section	Qtr. Qtr.			
DS-1 (001)	24N	85W	27	NE NW	W. Pool Table Draw	15-22-24-85 3-27-24-85	0.12
DS-2 (002)	24N	85W	27	NE SW	W. Pool Table Draw	1-27-24-85 11-27-24-85 16-27-24-85 4-34-24-85 7-34-24-85	0.35
DS-3 (003)	24N	85W	26	SW SW	E. Pool Table Draw	14-23-24-85 (alt) 5-26-24-85 14-26-24-85 4-35-24-85 16-33-24-85 12-34-24-85 10-34-24-85 14-35-24-85 4-3-23-85 2-3-23-85 (alt) 1-4-23-85	0.58

[1] Numbers in parentheses refer to the NPDES designation.

Cumulative discharge through time to Seminoe Reservoir was also calculated for the Project. The calculations considered flow volume and timing at each discharge point, estimated infiltration in the drainages as a function of time, and potential evaporation from the flowing streams and Pool Table Draw Reservoir. Based on current production schedules, the maximum discharge to Seminoe Reservoir will be about 16,912 bwpd or 1.10 cfs in January 2002. The steady state will be approximately 15,756 bwpd or 1.02 cfs starting in February 2002. Figure 6 illustrates the cumulative discharge rate to Seminoe Reservoir. The discharge calculation data sheets are in the unabridged Water Management Plan for the Project on file at the U.S. Bureau of Land Management (BLM) Field Office in Rawlins, Wyoming (BLM, 2001). It should be noted that the preceding production schedule is tentative and represents the earliest possible timing. The schedule assumes a favorable decision by the BLM on the EA, approval of the pending NPDES permit (see EA Appendix C), and other applicable federal and state requirements.

2.2 SURFACE DISTURBANCE

Access to the Project will be along existing developed and undeveloped roads. Production well sites will be constructed on level ground on pads about 2.5 acres in size. Drilling fluids and cuttings will be contained in pits. Each well will require a water discharge line and gas line. Water lines will be routed to nearby discharge points, as described in the previous section of this report. If the pilot project is successful, gas lines from the wells will be constructed and follow access roadways to a centrally located area and a new gas gathering line would be installed linking the Project site to gas lines located near Sinclair, Wyoming, along Interstate 80.

Access roads to the Project well sites will be engineered to minimize disturbance and erosion pursuant to the BLM *Road Standards Manual*, Section 9113 (BLM, 1985). The roads will be crowned and ditched, and graveled if necessary. Drainage crossings will be either low water crossings or provided with culverts where necessary. Low-flow crossings will not affect the natural drainage flow or channel cross section. Drainage crossings of narrow incised channels will be constructed with appropriately sized corrugated metal culverts installed in the center of the channel. Culvert crossings will be constructed with gabion baskets and riprap reinforcement, if necessary to prevent erosion. A detailed site map and culvert data table is available in the

unabridged Water Management Plan for the Project on file at the BLM Rawlins Field Office (BLM, 2001).

Well pads will be constructed on level ground, and all drilling fluids will be contained in the drilling pit. After drilling, the pits will be allowed to evaporate and the pads will be graded and reseeded according to permit requirements to prevent erosion. Gas lines will follow access roads for ease of maintenance and construction and to minimize surface disturbance. Water lines will also follow access roads where practical. However, the water lines will be routed off roadways to the discharge points. Water line corridors will be graded and reseeded to prevent erosion. Engineered road, well pad, and pipeline corridor design plans are detailed in state and federal applications for permits to drill (APDs) and in Chapter 2 of the EA for the Project.

3.0 SURFACE WATER HYDROLOGY

3.1 CLIMATE

The climatic regime at the Project Area is midcontinental and semi-arid (dry and cool). Windy conditions are common in this area, and winters are typically long and cold. Meteorological data for the Project were collected from nearby stations at Wamsutter, Rawlins, Seminoe Reservoir, and Leo 6 SW. The period of record for the Wamsutter station (elevation 6,820 feet) is 1948 to 1999. The Rawlins station is at an elevation of 6,740 feet and has a period of record from 1951 to 1999. Seminoe Reservoir is at an elevation of 6,840 feet with a period of record from 1948 to 1991. The period of record for Leo 6 SW (elevation 6,000 feet) is from 1948 to 1999. The Project site has a similar topography and elevation (approximately 6,600 feet) to these meteorological stations. A summary of the climatological data is presented in Table 2.

3.1.1 Temperature, Precipitation, and Evaporation

The Project Area is typically cool, with average annual minimum temperatures ranging from 27.3°F (Wamsutter) to 31.4°F (Seminoe Reservoir) and maximums between 55.0°F (Rawlins) and 57.8°F (Leo 6 SW). Extreme daily temperatures range from –40°F to over 90°F. The average annual precipitation is from 6.87 inches (Wamsutter) to 12.72 inches (Seminoe Reservoir). Precipitation is evenly distributed throughout the year, with a minor peak in May. Average snowfall is about 22.7 inches (Wamsutter) to 56.3 inches (Leo 6 SW). Average annual pan evaporation for southern Wyoming is estimated as 50.0 inches. This is equal to an average annual lake evaporation rate of about 38 inches.

3.1.2 Precipitation Frequency

Precipitation values associated with various return periods were collected from Volume II of the NOAA Precipitation Frequency Atlas of the Western United States (Miller et al., 1973). The precipitation distribution recommended for the southern Wyoming area is Type II. Table 3 summarizes the Project Area precipitation frequency data for various return periods for 24-hour storm durations.

TABLE 2
SUMMARY OF CLIMATOLOGICAL DATA, SEMINOE ROAD PILOT PROJECT

	Average Max. Temperature (ºF)				Average Min. Temperature (ºF)				Average Total Precipitation (inches)			
Station:	**Leo 6 SW[1]**	**Rawlins[2]**	**Seminoe[3]**	**Wamsutter[4]**	**Leo 6 SW[1]**	**Rawlins[2]**	**Seminoe[3]**	**Wamsutter[4]**	**Leo 6 SW[1]**	**Rawlins[2]**	**Seminoe[3]**	**Wamsutter[4]**
Month												
Jan	31.5	30.7	29.8	27.6	11.4	12.4	12.1	7.1	0.53	0.52	0.55	0.26
Feb	37.2	33.9	33.7	32.6	15.7	14.7	15.0	10.6	0.64	0.51	0.63	0.24
Mar	43.2	41.1	40.6	41.1	19.3	20.2	19.4	17.8	0.81	0.69	1.07	0.36
Apr	55.4	52.0	52.6	53.4	27.6	27.5	28.0	26.0	1.29	1.04	1.55	0.67
May	66.3	63.5	63.7	64.4	36.6	36.4	37.2	34.2	1.84	1.32	2.21	1.03
Jun	77.4	75.0	75.2	75.5	43.1	44.7	46.8	42.3	1.08	0.94	1.35	0.79
Jul	84.4	83.2	83.3	83.6	48.9	51.3	53.6	48.9	0.85	0.78	1.00	0.82
Aug	82.3	80.8	81.4	81.4	47.0	49.9	51.8	47.1	0.62	0.77	0.76	0.78
Sep	75.9	70.3	71.3	72.1	40.0	40.8	42.5	38.5	0.74	0.8	0.95	0.74
Oct	60.4	57.0	57.9	59.0	32.8	31.3	32.7	28.7	1.01	0.83	1.11	0.59
Nov	43.9	40.8	41.7	41.1	20.3	20.6	22.5	17.4	0.78	0.59	0.89	0.35
Dec	35.1	32.2	32.2	30.0	14.9	14.1	14.9	9.5	0.56	0.5	0.65	0.24
Annual	**57.8**	**55.0**	**55.3**	**55.2**	**29.8**	**30.3**	**31.4**	**27.3**	**10.75**	**9.28**	**12.72**	**6.87**

1 Leo 6 SW (485525); Elevation 6,000 feet, Period of Record from 8/1/1948 to 12/31/1999.

2 Rawlins FAA Airport (487533); Elevation 6,740 feet, Period of Record from 3/6/1951 to 12/31/1999.

3 Seminoe Dam (488070); Elevation 6,840 feet, Period of Record from 8/ 5/1948 to 9/30/1991.

4 Wamsutter (489459); Elevation 6,820 feet, Period of Record from 8/1/1948 to 12/31/1999.

Source: Western Regional Climate Center, 2000.

TABLE 3
PRECIPITATION FREQUENCIES, SEMINOE ROAD PILOT PROJECT

Return Period (yr)	Storm Duration (hr)	Precipitation (inches)
2	24	1.00
5	24	1.23
10	24	1.60
25	24	2.00
50	24	2.20
100	24	2.43

Source: Miller et al., 1973.

3.2 WATERSHED CHARACTERISTICS

Project well sites are located within two small watersheds with ephemeral drainages. Both watersheds discharge into Seminoe Reservoir on the North Platte River. It should be noted that prior to the filling of Seminoe Reservoir, the watersheds discharged into the O'Brien Creek; O'Brien Spring has perennial flow, whereas O'Brien Creek has intermittent flow. The western Project watershed is designated Pool Table Draw, which includes an East and West Fork, and the eastern watershed area is called Ayers Draw. The Project discharge points are all located in Pool Table Draw. The watershed areas are shown on Figure 3, and a summary of watershed characteristics is presented in Table 4.

The North Platte River flows from Colorado into Wyoming and on to Nebraska. The U.S. Geological Survey (USGS) gauging station above Seminoe Reservoir (station #06630000) has an average daily flow of 1,146 cfs, a maximum flow of 14,800 cfs, and a minimum of 70 cfs. The period of record for this station is from July 1939 to September 1999. The nearest USGS gauging station below Seminoe Reservoir is at Alcova (station #06642000) and has an average daily flow of 1,298 cfs, a maximum flow of 13,400 cfs, and a minimum of 3 cfs. The period of record for this station was from March 1903 to December 1905 and October 1934 to September 1998.

TABLE 4
WATERSHED CHARACTERISTICS SUMMARY,
SEMINOE ROAD PILOT PROJECT

Watershed	Characteristic	Sub-watershed	Area (acres)	Length (ft)	Headwaters Elevation (ft)	Discharge Elevation (ft)	Gradient (%)	Discharge Point
Pool Table Draw	Ephemeral	West Fork	6,783.4	42,480	7,300	6,420	2.1	Confluence
		East Fork	3,262.6	17,236	6,670	6,420	1.5	Confluence
Pool Table Draw Forks Confluence to Reservoir	Ephemeral		953.6	8,320	6,400	6,340	0.7	Seminoe Reservoir
Ayers Draw	Ephemeral		2,966.6	24,787	6,660	6,340	1.3	Seminoe Reservoir

3.2.1 Drainage Characteristics

The Project Area drainages are ephemeral and flow only in response to storm events or snowmelt. Pool Table Draw has two minor unnamed tributary forks. For the purpose of this study, the forks will be referred to as the East and West Forks of Pool Table Draw. The Pool Table Draw watershed has an area of 10,046 acres, with elevations of the drainage channel ranging from about 7,280 feet to 6,420 feet at the confluence of the two forks. Average gradient of the Pool Table Draw drainage channel is about 1.8%. The Ayers Draw watershed has an area of 2,967 acres, with elevations of the drainage channel ranging from about 6,660 feet to 6,340 feet at Seminoe Reservoir. The average gradient of the Ayers Draw drainage channel is 1.3%. The ephemeral drainages in the Project Area have widths ranging from several feet to over 20 feet, averaging about 4 feet. The drainage channels have been incised approximately 2 feet to over 6 feet. Minor head cutting zones are present in several spots along the drainage channels where the slope gradient increases.

3.2.2 Peak Flow Analysis

Only ephemeral drainages occur in the Project Area. In ephemeral streams, runoff volumes and peaks are dependent on precipitation frequency-duration relationships and on the characteristics of the contributing drainage area. Basin characteristics, which control runoff volumes, are basin area, relief, soil type, vegetative cover, and stream length. These parameters are critical in determining the hydraulic and geomorphic characteristics of the area.

Runoff calculations were performed for the Project Area drainages using two well-accepted analytical methods, "Techniques for Estimating Flow Characteristics of Wyoming Streams" (Lowham, 1976) and "Analysis of Runoff from Small Drainage Basins in Wyoming" (Craig and Rankl, 1978). Each method is based on a regression of drainage area for estimating flow for slightly different watershed areas. The calculated 2-year peak flows for Ayers Draw range from 102 cfs (Lowham method) to 235 cfs (Craig and Rankl method). The 2-year peak flows for Pool Table Draw range from 311 cfs (Lowham method) to 750 cfs (Craig and Rankl method). The 100-year peak flows for Ayers Draw range from 1,253 cfs (Lowham method) to 2,136 cfs (Craig and Rankl method). The 100-year peak flows for Pool Table Draw range from 3,792 cfs (Lowham method) to 7,056 cfs (Craig and Rankl method). A summary of peak flow calculations is shown in Table 5.

TABLE 5
SUMMARY OF PEAK FLOW CALCULATIONS (CFS),
SEMINOE ROAD PILOT PROJECT

Return Period (years)	Ayers Draw		West Fork		East Fork		Lower Pool Table Draw		Pool Table Draw	
Area (sq. miles)	4.6		10.6		5.1		1.5		17.2	
Method	Wyoming Streams[1]	Small Basins[2]	Wyoming Streams[1]	Small Basins[2]	Wyoming Streams[1]	Small Basins[2]	Wyoming Streams[1]	Small Basins[2]	Wyoming Streams[1]	Small Basins[2]
2	102	235	139	380	105	248	66	121	311	750
5	250	510	334	846	258	541	168	255	760	1,642
10	403	772	533	1,302	416	820	274	377	1,223	2,498
25	673	1,214	885	2,095	695	1,292	463	574	2,043	3,961
50	934	1,630	1,218	2,858	963	1,739	650	754	2,831	5,352
100	1,253	2,136	1,619	3,807	1,291	2,283	882	966	3,792	7,056

[1] Lowham, 1976. For basins from 5 to 5,300 square miles in Wyoming
[2] Craig and Rankl, 1978. For basins from 0.69 to 10.8 square miles in plains and large valleys in Wyoming.

3.2.3 Hydraulic Analysis

A hydraulic analysis of Pool Table Draw was performed using a computerized version of the Manning Equation (LMNO, 2001). The inputs to the program include channel shape, gradient, bottom width, and flow volume rate. Pool Table Draw will support the required continuous flows from the Project without significant erosion due to low channel velocities (<2 ft/sec in any reach), low Froude numbers, and distribution of flow in two tributary drainages. The calculated

channel velocities in the West Fork of the Pool Table Draw were calculated to be approximately 1.98 and 1.74 feet per second (ft/sec) for maximum and steady state discharge from the wells, respectively. Velocities in the East Fork of the Pool Table Draw will be 1.75 and 1.71 ft/sec for maximum and steady state discharge, respectively. Velocities in the lower portion of Pool Table Draw will be 1.73 and 1.67 ft/sec for maximum and steady state discharge, respectively. A summary of the hydraulic analyses is presented in Table 6. The data for the calculations are presented in Appendix B of the unabridged Water Management Plan. Flow velocities for natural peak discharges are significantly higher, from 311 to 7,056 ft/sec in the lower portion of the Pool Table Draw. The addition of the maximum discharge to any flood event will not increase the natural flood event measurably.

An analysis of hydraulic capacity of Pool Table Draw indicates that the proposed maximum flow from the Project can be transported in a nonerosive manner. Maximum discharge from the discharge points will be about 0.65 cfs for the West Fork of Pool Table Draw and 0.62 cfs for the East Fork (Table 6). These flows are significantly lower than the estimated 2-year peak flows of 139 cfs and 105 cfs for the West and East Forks respectively (Table 5) and should not contribute significantly to natural erosional activity.

TABLE 6
SUMMARY OF HYDRAULIC ANALYSES DATA,
SEMINOE ROAD PILOT PROJECT

	Maximum Discharge (cfs)	Steady State Discharge (cfs)	Gradient (%)	Shape	Side Slope (ft/ft)	Bottom Width (feet)	Manning's Coefficient	Maximum Velocity (ft/sec)	Steady State Velocity (ft/sec)	Froude Number[3]
West Fork[1]	0.65	0.47	2.1	Trapez.	0.5	4	0.020	1.98	1.74	1.20
East Fork[1]	0.62	0.58	1.5	Trapez.	0.5	4	0.020	1.75	1.71	1.00
Lower Pool Table Draw[2]	1.10	1.02	0.7	Trapez.	0.5	4	0.020	1.73	1.67	0.80

Notes:
1 Discharge values do not consider infiltration or evaporative losses.
2 Infiltration and evaporative losses considered for discharge estimates.
3 Froude number is the same for maximum and steady state discharge (less than significant digits).

4.0 GROUND WATER HYDROLOGY

Based on limited drilling data and observations of several wells and springs, the ground water system in the area consists of several ground-water-bearing zones. There is a shallow ground-water-bearing zone in the upper coalbeds and sandstone beds of the Medicine Bow and Fox Hills Formations and a deeper ground water zone in the coals and sandstones of the Upper Mesaverde Group. No water wells or springs are located in the Project Area. The nearest water wells (Coal Creek Bay and Lower Little Shoe wells) and spring (O'Brien Spring) are located about 3 miles from Project coalbed methane wells (see Figure 3).

4.1 SHALLOW GROUND WATER SYSTEM

Several local wells are installed in shallow ground-water-bearing zone. The depth of the wells range from about 100 feet to over 500 feet. The shallow ground-water zone is confined to semi-confined, and many of the wells have artesian flow. The shallow ground-water flow direction generally follows topography and flows from west to east toward the North Platte River and Seminoe Reservoir. A major fault located west of Seminoe Road may act as a regional barrier to ground-water flow. Recharge to this system is from direct precipitation and infiltration and from surface flows at surface outcrops in Haystack Mountains. The Haystack Mountains are located about 5 miles west of the Project Area. Typical recharge rates for semi-arid areas range from 5 to 10% of annual precipitation.

4.2 DEEP GROUND WATER SYSTEM

The deep ground-water zone has been penetrated by numerous oil and gas wells in the area at a depth of about 5,000 feet. The deep ground water occurs in the coals and sandstones of the Upper Mesaverde Group. The deep ground-water system is confined with water levels well above the water-bearing horizon. Test well 4-35-24-85 is over 6,000 feet deep and is perforated in coals in the Almond and Allen Ridge Formations at depths ranging from about 5,000 to 5,650 feet. The water level in this well is about 163 feet below ground surface. The overlying Lewis Shale and underlying Steele Shale Formations effectively isolate the Mesaverde water-bearing system from other aquifers (Lowry et al., 1973). No known water wells in the area are completed in the Mesaverde strata.

5.0 WATER QUALITY AND QUANTITY

5.1 SURFACE WATER

Three water quality samples have been collected from Seminoe Reservoir near the mouth of Pool Table Draw. The Seminoe Reservoir water is calcium bicarbonate type, with slightly alkaline pH of 8.19 to 9.06 units (May and June 2000) and total dissolved solids (TDS) concentration of 248 to 304 mg/l (May and June 2000). The water has generally low concentrations of trace constituents, with the exception of aluminum, copper, iron, manganese, lead, and zinc. Aluminum (total) concentrations were variable, ranging from <50 µg/l to 555 µg/l (November and June 2000). Copper (dissolved) concentrations were also variable ranging from 2.4 µg/l to 4.4 µg/l (June and May 2000). Iron (total) concentrations ranged from 150 µg/l to 2,360 µg/l (November and June 2000). The lead (dissolve) concentration was elevated in June 2000 at 3.21 µg/l, and zinc (dissolved) was slightly elevated in November 2000 at 40 µg/l. A summary of water quality data is presented in Table 7.

5.2 SHALLOW GROUND WATER

Two rounds of ground-water quality sampling were completed for the Project in the spring of 2000, and a single sample from O'Brien Spring was collected in November 2000. Monitoring sites include two wells (Wild Horse and Section 19 wells) and two springs (O'Brien and Corral Canyon Spring) (see Figure 3). The Wild Horse Draw well has calcium sulfate/bicarbonate type water, with a pH of 7.7 to 8.3 units (May and June 2000) and TDS concentrations ranging from 1,220 mg/l (May 2000) to 1,190 mg/l (June 2000) (Table 7). Water level measurements were not recorded for this site. The Section 19 well is an artesian well that is piped to a stock tank approximately 0.5 miles to the east. The flow, as measured at the stock tank, is 0.75 gallons per minute (gpm). The water at this well is a calcium sulfate/bicarbonate type, with a neutral pH of 7.27 to 7.23 (May and June 2000) and TDS concentrations of 936 mg/l (May 2000) and 888 mg/l (June 2000). O'Brien spring has a perennial flow of about 60 gpm and flows into O'Brien Creek. The water of O'Brien spring is a calcium bicarbonate type, with a pH of 8.0 and 8.2 units (May and June 2000) and TDS concentrations ranging from 767 mg/l (May 2000) to 720 mg/l (June 2000). Corral Canyon Spring is a calcium bicarbonate type, with a neutral pH (6.87) and

TABLE 7
SUMMARY OF WATER QUALITY DATA, SEMINOE ROAD PILOT PROJECT[1]

Parameter	Aquatic Life Acute Value[2]	Aquatic Life Chronic Value[2]	Wyoming Livestock Standards[2]	Wyoming Human Health Standards[2]	O'Brien Spring[3]	Wild Horse Draw Well[4]	Corral Creek Spring[5]	Section 19 Well[4]	Seminoe Reservoir[6]	Well 4-35-24-85[7]
pH (units)		6.5-9.0	6.5-8.5	6.5-9.0	8.0-8.2	7.72-8.30	6.96	7.23-7.27	8.19-9.06	7.0-8.31
TDS			5000		720-767	1190-1220	608	888-936	248-304	1300-1970
Bicarb. (tot)					361-381	360-466	381	348-356	111-132	1280-1341
Chloride (tot.)	860	230	2000		15.5-18	7.7-11.0	6.2	8.8-10	2-6.3	33.1-458
Sulfate (tot.)			3000		236-288	545-638	225	220-411	82.4-102	bdl-3
Calcium (diss.)					79-81	110-154	120	130-145	40-44	8-36
Magnesium (diss.)					13-54	84-96	52	64-65	13-15	2-9
Sodium (diss.)					22-110	98-110	49	44-159	23-30	448-641
Aluminum (diss.)	0.75	0.087	5.0		bdl-0.13	0.007-0.16	0.36	0.006-0.19	bdl-0.555	bdl-0.32
Antimony (tot.)				0.014	bdl-0.0041	bdl-0.0008	bdl	bdl-0.0001	bdl-0.00008	bdl-0.0003
Arsenic (tot.)	0.36	0.19	0.2	0.007	bdl-0.0007	bdl-0.003	bdl	bdl-0.0001	bdl-0.0021	bdl-0.0002
Barium (tot.)				2.0	bdl-0.028	0.012-0.013	0.032	0.0089-0.011	0.037-0.0666	0.2-3.08
Boron (diss.)			5.0		0.11-0.35[8]	0.166-0.18[(7)]	0.036[(7)]	bdl-0.042	0.0073-0.059[(7)]	0.446-0.62
Copper (diss.)	0.018	0.012	0.5	1.0	0.0015-0.0067	0.0018-0.0028	0.0039	0.0007-0.0026	0.0024-0.0044	bdl-0.052
Iron (tot.)		1.0 (diss)		0.3	bdl-0.19	0.078-0.156	4.9	2.54-2.8	0.15-2.36	3.47-16.3
Manganese (tot.)	0.311 (diss)	1.462 (diss)		0.050	0.16-0.24	0.013-0.107	0.2	0.041-0.043	bdl-0.076	0.03-0.21
Nickel (diss.)	1.4	0.16		0.61	0.0006-0.01	0.0015-0.0015	0.0025	0.0008-0.0039	0.0018-0.0038	bdl-0.0021
Lead (diss.)	0.082	0.0032	0.1	0.050	bdl-0.00061	bdl-0.0009	0.0025	0.0003-0.0017	0.0008-0.0032	bdl-0.0018
Zinc (diss.)	0.12	0.11	25.0	5.0	0.005-0.03	0.004-0.033	0.028	0.004-0.038	0.014-0.04	0.030-0.510
TRPH				10	bdl				bdl	bdl-0.187
SAR (tot.)			8[9]		1.9-2.3	1.58-1.8	0.94	0.79-0.82	0.8-0.97	24.6-53

Notes: bdl = below detection limit; TRPH = Total Recoverable Petroleum Hydrocarbons; SAR = Sodium Absorption Ratio.

1 All water quality data are shown in mg/l unless otherwise indicated in the parameter column.
2 Wyoming Water Quality Criteria, 2000
3 May, June, and November 2000
4 May and June 2000
5 June 2000
6 May, June, and November 2000
7 May, October, and November 2000, and January 2001
8 Analyte Detected in Method Blank
9 Wyoming Agricultural Standard

TDS concentrations ranging from 680 mg/l (May 2000, partial analysis) to 608 mg/l (June 2000). Corral Canyon Spring has a perennial flow of about 1 gpm. The water from the wells and springs has low concentrations of trace constituents with the exception of slightly elevated concentrations of iron and manganese.

5.3 DISCHARGE WATER (DEEP GROUND WATER)

Water quality samples were collected from the Dudley test well 4-35-24-85 in May, October, November, and January 2001, and samples were analyzed for the Wyoming NPDES baseline parameters recommended for CBM producers. The discharge water is a sodium chloride type, with a slightly alkaline pH (7.7 to 8.3 units) and moderately high TDS concentrations ranging from 1,300 to 1,970 mg/l (see Table 7). The water has generally low concentrations of trace constituents, with the exception of chloride, iron, manganese, and barium. The concentrations of chlorides ranged from 33.1 to 458 mg/l (November and May 2000). Iron (total) concentrations ranged from 3,470 µg/l to 16,300 µg/l (November and May 2000). Manganese (total) concentrations ranged from 30 µg/l to 210 µg/l (November and May 2000), and barium concentrations ranged from 200 µg/l to 3,080 mg/l (October and May 2000). The water also has a relatively high sodium absorption ratio (SAR), ranging from 24.6 to 53 (May and October 2000) compared to the Wyoming agricultural standard of 8.0. It should be noted that the water quality improved significantly during the sample period of record, indicating possible flushing of drilling fluid and well casing contaminants, particularly barium and iron. Future water quality tests will verify aquifer water quality. The laboratory analysis reports are included in the unabridged Water Management Plan for the Project (BLM, 2001).

A water sample from Project well 4-35-24-85 was age-dated using carbon 14, tritium, oxygen 18/16, and deuterium methods. The results of the analyses indicate that the water is over 5,000 years old. The antiquity of the water shows that the deep ground-water system is stagnant with little or no connectivity with shallow ground-water-bearing zones or area surface water resources.

Limited water quality data for the Mesaverde strata are available from several oil wells in area. This data was collected several years ago and was not analyzed as thoroughly as Dudley's

current program. Well 42-22-23-85 is located about 2.0 miles south the Project Area. Water quality data from drill stem tests performed in the Mesaverde Group at depths of 4,460 feet and 4,754 feet indicated relatively low TDS concentrations of 938 mg/l and 770 mg/l, respectively. Water from this zone is a sodium bicarbonate type. Trace constituents concentrations were not analyzed. Well 24-26-24-85 is located within the Project Area, and water quality from the Mesaverde Group (depth of 5,267 feet) from this well was reported as "fresh," and no additional analyses are available for this interval (Petroleum Information Center, 1999).

6.0 WATER RIGHTS

Water rights information was collected from the Wyoming State Engineer's office, Division of Water Resources. A search area of over 6 miles from the Project Area was assessed for this report. No water wells or springs are located within the Project boundary. The nearest water wells with ground-water rights to the Project Area are the Coal Creek Bay #1 (1 mile north) and Lower Little Shoe well (2 miles west), owned by Miller Estate Company (see Figure 3).

Three surface water rights are located within the Project Area on a Pool Table Draw Reservoir fed by Pool Table Draw. Four water rights are just outside the Project Area on Ayers Draw. Several other surface water rights are within a 5-mile radius of the Project Area. Most of the surface water rights in the area are associated with Seminoe Reservoir. A summary of ground- and surface-water rights, excluding monitoring and test wells and surface water rights on Seminoe Reservoir, is presented in Table 8.

TABLE 8
WATER RIGHTS SUMMARY, SEMINOE ROAD PILOT PROJECT

Permit No.[1]	Tns	Rng	Sec	Qtr	Status[2]	Supply[3]	Use[4]	Facility	Applicant	Well Depth	Static Depth	Priority	Una Amt	Una Unit	App. Distance[5]
P39167W	23	84	17	NESW	PU	ORI	TEM, MIS	Seminoe Reservoir Unit Water Well #1	Amoco Production Company			06/17/1977	150	GPM	4.0
P39167W	23	84	17	NWSW	PU	ORI	TEM, MIS	Seminoe Reservoir Unit Water Well #1	Amoco Production Company			06/17/1977	150	GPM	4.0
P39167W	23	84	17	SWSW	PU	ORI	TEM, MIS	Seminoe Reservoir Unit Water Well #1	Amoco Production Company			06/17/1977	150	GPM	4.0
P39167W	23	84	17	SESW	PUW	ORI	TEM, MIS	Seminoe Reservoir Unit Water Well #1	Amoco Production Company			06/17/1977	150	GPM	4.0
P32833W	23	85	27	NESW	PUW	ORI	STO	HO Roughs	Miller Estate Co.			04/27/1976	20	GPM	4.1
P1285W	23	85	33	NWNE	PUW	ORI	STO	Miller Estate #1	Miller Estate Co.	2,462	-4	03/08/1964	7.5	GPM	4.6
P32832W	23	85	21	NWSW	CAN	ORI	STO	Stone Fence	Miller Estate Company	0	0	04/27/1976	20	GPM	3.0
P55069W	23	86	1	NENW	PUW	ORI	STO	Lower Little Shoe	Miller Estate Co.	520	40	01/08/1981	20	GPM	3.2
P55069W	23	86	1	NENW	PU	ORI	STO	Lower Little Shoe	Miller Estate Co.	520	40	01/08/1981	20	GPM	3.3
P60741W	23	86	2	SWNW	PUW	ORI	STO	Little Shoe Artesian Well	USDI BLM, Rawlins District	520	-4	05/11/1982	10	GPM	4.4
P87473W	24	84	4	SWSW	UNA	ORI	MIS	Boat Club #3	Seminoe Boat Club	220	12	02/26/1992	100	GPM	5
P87473W	24	84	4	SESW	UNA	ORI	MIS	Boat Club #3	Seminoe Boat Club	220	12	02/26/1992	100	GPM	5
P68623W	24	84	4	SWSW	PU	ORI	MIS	Boat Club #2	Seminoe Boat Club	287	16	08/23/1984	100	GPM	5
P68623W	24	84	4	SESW	PU	ORI	MIS	Boat Club #2	Seminoe Boat Club	287	16	08/23/1984	100	GPM	5
P17437W	24	84	7	NWNW	PUW	ORI	UTL	Coal Creek Bay #1	Miller Estate Co.			09/29/1972	100	GPM	2.9
P25273W	24	84	9	NENW	PUW	ORI	DOM	Paris #1	Walter H. Paris			03/28/1973	5	GPM	5
P31329W	24	84	9	NWNW	PUW	ORI	DOM	Hans #1	Charles William Hans	100	-1	07/25/1975	25	GPM	5
P67878W	24	84	9	NWNW	PUW	ORI	DOM	Jim #1	Seminoe Boat Club	130	35	07/10/1984	8	GPM	5
P35106W	24	84	9	NWNW	PUW	ORI	DOM	Bonnett #1	USDI BLM, David L. Bonnett	140	30	08/10/1976	10	GPM	5
P20444W	24	84	9	NWNW	UNA	ORI	DOM	Bottoms #1	Jack M. Bottoms	140	122	03/22/1973	5	GPM	5
P20429W	24	84	9	NWNW	PUW	ORI	DOM	Joe #1	Seminoe Boat Club	220	40	03/19/1973	17.5	GPM	5
P87473W	24	84	9	NENW	UNA	ORI	MIS	Boat Club #3	Seminoe Boat Club	220	12	02/26/1992	100	GPM	5
P87473W	24	84	9	NWNW	UNA	ORI	MIS	Boat Club #3	Seminoe Boat Club	220	12	02/26/1992	100	GPM	5
P68623W	24	84	9	SENE	PU	ORI	MIS	Boat Club #2	Seminoe Boat Club	287	16	08/23/1984	100	GPM	5
P68623W	24	84	9	NENW	PU	ORI	MIS	Boat Club #2	Seminoe Boat Club	287	16	08/23/1984	100	GPM	5
P68623W	24	84	9	NWNW	PUW	ORI	MIS	Boat Club #2	Seminoe Boat Club	287	16	08/23/1984	100	GPM	5
P55612W	24	86	13	SESW	PUW	ORI	STO	Coal Creek Rim	Miller Estate Co.	540	-4	02/24/1981	4	GPM	3.6
P55611W	24	86	27	NESE	PUW	ORI	STO	Corral Canyon East	Miller Estate Co.	280	-4	02/24/1981	20	GPM	5.1

Table 8 (Continued)

Permit No.[1]	Tns	Rng	Sec	Qtr	Status[2]	Supply[3]	Use[4]	Facility	Applicant	Well Depth	Static Depth	Priority	Una Amt	Una Unit	App. Distance[5]
P114531W	25	84	30	NESE	UNA	ORI	DOM	Miller Estate Ranch #99	Miller Estate Company			03/12/1999			5.1
P110477W	25	86	31	SESW	UNA	ORI	MIS	Karmann Ghia #1 WW	Equity Oil Co.** Bureau Of Land Management			06/17/1998	25	GPM	3.8
P111139W	25	86	31	SESW	UNA		MIS	O'Brien Springs #3 & 10	Equity Oil Co.	6	0	07/24/1998			4.1
P5343S	23	85	11	SWNE	PUO	ORI	STO	Dry Creek #1- Miller Creek	Miller Estate Co.			03/15/1963	4.6	ACFT	1.2
P5343S	23	85	11	SENW	PU	ORI	STO	Dry Creek #1- Miller Creek	Miller Estate Co.			03/15/1963	4.6	ACFT	1.4
P5343S	23	85	11	NESW	PU	ORI	STO	Dry Creek #1- Miller Creek	Miller Estate Co.			03/15/1963	4.6	ACFT	1.2
P5343S	23	85	11	NWSE	PU	ORI	STO	Dry Creek #1- Miller Creek	Miller Estate Co.			03/15/1963	4.6	ACFT	1.2
P5344S	23	85	13	NWNW	PUO	ORI	STO	Witches Teat Creek	Miller Estate Co.			03/15/1963	9.65	ACFT	2.2
P3171S	23	85	16	NWSE	PUO	ORI	STO	Upper Stone Fence, Dirtyman Draw	Miller Estate Co.			02/11/1960	4.27	ACFT	1.8
CR5/396A	23	86	12	SWSE	PU	ORI	STO	Upper Dirtyman Stock Res	USDI BLM			11/12/1969	6.1 (Adj.)	ACFT	3.0
CR5/396A	23	86	12	SESE	PUO	ORI	STO	Upper Dirtyman Stock Res	USDI BLM			11/12/1969	6.1 (Adj.)	ACFT	2.7
P11135S	24	85	8	SWNE	GST	ORI	STO	Sand Dune- O'Brien Creek	USDI BLM			09/06/1990	0.16	ACFT	2.8
P2203S	24	85	20	SENW	PUO	ORI	STO	Little Shoe #1	Miller Estate Co.			01/31/1958	19.55	ACFT	1.4
P2227S	24	85	27	NWNE	UNA	ORI	STO	Pool Table Draw	Miller Estate Co.			03/06/1958	12.19	ACFT	0
P2227S	24	85	27	NENW	UNA	ORI	STO	Pool Table Draw	Miller Estate Co.			03/06/1958	12.19	ACFT	0
P2227S	24	85	27	SENW	UNA	ORI	STO	Pool Table Draw	Miller Estate Co.			03/06/1958	12.19	ACFT	0
P31872D	24	85	35	NWSE	UNA	SUP	IRR	Reyes No. 2 Ditch Ayers Draw	Juan And Joni Reyes			12/24/1996	0.57	CFS	0
P7216E	24	85	35	NWSE	UNA	SUP	IRR	Enl Ockinga Supplemental Diversion #3	K. D. & B. B. Ockinga			12/24/1996	0.8	CFS	0
P31872D	24	85	35	SWSE	UNA	SUP	IRR	Reyes No. 2 Ditch- Ayers Draw	Juan And Joni Reyes			12/24/1996	0.57	CFS	0
P7216E	24	85	35	SWSE	UNA	SUP	IRR	Enl Ockinga Supplemental Diversion #3	K. D. & B. B. Ockinga			12/24/1996	0.8	CFS	0
P12781S	24	86	1	SWSW	UNA	ORI	STO	Taper (0924) Cheyenne Depression Drainage	USDI, BLM, Rawlins			03/22/1996	0.42	ACFT	4.4

[1] Record suffixes are denoted as follows: "W" permits are for wells with a priority date for the date of filing with the state engineer; "S" signifies a stock reservoir permit; "D" signifies a ditch or pipeline permit , "E" signifies an enlargement of a ditch or pipeline permit.

[2] Abbreviations for status: PU or PUW = point of use for a well; UNA = unadjudicated; GST = good standing pending; PUO = point of use other.

[3] Abbreviations for Supply: ORI = original; SUP = supplemental;

[4] Abbreviations for uses: CAN = cancelled; DOM = domestic; MIS = miscellaneous; STO = stock; IRR = irrigation; TEM = temporary use for drilling; UTL = public utility.

[5] Approximate distance from Project well site quarter sections. Source: Wyoming State Engineer's Office, 2000.

7.0 POTENTIAL IMPACTS

There is a potential for impacts on surface- and ground-water resources from the development of the Seminoe Road Pilot Project. These potential impacts include:

- erosion in local drainages;
- vegetative changes along local drainages;
- surface-water quality changes;
- drawdown of ground-water levels;
- ground-water quality changes, and
- discharge water evaporative loss.

Discharge water volumes from the CBM wells would be minor relative to calculated peak flows for the receiving drainages. As a result, Project-related erosion would be far less than natural erosional processes. In addition, the channel flow velocities resulting from continuous well discharges will be very low (<2 ft/sec) with minimal erosion. Discharge outfall points will be located in low-gradient reaches of the drainages below head cutting areas and will have energy dissipaters to reduce erosion.

During Project operations, Pool Table Draw will flow continuously and the channel will remain flooded. The Pool Table Draw Reservoir would be full for the duration of Project operations. The continuous flows would result in vegetation changes from upland to wetland species. During this transition, the channel may be vulnerable to minimal erosion. Although the receiving drainage channels are hydraulically adequate for the proposed discharge volumes, the drainage channels will be monitored for erosion degradation.

The discharge water quality, based on available data, will be adequate for wildlife and stock watering purposes and will provide a beneficial use to these resources. The discharge water quality is not significantly different to the receiving water of Seminoe Reservoir. If erosion of the drainages occurs, sediment load would increase and total suspended solids (TSS) concentrations would be elevated. There are no irrigation activities in the area, and the elevated SAR in the discharge water would not cause significant impacts. The high iron and manganese concentrations in test well 4-35-24-85 have decreased since the well has been produced to supply

water for the drilling program. Total iron concentrations have decreased from 16.3 mg/l to 3.4 mg/l and manganese concentrations that decreased from 0.21 mg/l to 0.03 mg/l between May and November 2000. In December 2000, several new zones were perforated in the well, and the iron and manganese concentrations increased. It is believed that the iron and manganese concentrations will decrease over time; however, it is still likely that a treatment system will have to be used to manage the high iron and manganese concentrations in the discharge water. Two treatment options are being considered for the project--oxidation or aeration. Depending on the results of bench scale testing, the most appropriate method will be used to meet discharge permit (NPDES) requirements. Barium concentrations are also elevated in the discharge water.

Analysis of the soil chemistry in the discharge drainages indicates that the soil is slightly alkaline (pH 8.0) with a high soluble total sulfate content (8,030 and 13,100 mg/kg). Sulfate in the soils will react with free barium in the discharge water, resulting in the precipitation of barium sulfide, possibly decreasing the concentration of barium in the discharge water entering Seminoe Reservoir. To test the attenuation capacity of the soils, three “batch roll” tests were performed by Energy Laboratories of Casper, Wyoming (Table 9). In these tests, soil from Pool Table Draw was mixed with discharge water from well 4-35-24-85 at three different soil to water ratios (1:3, 1:5, and 1:10). The mixtures were rolled to mix the water and soil, and the effluent chemistry was tested. The results of the roll tests indicated that the soil in Pool Table Draw has the capacity to reduce barium, chloride, aluminum, iron, manganese, and zinc. Barium concentration in the discharge water was reduced from 0.22 mg/l to 0.10 mg/l in the testing. Chloride concentrations went from 1,860 mg/l to 1,530 mg/l. Aluminum concentrations were reduced from 3.86 mg/l to <0.10 mg/l. Iron concentrations were lowered from 61.1 mg/l to <0.03 mg/l. Manganese concentrations were reduced from 3.83 mg/l to 2.53 mg/l, and zinc concentrations were lowered from 0.81 mg/l to <0.01 mg/l. A summary of test results is shown in Table 9. It should be noted that roll tests provide only cursory analytical results, but the tests show that the Pool Table Draw soils have the capacity to attenuate metals and some anions. Discharge water will be monitored to verify "batch roll" test results. Laboratory data for the tests are provided in the unabridged Water Management Plan (BLM, 2001). Actual discharge water quality in Pool Table Draw will be monitored in the field at a monitoring station at Seminoe Reservoir, in part to verify attenuation predictions.

TABLE 9
SUMMARY OF BATCH ROLL TESTS, SEMINOE ROAD PILOT PROJECT[1]

Parameter	Discharge Water	Batch Test (1:3)	Batch Test (1:5)	Batch Test (1:10)
Calcium	619	1120	1170	1090
Magnesium	94.9	175	153	127
Sodium	383	564	456	404
Bicarbonate	<1.0	267	253	240
Chloride	1860	1620	1660	1530
Sulfate	323	1520	1430	1100
Conductivity (µhmo/cm)	5660	7690	7530	7050
pH (units)	4.46	7.92	7.90	7.73
S.A.R. (dimensionless)	20.3	46.0	44.0	35.4
Aluminum	3.86	<0.10	<0.10	<0.10
Barium	0.22	0.10	0.10	0.10
Beryllium	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	<0.01	<0.01
Iron	61.1	<0.03	0.03	<0.03
Manganese	3.83	2.53	2.93	3.96
Zinc	0.81	<0.01	<0.01	<0.01

[1] All data are in mg/l unless otherwise indicated in the parameter column.

Project dewatering activities will impact water levels in the deep Mesaverde ground-water system in the area. Dewatering will cause a drawdown cone to form around the well field. A drawdown analysis for multiple well pumping was completed for the Project using the "RockWare" program RockWorks99 (1999). RockWare utility uses a computerized version of the Theis method of simulating well field drawdown (Freeze and Cherry, 1979). This method assumes that flow follows Darcy's Law, and the water-bearing horizon is homogeneous and isotropic and has a constant thickness, negligible slope, and infinite extent. The faults are simulated by inserting image wells, mirrored across the fault, with pumping rates equal to the actual wells, injecting water into the aquifer. The analysis considered well spacing, maximum

drawdown, and aquifer characteristics of hydraulic conductivity, storativity, and thickness. The hydraulic conductivity is approximately 0.0154 feet/day (Halliburton, 2000), the aquifer thickness 740 feet (from well 4-35-24-85), and the estimated storativity is 0.001 (Freeze and Cherry, 1979). Input data for drawdown calculations is provided in the unabridged Water Management Plan for the Project on file at the BLM Rawlins Field Office (BLM, 2001).

Two scenarios were analyzed for the Project. The first scenario, the most conservative, assumed a homogeneous uninterrupted aquifer system. The second scenario assumed that the major fault on the west side of Seminoe Road acts as a barrier to flow. Both scenarios assume a steady-state pumping rate of 900 bwpd for each of the 16 production wells for a period of 5 years. It is assumed that near steady state conditions (discharge equals recharge for the system) would occur in a period of about 5 years. The drawdown cones for both simulations are shown on Figure 7.

The deep water-bearing horizon is not believed to be connected to the shallow ground-water system. Over 4,000 feet of sedimentary strata that includes thick beds of low permeable shale and siltstone separate the two systems. There are no known water supply wells installed in the deep ground-water system strata within 5 miles of the site. Local water wells are shallow (<500 feet deep) and used primarily for stock watering. The nearest water well is over 3 miles from the coalbed methane wells. While water quantity would be reduced in the Mesaverde Formation as a result of dewatering, impacts to ground-water quality are not anticipated. In the event this Pilot Project is successful and the Project is expanded, additional ground-water monitoring requirements likely will be required to include monitoring of water levels in water-bearing zones adjacent to the productive zones, particularly the Fox Hills Formation (see also Section 8.0). Dudley will monitor in-field well 16-27-24-85 which is completed in the productive zone.

The evaporative loss of the Project discharge was calculated from the discharge points and Seminoe Reservoir. It was estimated that the annual evaporation from the Project would be 57.8 ac-ft. The total evaporative loss for the project life (5 years) would be 289.1 ac-ft. Some additional evaporative losses would occur along the North Platte River. The evaporative loss calculation sheet is in the unabridged Water Management Plan for the Project on file at the BLM Rawlins Field Office (BLM, 2001).

8.0 MONITORING AND MITIGATION

The Project proponent will be required to monitor the conditions of the surface drainages and ground- and surface-water resources in the area. Surface drainages in the Project Area will be regularly inspected for signs of degradation and erosion due to operational activities. Any channel degradation will be mitigated using best management practices (BMPs). Mitigation measures may include armoring of affected channel areas, adjusting energy dissipaters or moving discharge points, and installation of culverts in spillway areas. Other mitigation measures will be considered depending on the situations that develop during operations.

Road/drainage crossings and culverts will be monitored for flow capacity and integrity. Installing larger culverts and/or armoring affected sites with riprap will mitigate failure or degradation of these sites, Gas and water line corridors will be inspected for successful revegetation and for erosional degradation. Problem areas will be regraded and reseeded, if necessary.

A surface- and ground-water monitoring program will be established for the Project. Regular monitoring of discharge water quality and volume will be required for the Project's NPDES permit. The draft NPDES permit specifies discharge water quality requirements and monitoring points. A copy of the draft NPDES permit is included as Appendix C of the EA. The draft NPDES permit includes water quality monitoring at:

- the three discharge points (initial);
- the mouth of Pool Table Draw at Seminoe Reservoir (point of compliance);
- Pool Table Draw at the confluence of the East and West Forks (additional);
- at Seminoe Reservoir adjacent to Pool Table Draw (additional); and
- at Seminoe Reservoir at Seminoe Reservoir Dam (additional).

A regional ground- and surface-water-monitoring program will also be developed for the Project during the permitting process. Local ground- and surface-water sites will be selected for the monitoring program, and a monitoring schedule will be developed in cooperation with the regulatory agencies.

In addition to the NPDES monitoring, the regional monitoring system will likely include:

- Dudley monitoring well 16-27-24-85 (located in the Project Area);
- Coal Creek Bay #1 water supply well;
- Wild Horse Draw and Section 19 stock wells;
- O'Brien and Corral Creek springs; and
- possibly other wells that are not registered with the State Engineer and have not been located at this time.

Monitoring will include water quality sampling and water level or flow measurements, along with field water quality parameters of pH, electrical conductivity, and temperature. The laboratory testing will likely include a suite of parameters similar the "CBM baseline suite" (see Appendix C of the EA). The parameter list will be adjusted based on the results of water quality tests over time, and in cooperation with regulatory agencies.

Iron/manganese treatment is anticipated to meet NPDES requirements. No other treatment is expected to be necessary, and no bioaccumulation of metals in fish is anticipated. Discharge water quality will be monitored to assure permit compliance.

No adverse impacts to surface- and ground-water resources are expected from the Project. However, if adverse impacts are detected, mitigation measures will be implemented. Mitigation for surface-water impacts may include a water quality treatment system for discharge water, sediment control structures in receiving drainages, injection well(s), or other measures, as deemed necessary. The water treatment method, if necessary, will be determined based on bench scale testing results, but will likely involve an aeration or oxidation system.

Mitigation of ground-water impacts may include replacement or deepening of affected wells, additional development of spring sources, or other measures, based on BMPs. A draft of Dudley's water well agreement for mitigation of lost water resources due to Project operations is provided as Addendum 1 to this Water Management Plan.

9.0 REFERENCES

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10.0 FIGURES

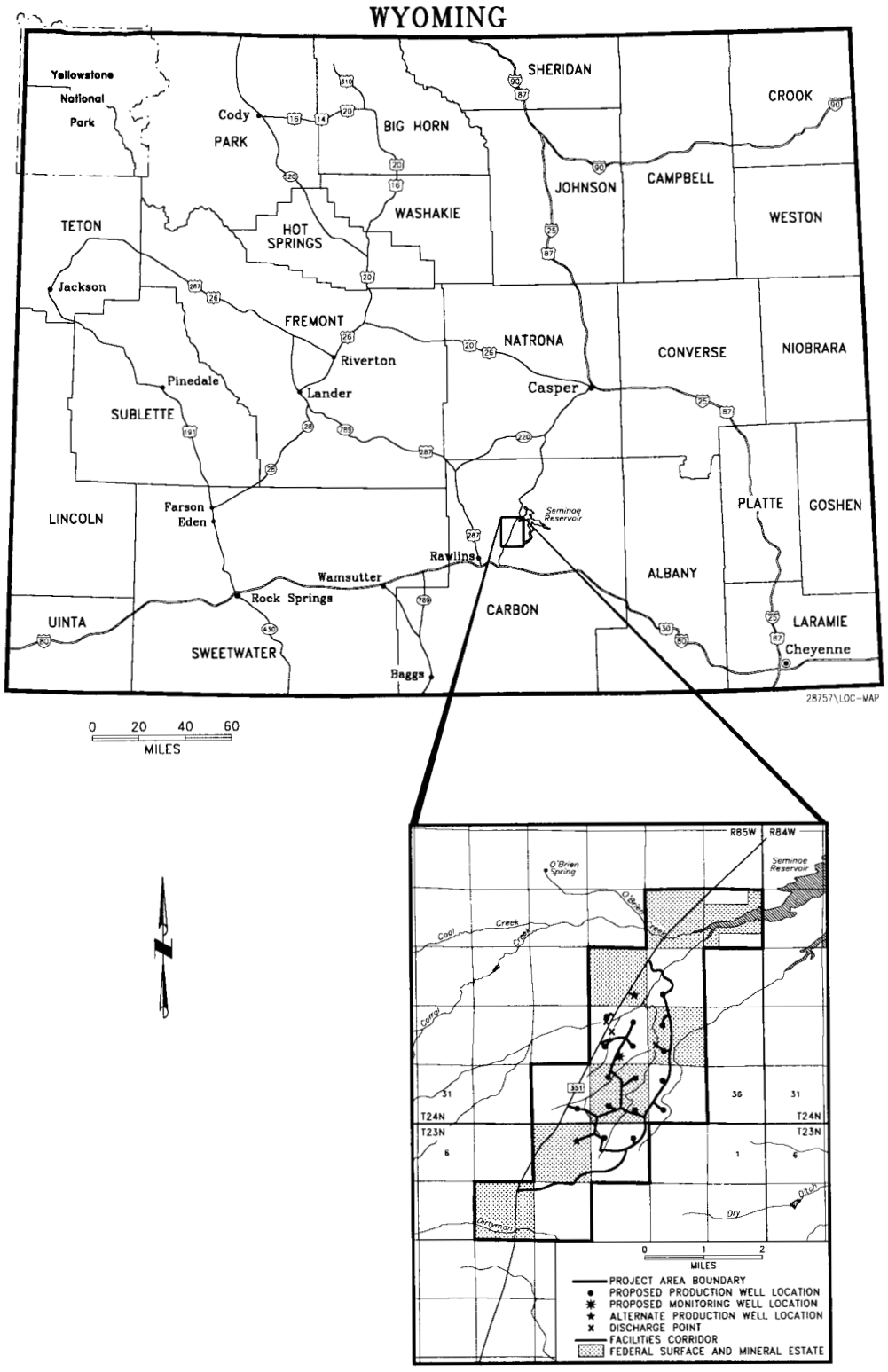
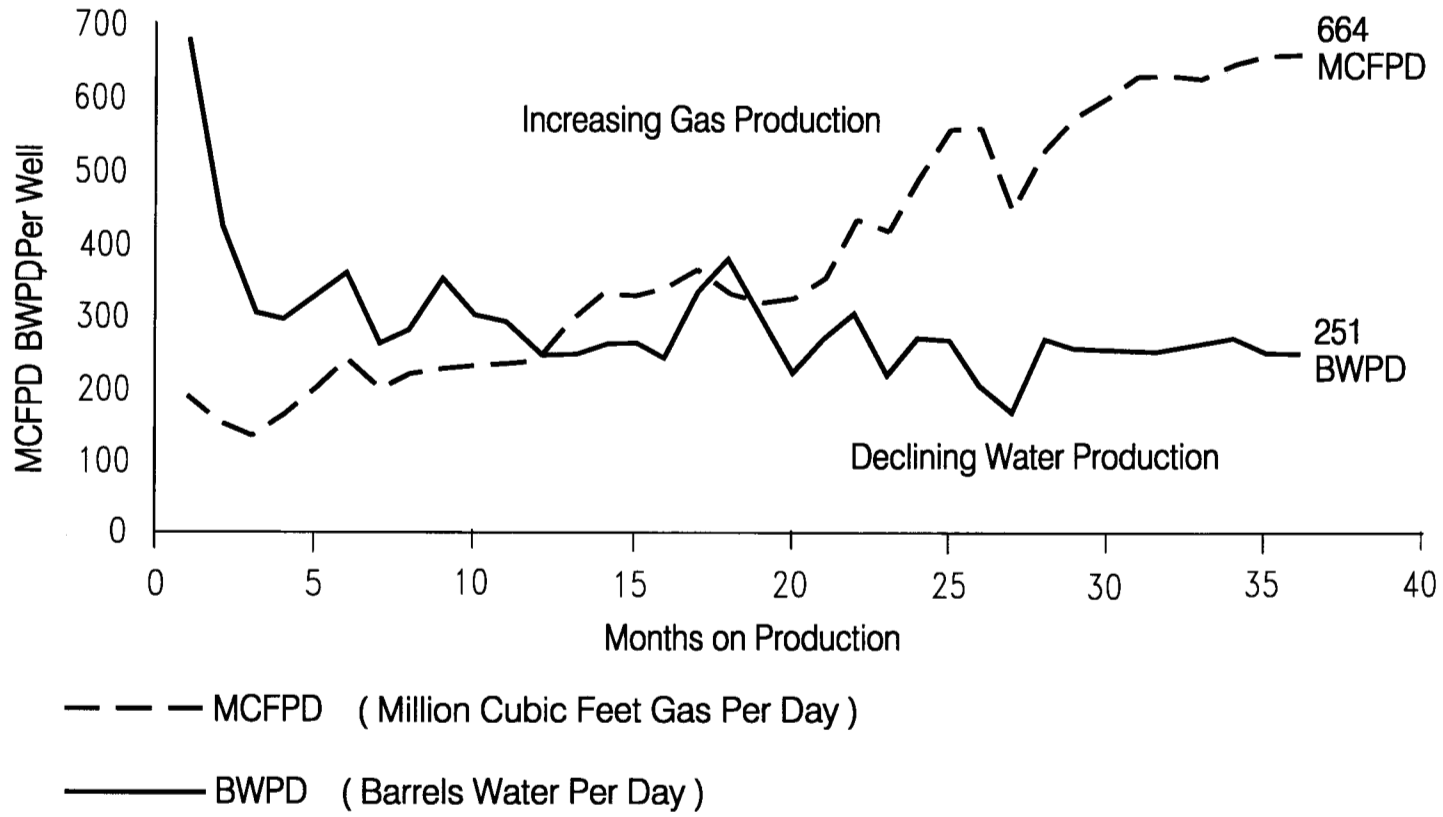


Figure 1 General Location Map.



REV. No.	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY

TRC

Seminoe Road Pilot Project

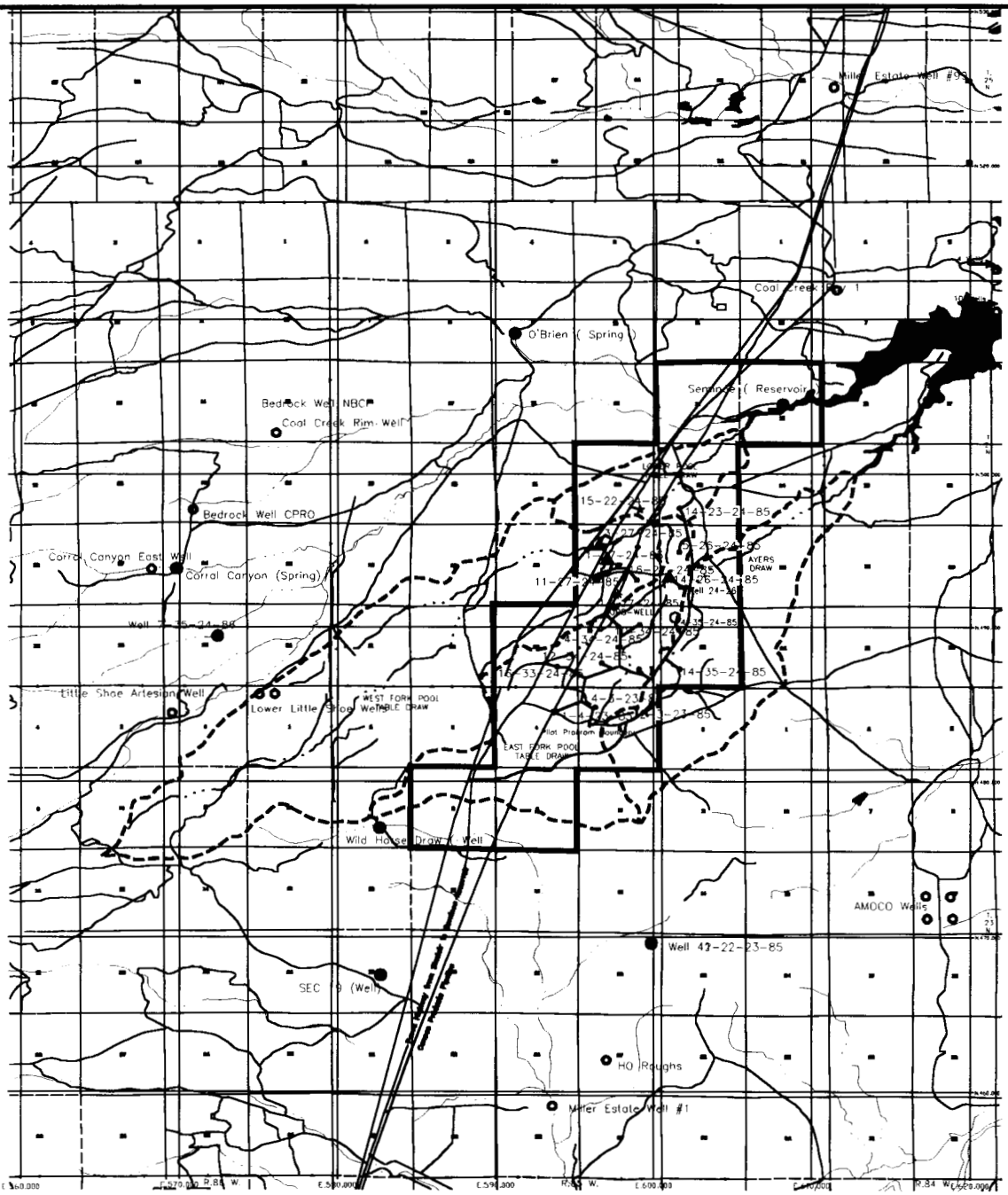
Figure 2

NORMALIZED PRODUCTION DATA FOR DRUNKARD'S WASH CBM PROJECT

(LAMARRE AND BURNS, 1997)

28757\WATER MGMT PLAN\DUDLEY2001\FIGURE 2

Figure 2 Normalized Production Data for Drunkard's Wash CBM Project.



LEGEND

- Proposed Production Well
- Proposed Monitoring Well
- Alternate Production Well Location
- Wells With Established Water Rights
- Sampling Point
- Proposed Discharge Point
- Pilot Project Boundary
- Watershed Boundary
- Drainage / Stream
- Facilities Corridor

REV. No	REVISIONS	DATE	DESIGN BY	DRAWN BY	REVIEWED AND SIGNED BY

SEMINOE ROAD PILOT PROJECT

FIGURE 3
HYDROLOGY STUDY MAP

TRC
Customer-Focused Solutions
7761 Shaffer Pkwy, Suite 100
Littleton, Colorado 80127
Phone: 303-792-5555
Fax: 303-792-0122

28757\WATER MGMT PLAN\DUDLEY2001\GREYSCALE\DUDLEY-003

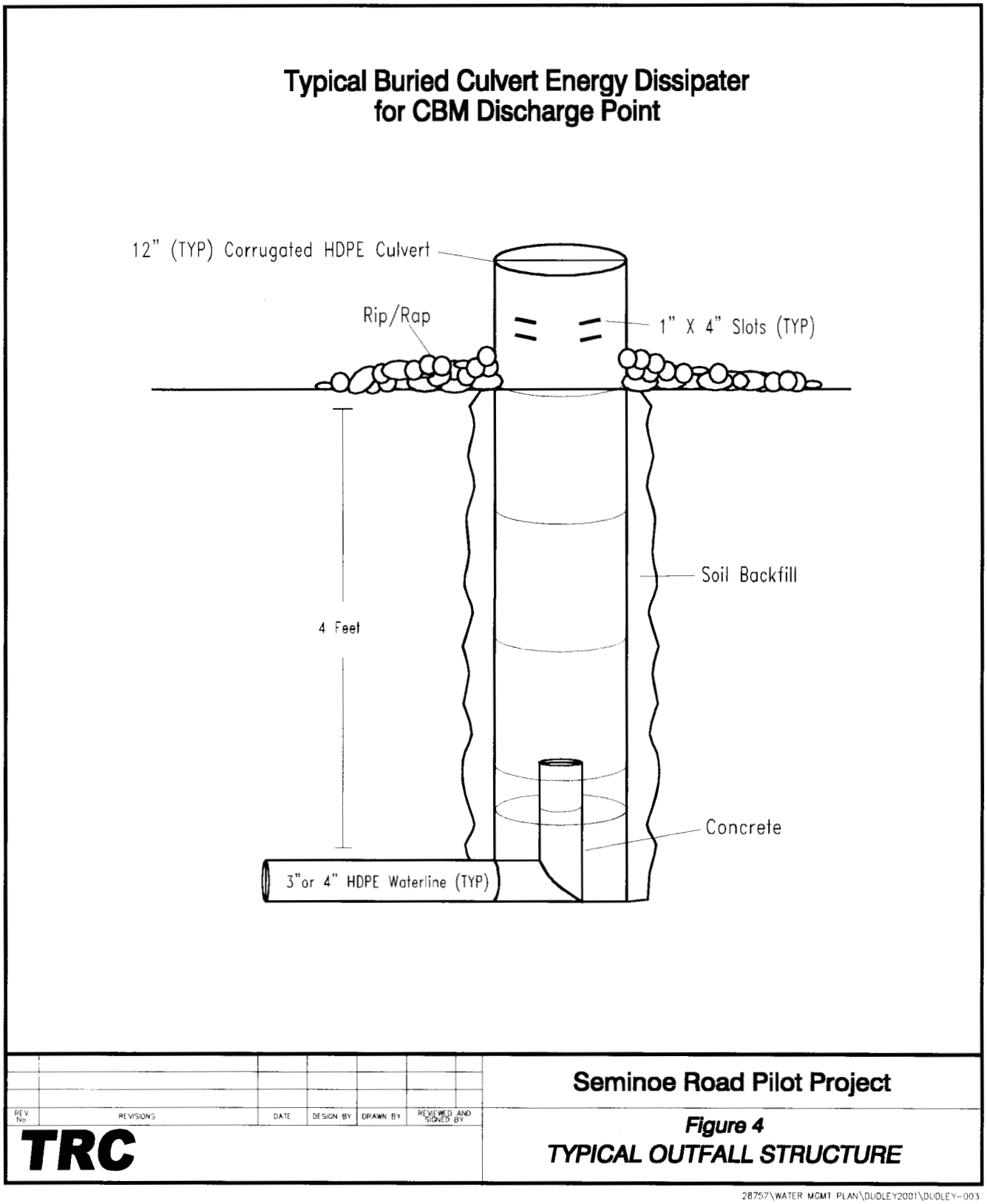


Figure 4 Typical Outfall Structure.

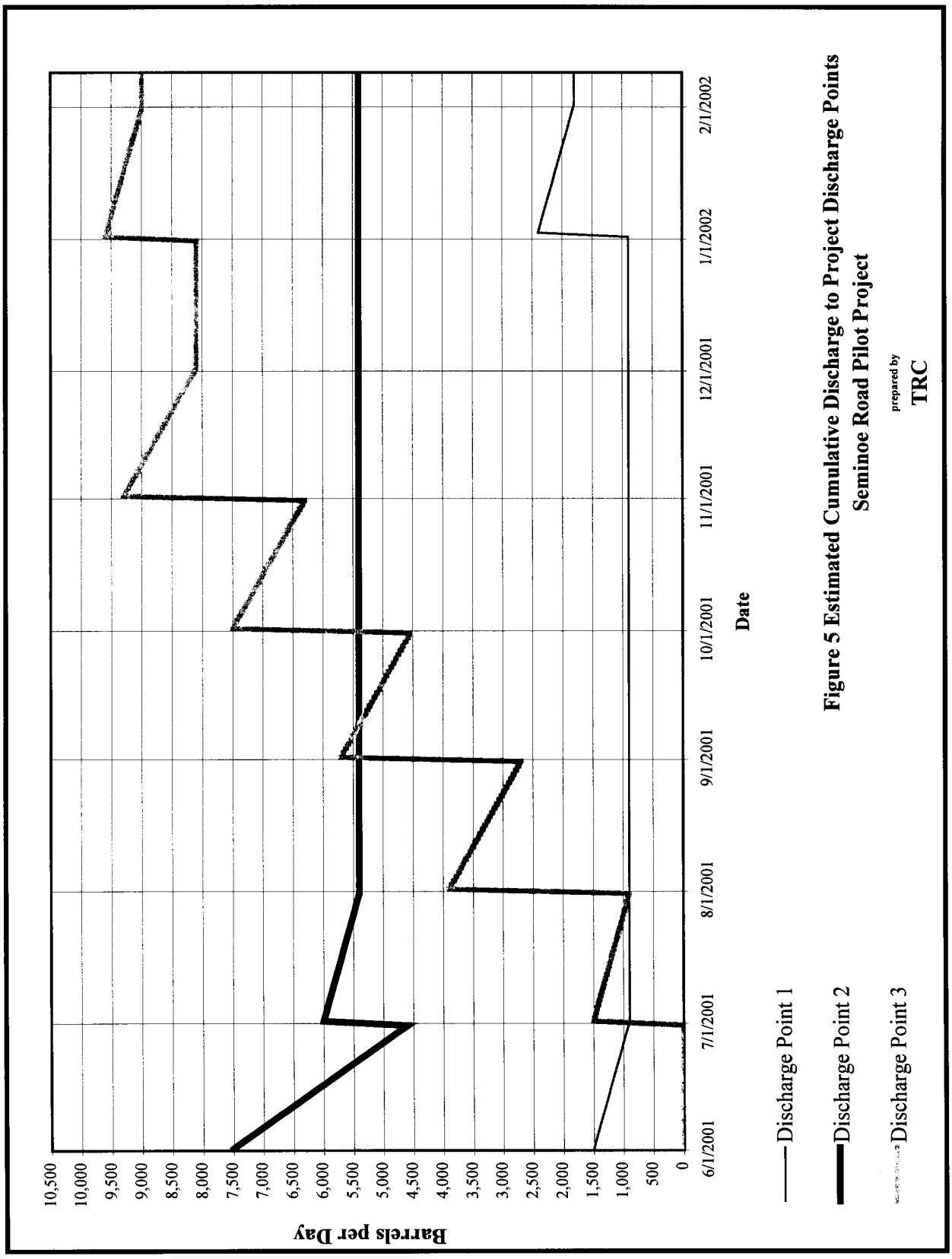


Figure 5 Estimated Cumulative Discharge to Project Discharge Points.

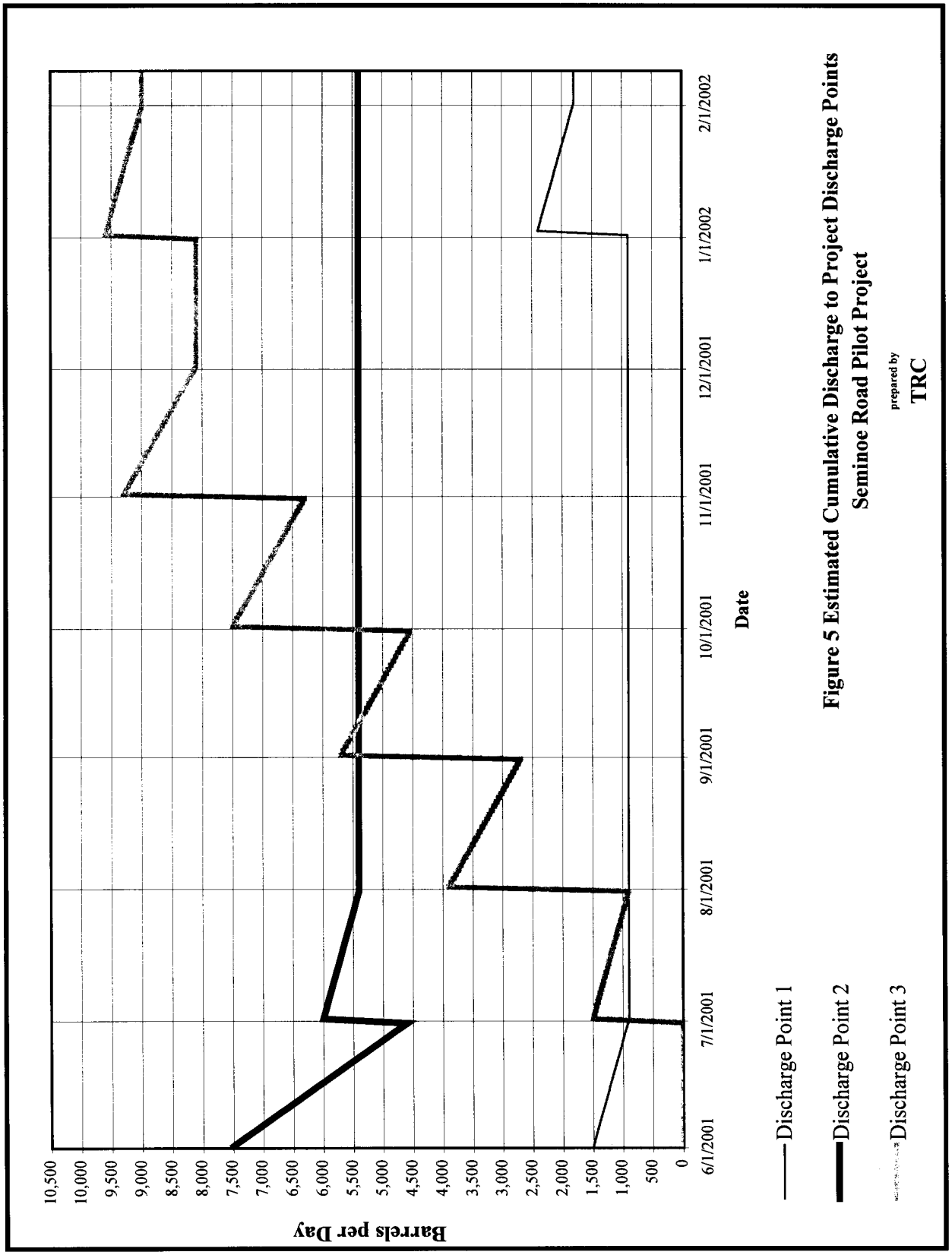
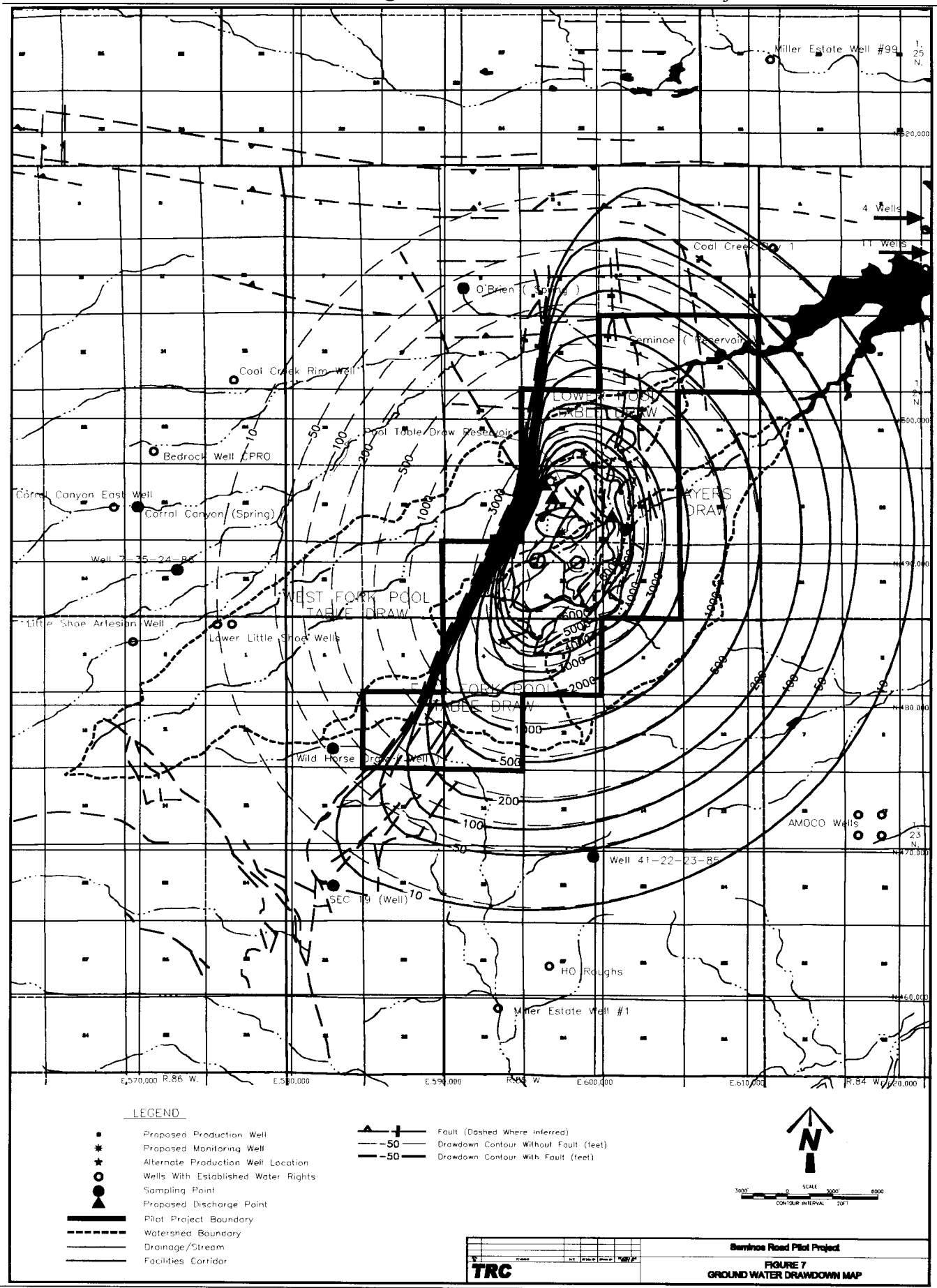


Figure 5 Estimated Cumulative Discharge to Project Discharge Points.


Miller Estate Well #99
4 Wells
11 Wells
Coal Creek Spring 1
O'Brien (Spring)
Seminoe (Reservoir)
Coal Creek Rim Well
Pool Table Draw Reservoir
Bedrock Well CPRO
Corral Canyon East Well
Corral Canyon (Spring)
Well 7-35-24-86
WEST FORK POOL TABLE DRAW
Little Shoe Artesian Well
Lower Little Shoe Wells
Wild Horse Draw Well
AMOCO Wells
Well 41-22-23-86
SEC 19 (Well)
HO Roughs
Miller Estate Well #1
E.570,000 R.86 W.
E.580,000
E.590,000
E.600,000
E.610,000
R.84 W.
N.500,000
N.490,000
N.480,000
N.470,000
N.460,000
LEGEND
Proposed Production Well
Proposed Monitoring Well
Alternate Production Well Location
Wells With Established Water Rights
Sampling Point
Proposed Discharge Point
Pilot Project Boundary
Watershed Boundary
Drainage/Stream
Facilities Corridor
Fault (Dashed Where Inferred)
Drawdown Contour Without Fault (feet)
Drawdown Contour With Fault (feet)
SCALE
CONTOUR INTERVAL 20FT
TRC
Seminoe Road Pilot Project
FIGURE 7
GROUND WATER DRAWDOWN MAP

ADDENDUM 1:

DRAFT WATER WELL AGREEMENT

Dudley & Associates, LLC
1776 Lincoln Street, Suite 904

Re: Draft Water Well Agreement

Dudley & Associates agrees to mitigate any loss of water to ground-water resources caused by

to the following:

- lowering of a water level in a well caused by dewatering activities or
- reducing flow or drying of springs or seeps caused by dewatering activities.

Mitigation measures could include but not be limited to replacing or deepening affected wells,

APPENDIX C:

DRAFT NPDES PERMIT

The State
of Wyoming

Jim Geringer, Governor

Department of Environmental Quality

Herschler Building • 122 West 25th Street • Cheyenne, Wyoming 82002

ADMIN/OUTREACH	ABANDONED MINES	AIR QUALITY	INDUSTRIAL SITING	LAND QUALITY	SOLID & HAZ. WASTE	WATER QUALITY
307-777-7758	307-777-6145	307-777-7391	307-777-7369	307-777-7756	307-777-7752	307-777-7781
FAX 777-3610	FAX 777-6462	FAX 777-5616	FAX 777-6937	FAX 777-5864	FAX 777-5973	FAX 777-5973

STATEMENT OF BASIS

New

APPLICANT NAME: Dudley and Associates, LLC

MAILING ADDRESS: 1776 Lincoln Street, Room 904
Denver, CO 80203-1026

FACILITY LOCATION: The outfalls of the Seminoe Road Project CBM wells located in the NENW, NESW of Section 27, and the SWSW of Section 26, Township 24 North, Range 85 West in Carbon County. The wastewater will be discharged to West Fork Pool Table Draw and East Fork Pool Table Draw (Class 4 waters) which are tributaries of Pool Table Draw (class 4). Pool Table Draw flows into Seminoe Reservoir (Class 2 water) within the North Platte River drainage. The established POC is in the SWSW of Section 13, Township 24 North, Range 85 West at the confluence of Pool Table Draw with Seminoe Reservoir.

NUMBER: WY0041807

This facility is a typical coal bed methane production facility in which groundwater is pumped from a coal bearing formation resulting in the release of methane from the coal bed. The permit authorizes the discharge to the surface of groundwater produced in this way provided the effluent quality is in compliance with effluent limits that are established by this permit. In developing effluent limits, all federal and state regulations and standards have been considered and the most stringent requirements incorporated into the permit. The EPA Effluent Guidelines and Standards for Oil and Gas Extraction Point Source Category (Part 435, Subpart E) predate the development of coal bed methane extraction technology; however the technology is similar enough to conventional gas extraction that, in the professional judgement of the WDEQ, this effluent limit guideline is appropriately applied to coal bed methane gas production. The guideline limits oil and grease effluent concentrations to less than 35 mg/l and requires that discharges of produced water be used to enhance agricultural and/or wildlife purposes. This permit does not cover activities associated with discharges of drilling fluids, acids, stimulation waters or other fluids derived from the drilling or completion of the wells.

The permittee has chosen option 2 of the coal bed methane permitting options as defined in DEQ's Coal Bed Methane NPDES Guidance Document dated October 22, 1999. Under this permitting option, the produced water is immediately discharged to a Class 4 water which is a tributary of a Class 2 or 3 water. The permit establishes effluent limits for the end of pipe, which are protective of Class 4 standards, and a point of compliance (POC). The POC is a designated monitoring location in the Class 4 drainage prior to the confluence with Class 2 or 3 waters. The more stringent effluent limits associated with the POC are protective of water quality standards for Class 2 and 3 waters and are calculated as 20 percent of the water quality standard. This calculation satisfies the antidegradation provisions in Wyoming Water Quality Rules and Regulations, Chapter 1.

The Seminoe Road Project consists of produced water from eighteen test production CBM wells. The produced water at outfalls 001 and 002 will discharge to the ephemeral West Fork of Pool Table Draw (class 4 water) and the produced water at outfall 003 will discharge to the ephemeral East Fork of Pool Table Draw (class 4 water). These two Forks then join at Pool Table Draw and flow to Seminoe Reservoir about 2 miles to the northeast. It is approximately 30 miles from the point of compliance at the confluence of Pool Table Draw and Seminoe Reservoir to the North Platte River. Considering the low discharge volume from this project (1.10 cfs) and the significant dilution factor provided by Seminoe Reservoir, any produced water reaching Seminoe Reservoir will be highly diluted. In addition, there is no irrigation along Pool Table Draw and it's tributaries from the points of

discharge to Seminoe Reservoir or along the banks of Seminoe Reservoir. The Seminoe Road Project is considered to be a pilot project that will assist in determining potential development in the Seminoe Reservoir area of the North Platte River drainage. A water management plan has been submitted to WDEQ by Dudley and Associates indicating high infiltration and evaportation rates. The permit will be issued for a two year period, expiring on April 30, 2003.

Permit effluent limits are based on federal and state regulations and are effective as of the date of issuance. The permit limits total petroleum hydrocarbons to 10 mg/l and the pH must remain within 6.5 and 8.5 standard units. These limits are based upon Wyoming Water Quality Rules and Regulations, Chapter 7 and apply to discharge from any permitted outfall. In addition, the permit establishes limits for radium 226, dissolved iron, dissolved manganese, total barium, total arsenic and chlorides. The permittee has the option of meeting limits for these parameters at each outfall or at the designated POC. If the water discharged from the wells does not reach the POC, in this case the SWSW of Section 13, Township 24 North, Range 85 West at the confluence of Pool Table Draw with Seminoe Reservoir, the permit establishes a radium 226 limit of 60 pCi/l and a chlorides limit of 2,000 mg/l at the end of the pipe. These limits are based on Wyoming Water Quality Rules and Regulations, Chapters 1 and 7. When the discharge is contained within a class 4 water and fails to reach the POC, the permit establishes annual sampling and reporting requirements for dissolved iron, dissolved manganese, total barium, and total arsenic at the end of pipe. This requirement is based on the need to establish baseline data for these constituents.

However, if the water discharged from the coal bed methane wells reaches the POC, the permit establishes the following limits: 1 pCi/l for radium 226, 46 mg/l for chlorides, 200 µg/l for dissolved iron, 621 µg/l for dissolved manganese, 400 µg/l for total barium, and 1.4 µg/l for total arsenic. These limits can either be met at the designated POC or end of pipe for each outfall. These limits are based on standards for class 2 and 3 waters as defined in Wyoming Water Quality Rules and Regulations, Chapter 1 and reflect the application of the antidegradation provisions.

The permit requires daily monitoring of the section of Pool Table Draw to determine whether water discharged from the outfalls reaches the established POC. Daily monitoring is necessary because the permit establishes different sampling and analysis requirements based on whether the effluent reaches the POC. Once flow at the POC has been documented within a sampling quarter, monthly monitoring of flow is required for the quarter. At the beginning of each calendar quarter, the frequency will revert to daily until such time as flow occurs at the POC and a sample is collected to represent effluent quality for point of compliance constituents for that quarter. Effluent samples must be collected for a quarterly sampling period if flow persists at the POC for 24 hours or more. Results are to be reported twice-yearly and if no discharge occurs then "no discharge" is to be reported. The permit also requires that an initial monitoring of the effluent be conducted within the first 30 days of discharge and the results submitted to WDEQ and the U.S. Environmental Protection Agency within 90 days of the commencement of discharge.

In order to monitor and regulate coal bed methane discharge for compliance with Chapter 1, Section 20 (protection of agricultural water supply), three additional monitoring points have been included in this permit. The first addtional monitoring point is located in the SENW of Section 23, Township 24 North, Range 85 West at the confluence of the East and West forks of Pool Table Draw; the second is in the NESW of Section 13, Township 24 North, Range 85 West on the north side of Seminoe Reservoir across from Pool Table Draw; and the third is in the SWNE of Section 8, Township 25 North, Range 84 West in Seminoe Reservoir at Seminoe Dam. Monitoring will be required for flow volume, total alkalinity, calcium, magnesium, sodium, potassium, bicarbonate, fluoride, chloride, sulfate, sodium adsorption ratio and specific conductance monthly at the outfalls, the POC and at the three additional monitoring points, during the irrigation months of April, May, June and July. Due to the facts that there is no irrigation between the outfalls and the North Platte River, and the high dilution ratio at the reservoir, an SAR limit has not been established for this permit. However, continued monitoring at the three additional monitoring locations will help to characterize mixing within the reservoir and monitor SAR values. This data will be continually evaluated by WDEQ during the life of the permit. The permit may be modified in the future by WDEQ to include more stringent limits and monitoring.

There shall be no discharge of floating solids or visible foam in other than trace amounts, nor shall the discharge cause formation of visible deposits of iron, hydrocarbons or any other constituent on the bottom or shoreline of the receiving water. In addition, erosion control measures will be implemented to prevent significant damage to or erosion of the receiving water channel at the point of discharge.

The discharge of wastewater and the effluent limits that are established in this permit have been reviewed to ensure that the levels of water quality necessary to protect the designated uses of the receiving waters are maintained and protected. An antidegradation review has been conducted and verifies that the permit conditions, including the effluent limitations established, provide a level of protection to the receiving water consistent with the antidegradation provisions of Wyoming surface water quality standards.

Self monitoring of effluent quality and quantity is required on a regular basis with reporting of results semiannually. The permit is scheduled to expire on April 30, 2003.

Becky Peters
Water Quality Division
Department of Environmental Quality
March 24, 2001

AUTHORIZATION TO DISCHARGE UNDER THE

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, (hereinafter referred to as "the Act"), and the Wyoming Environmental Quality Act,

Dudley and Associates, LLC

is authorized to discharge from the wastewater treatment facilities serving the

Seminoe Road CBM Project

located in

the NENW, NESW of Section 27, and the SWSW of Section 26, Township 24 North, Range 85 West in Carbon County

to receiving waters named

West Fork Pool Table Draw and East Fork Pool Table Draw (Class 4 waters) which are tributary Seminoe Reservoir (Class 2 water) within the North Platte River Drainage

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II and III hereof.

This permit shall become effective on the date of issuance.

This permit and the authorization to discharge shall expire at midnight, April 30, 2003.

Gary Beach
Administrator - Water Quality

May 1, 2001
Date

PROPOSED

Dennis Hemmer
Director - Department of Environmental Quality

May 1, 2001
Date

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

Effective immediately and lasting through April 30 2003, the quality of effluent discharged by the permittee shall, at a minimum, meet the limitations set forth below. The permittee is authorized to discharge from outfalls(s) serial number(s) 001-003.

1. Such discharges shall be limited as specified below:

Effluent Characteristic	Effluent Limits Daily Maximum Any Outfall Class 4	Daily Maximum Point of Compliance or Any Outfall
Chlorides, mg/l	2000	46**
Dissolved Iron, µg/l		200**
Dissolved Manganese, µg/l		621**
Specific Conductance, micrombos/cm	2000	
Sulfates, mg/l	3000	
Total Arsenic, µg/l		1.4**
Total Barium, µg/l		400**
Total Petroleum Hydrocarbons (TPH), mg/l*	10	
Total Radium 226, pCi/l	60	1**

*Acceptable methods for this parameter are 418.1 in the latest edition of Standard Methods for the Examination of Water and Wastewater and EPA SW846 Method 8015 (modified) for Total Extractable Petroleum Hydrocarbons.

**Limits established when effluent reaches the POC. Permittee has the option of meeting limits at either the outfall or the POC for each constituent.

The pH shall not be less than 6.5 standard units nor greater than 8.5 standard units in any single grab sample.

There shall not be a discharge of a salt load greater than one ton per day or 350 tons per year, whichever is less.

There shall be no discharge of floating solids or visible foam in other than trace amounts, nor shall the discharge cause formation of a visible sheen or visible hydrocarbon deposits on the bottom or shoreline of the receiving water.

All waters shall be discharged in a manner to prevent erosion, scouring, or damage to stream banks, stream beds, ditches, or other waters of the state at the point of discharge. In addition, there shall be no deposition of substances in quantities which could result in significant aesthetic degradation, or degradation of habitat for aquatic life, plant life or wildlife; or which could adversely affect public water supplies or those intended for agricultural or industrial use.

2. Discharges shall be monitored by the permittee as specified below:

a. Monitoring of the initial discharge

Within 30 days of commencement of discharge, a sample shall be collected from each outfall and analyzed for the 39 constituents specified below, noting the required detection limits. Within 90 days of commencement of discharge, a summary report on the produced water must be submitted to the

Wyoming Department of Environmental Quality and the U.S. EPA Region 8 at the addresses listed below. This summary report must include the results and detection limits for each of the 39 constituents and documentation which indicates whether effluent has the potential to reach a class 2 or 3 water body. In addition, the report must include written notification of the established location of the discharge point (refer to Part I.B.11). This notification must include a confirmation that the location of the established discharge point(s) is within 1,510 feet of the location of the identified discharge point(s), is within the same drainage, and discharges to the same landowner's property as identified on the original application form. The legal description and location in decimal degrees of the established discharge point(s) must also be provided. After receiving the monitoring results for the initial discharge, the routine monitoring requirements described in Part I.A.2.b. may be modified to require more stringent monitoring.

Parameter	Required Detection Limit	Sample Type
Aluminum	50 µg/l	Grab
Bicarbonate	1 mg/l	Grab
Cadmium	0.1 µg/l	Grab
Calcium	as me/l	Grab
Chlorides	5 mg/l	Grab
Chromium	1 µg/l	Grab
Copper	1 µg/l	Grab
Cyanide (total)	5 µg/l	Grab
Dissolved Boron	0.1 mg/l	Grab
Dissolved Iron	30 µg/l	Grab
Dissolved Manganese	10 µg/l	Grab
Flow Volume	± 10% of actual volume	Monthly Total
Fluoride	0.1 mg/l	Grab
Hardness	10 mg/l as $CaCO_3$	Grab
Lead	2 µg/l	Grab
Magnesium	as me/l	Grab
Mercury	0.06 µg/l	Grab
Nickel	10 µg/l	Grab
pH	to 0.1 pH unit	Grab
Phenol	10 µg/l	Grab
Potassium	1 mg/l	Grab
Radium 226	0.2 pCi/l	Grab
Selenium	5 µg/l	Grab
Silver	3 µg/l	Grab
Sodium	as me/l	Grab
Sodium Absorption Ratio	not applicable	Calculated
Specific Conductance	5 micromhos/cm	Grab
Sulfates	10 mg/l	Grab
Total Alkalinity	1 mg/l as $CaCO_3$	Grab
Total Antimony	5 µg/l	Grab
Total Arsenic	1 µg/l	Grab
Total Barium	100 µg/l	Grab

Parameter	Required Detection Limit	Sample Type
Total Beryllium	0.03 µg/l	Grab
Total Dissolved Solids	5 mg/l	Grab
Total Iron	30 µg/l	Grab
Total Manganese	30 µg/l	Grab
Total Petroleum Hydrocarbons*	1 mg/l	Grab
Total Thallium	10 µg/l	Grab
Zinc	10 µg/l	Grab

*Acceptable methods for this parameter are 418.1 in the latest edition of Standard Methods for the Examination of Water and Wastewater and EPA SW846 Method 8015 (modified) for Total Extractable Petroleum Hydrocarbons.

Initial monitoring reports are to be sent to the following addresses:

Planning and Targeting Program, 8ENF-PT
Office of Enforcement, Compliance, and Environmental Justice
U.S. EPA Region 8
999 18th St., Suite 300
Denver, CO 80202-2466

and

Wyoming Department of Environmental Quality
Water Quality Division
Herschler Building, 4 West
122 West 25th Street
Cheyenne, WY 82002

b. Routine monitoring

The permit requires daily monitoring of Pool Table Draw to determine if water discharged from the outfalls reaches the established POC which is in the SWSW of Section 13, Township 24 North, Range 85 West at the confluence of Pool Table Draw with Seminoe Reservoir. Daily monitoring is necessary because the effluent limitations and monitoring requirements established by this permit vary depending on whether produced water reaches the POC.

End of Pipe

For the duration of the permit, at a minimum, samples for the constituents described below shall be collected at the indicated frequencies. The first routine monitoring for the time frame during which the monitoring of initial discharge occurs will, at a minimum, consist of flow measurements for the duration of the six-month monitoring time frame. Monitoring will be based on semi-annual time frames, from January through June, and from July through December.

Parameter	Measurement Frequency	Sample Type
Bicarbonate	Monthly for April, May, June, July	Grab
Calcium	Monthly for April, May, June, July	Grab
Chloride	Monthly for April, May, June, July	Grab
Dissolved Iron	Annually	Grab
Dissolved Manganese	Annually	Grab

Parameter	Measurement Frequency	Sample Type
Fluoride	Monthly for April, May, June, July	Grab
Magnesium	Monthly for April, May, June, July	Grab
pH	Once Every Six Months	Grab
Potassium	Monthly for April, May, June, July	Grab
Radium 226	Annually	Grab
Sodium	Monthly for April, May, June, July	Grab
Sodium Adsorption Ratio	Monthly for April, May, June, July	Calculated
Specific Conductance	Monthly for April, May, June, July	Grab
Sulfate	Monthly for April, May, June, July	Grab
Total Alkalinity	Monthly for April, May, June, July	Grab
Total Arsenic	Annually	Grab
Total Barium	Annually	Grab
Total Flow - (MGD)	Monthly	Continuous
Total Petroleum Hydrocarbons	Once Every Six Months	Grab
Total Dissolved Solids	Monthly	Grab

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the outfall of the final treatment unit which is located out of the natural drainage and prior to admixture with diluent waters.

Point of Compliance

For the duration of the permit, at a minimum, samples for the constituents described below shall be collected at the indicated frequencies when water discharged from the outfalls reaches the POC. Monitoring will be based on quarterly time frames, from January through March, April through June, July through September, and from October through December.

Parameter	Measurement Frequency	Sample Type
Bicarbonate	Monthly for April, May, June, July	Grab
Calcium	Monthly for April, May, June, July	Grab
Chloride	Monthly for April, May, June, July	Grab
Dissolved Iron	Quarterly	Grab
Dissolved Manganese	Quarterly	Grab
Fluoride	Monthly for April, May, June, July	Grab
Magnesium	Monthly for April, May, June, July	Grab
Potassium	Monthly for April, May, June, July	Grab
Radium 226	Quarterly	Grab
Sodium	Monthly for April, May, June, July	Grab
Sodium Adsorption Ratio	Monthly for April, May, June, July	Calculated
Specific Conductance	Monthly for April, May, June, July	Grab
Sulfate	Monthly for April, May, June, July	Grab
Total Alkalinity	Monthly for April, May, June, July	Grab
Total Arsenic	Quarterly	Grab

Parameter	Measurement Frequency	Sample Type
Total Barium	Quarterly	Grab

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Either at the end of the pipe or at the POC which is in the SWSW of Section 13, Township 24 North, Range 85 West at the confluence of Pool Table Draw with Seminoe Reservoir. When the permittee chooses to sample at the point of compliance the samples shall be collected in the main channel of Pool Table Draw.

Once flow at the POC has been documented within a sampling quarter, monthly monitoring is required. At the beginning of each calendar quarter, the frequency will revert to daily until such time as the effluent reaches the POC and a sample is collected to represent effluent quality for point of compliance constituents.

Additonal Monitoring Points

For the purpose of collecting baseline data and monitoring for SAR constituents, the permittee will collect and analyze samples for the following constituents at three additional monitoring points during the irrigation months of April, May, June and July.

Parameter	Measurement Frequency	Sample Type
Bicarbonate	Monthly for April, May, June, July	Grab
Calcium	Monthly for April, May, June, July	Grab
Chloride	Monthly for April, May, June, July	Grab
Fluoride	Monthly for April, May, June, July	Grab
Magnesium	Monthly for April, May, June, July	Grab
Potassium	Monthly for April, May, June, July	Grab
Sodium	Monthly for April, May, June, July	Grab
Sodium Adsorption Ratio	Monthly for April, May, June, July	Calculated
Specific Conductance	Monthly for April, May, June, July	Grab
Sulfate	Monthly for April, May, June, July	Grab
Total Alkalinity	Monthly for April, May, June, July	Grab

Additonal Monitoring Points (AMP's):

AMP1 - (SW-3) is located in the SENW of Section 23, Township 24 North, Range 85 West at the confluence of the East and West forks of Pool Table Draw.

AMP2 - (SW-2) is located in the NESW of Section 13, Township 24 North, Range 85 West on the north side of Seminoe Reservoir across from Pool Table Draw.

AMP3 - (SW-4) is located in the SWNE of Section 8, Township 25 North, Range 84 West in Seminoe Reservoir at Seminoe Dam.

These four monthly reports and lab analysis sheets will be sent to WDEQ at the address listed in Part I.B.2 below.

B. MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and approval by, the permit issuing authority.

2. Reporting

Results of initial monitoring shall be summarized on a Monitoring Report Form for Monitoring of Initial Discharge and submitted to the state water pollution control agency at the address below postmarked no later than 90 days after the commencement of discharge.

Results of routine monitoring shall be summarized and reported on a Discharge Monitoring Report Form (DMR). The information submitted on the first six-month DMR shall contain a summary of flow measurements and any additional monitoring conducted subsequent to the submittal of the initial monitoring report. Whole effluent toxicity (biomonitoring) results must be reported on the most recent version of EPA Region VIII's Guidance for Whole Effluent Reporting. Monitoring reports must be submitted to the state water pollution control agency at the following address postmarked no later than the 28th day of the month following the completed reporting period. The first report is due on July 28, 2001.

Legible copies of these, and all other reports required herein, shall be signed and certified in accordance with the Signatory Requirements contained in Part II.A.11.

Wyoming Department of Environmental Quality
Water Quality Division
Herschler Building, 4 West
122 West 25th Street
Cheyenne, WY 82002
Telephone: (307) 777-7781

If no discharge occurs during the reporting period, "no discharge" shall be reported. If discharge is intermittent during the reporting period, sampling shall be done while the facility is discharging.

3. Definitions

a. The "monthly average" shall be determined by calculating the arithmetic mean (geometric mean in the case of fecal coliform) of all composite and/or grab samples collected during a calendar month.

b. The "weekly average" shall be determined by calculating the arithmetic mean (geometric mean in the case of fecal coliform) of all composite and/or grab samples collected during any week.

c. The "daily maximum" shall be determined by the analysis of a single grab or composite sample.

d. "MGD", for monitoring requirements, is defined as million gallons per day.

e. "Net" value, if noted under Effluent Characteristics, is calculated on the basis of the net increase of the individual parameter over the quantity of that same parameter present in the intake water measured prior to any contamination or use in the process of this facility. Any contaminants contained in any intake water obtained from underground wells shall not be adjusted for as described above and, therefore, shall be considered as process input to the final effluent. Limitations in which "net" is not noted are calculated on the basis of gross measurements of each parameter in the discharge, irrespective of the quantity of those parameters in the intake waters.

f. A "composite" sample, for monitoring requirements, is defined as a minimum of four grab samples collected at equally spaced two hour intervals and proportioned according to flow.

g. An "instantaneous" measurement for monitoring requirements is defined as a single reading, measurement, or observation.

h. A "pollutant" is any substance or substances which, if allowed to enter surface waters of the state, causes or threatens to cause pollution as defined in the Wyoming Environmental Quality Act, Section 35-11-103.

i. "Total Flow" is the total volume of water discharged, measured on a continuous basis and reported as a total volume for each month during a reporting period. The accuracy of flow measurement must comply with Part III.A.1.

4. Test Procedures

Test procedures for the analysis of pollutants, collection of samples, sample containers, sample preservation, and holding times, shall conform to regulations published pursuant to 40 CFR, Part 136, unless other test procedures have been specified in this permit.

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date and time of sampling;

b. The dates and times the analyses were performed;

c. The person(s) who performed the analyses and collected the samples;

d. The analytical techniques or methods used; and

e. The results of all required analyses including the bench sheets, instrument readouts, computer disks or tapes, etc., used to determine the results.

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form. Such increased frequency shall also be indicated.

7. Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the administrator at any time. Data collected on site, copies of Discharge Monitoring Reports and a copy of this NPDES permit must be maintained on site during the duration of activity at the permitted location.

8. Penalties for Tampering

The Act provides that any person who falsifies, tampers with or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years per violation, or both.

9. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any Compliance Schedule of this permit shall be submitted no later than 14 days following each schedule date.

10. Facility Identification

All facilities discharging produced water shall be clearly identified with an all-weather sign posted at each outfall and POCs. This sign shall, as a minimum, convey the following information:

a. The name of the company, corporation, person(s) who holds the discharge permit, and the NPDES permit number;

b. The contact name and phone number of the person responsible for the records associated with the permit;

c. The name of the facility (lease, well number, etc.) and the outfall number as identified by the discharge permit.

11. Identification and Establishment of Discharge Points

According to 40 CFR 122.21(k)(1), the permittee shall identify the expected location of each discharge point on the appropriate NPDES permit application form. The location of the discharge point must be identified to within an accuracy of 15 seconds . This equates to a distance of 1,510 feet.

In order for the permit not to be subjected to additional public notice, the location of the established discharge point must be within 1,510 feet of the location of the discharge point originally identified on the permit application. In addition, the discharge must be within the same drainage and must discharge to the same landowner's property as identified on the original application form. If the three previously stated requirements are not satisfied, modification of the discharge point location(s) constitutes a major modification of the permit as defined in Part I.B.12. The permittee shall provide written notification of the establishment of each discharge point in accordance with Part I.A.2.a above.

12. Location of Discharge Points

As of the date of permit issuance, authorized points of discharge were as follows:

001 - The outfall of Seminoe Road Project CBM wells 15-22-24-85, 3-27-24-85 which is located in the NENW of Section 27, Township 24 North, Range 85 West. The produced water will be discharged to the West Fork of Pool Table Draw.

002 - The outfall of Seminoe Road Project CBM wells 1-27-24-85, 11-27-24-85, 16-27-24-85, 4-34-24-85, 7-34-24-85 which is located in the NESW of Section 27, Township 24 North, Range 85 West. The produced water will be discharged to the West Fork of Pool Table Draw.

003 - The outfall of Seminoe Road Project CBM wells 14-23-24-85, 5-26-24-85, 14-26-24-85, 4-35-24-85, 16-33-24-85, 12-34-24-85, 10-34-24-85, 14-35-24-85, 4-3-23-85, 2-3-23-85, 1-4-23-85 which is located in the SWSW of Section 26, Township 24 North, Range 85 West. The produced water will be discharged to the East Fork of Pool Table Draw.

POC1 - The established point of compliance for the above listed outfalls is located in the SWSW of Section 13, Township 24 North, Range 85 West at the confluence of Pool Table Draw with Seminoe Reservoir.

Requests for modification of the above list will be processed as follows. If the requested modification satisfies the definition of a minor permit modification as defined in 40 CFR 122.63 modifications will not be required to be advertised in a public notice. A minor modification constitutes a correction of a typographical error, increase in monitoring and/or reporting, revision to an interim compliance schedule date, change in ownership, revision of a construction schedule for a new source discharger, deletion of permitted outfalls, and/or the incorporation of an approved local pretreatment program.

A request for a minor modification must be initiated by the permittee by completing the form titled National Pollutant Discharge Elimination System Permit Modification Application For Coal Bed Methane. Incomplete application forms will be returned to the applicant.

PART II

A. MANAGEMENT REQUIREMENTS

1. Changes

The permittee shall give notice to the administrator of the Water Quality Division as soon as possible of any physical alterations or additions to the permitted facility. Notice is required when:

a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source as determined in 40 CFR 122.29 (b); or

b. The alteration or addition could change the nature or increase the quantity of pollutants discharged.

2. Noncompliance Notification

a. The permittee shall give advance notice of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

b. The permittee shall report any noncompliance which may endanger health or the environment as soon as possible, but no later than 24 hours from the time the permittee first became aware of the circumstances. The report shall be made to the Water Quality Division, Wyoming Department of Environmental Quality at (307) 777-7781.

c. A written submission shall be provided within five (5) days of the time that the permittee becomes aware of a noncompliance circumstance as described in paragraph c. above.

The written submission shall contain:

(1) A description of the noncompliance and its cause;

(2) The period of noncompliance, including exact dates and times;

(3) The estimated time noncompliance is expected to continue if it has not been corrected; and

(4) Steps taken or planned to reduce, eliminate and prevent reoccurrence of the noncompliance.

d. The following occurrences of unanticipated noncompliance shall be reported by telephone to the Water Quality Division, Watershed Management Section, NPDES Program (307) 777-7781 by the first workday following the day the permittee became aware of the circumstances.

(1) Any unanticipated bypass which exceeds any effluent limitation in the permit;

(2) Any upset which exceeds any effluent limitation in the permit; or

(3) Violation of a maximum daily discharge limitation for any of the pollutants listed in the permit.

e. The administrator of the Water Quality Division may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the Water Quality Division, Watershed Management Section, NPDES Program (307) 777-7781.

f. Reports shall be submitted to the Wyoming Department of Environmental Quality at the address in Part I under Reporting and to the Planning and Targeting Program, 8ENF-PT, Office of Enforcement, Compliance, and Environmental Justice, U.S. EPA Region 8, 999 18th St., Suite 300, Denver, CO 80202-2466.

g. The permittee shall report all instances of noncompliance that have not been specifically addressed in any part of this permit at the time the monitoring reports are due.

3. Facilities Operation

The permittee shall, at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of the permit. However, the permittee shall operate, as a minimum, one complete set of each main line unit treatment process whether or not this process is needed to achieve permit effluent compliance.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to waters of the state resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Bypass of Treatment Facilities

a. Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

b. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs c. and d. of this section. Return of removed substances to the discharge stream shall not be considered a bypass under the provisions of this paragraph.

c. Notice:

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice at least 60 days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required under Part II.A.2.

d. Prohibition of bypass.

(1) Bypass is prohibited and the administrator of the Water Quality Division may take enforcement action against a permittee for a bypass, unless:

(a) The bypass was unavoidable to prevent loss of life, personal injury or severe property damage;

(b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(c) The permittee submitted notices as required under paragraph c. of this section.

e. The administrator of the Water Quality Division may approve an anticipated bypass, after considering its adverse effects, if the administrator determines that it will meet the three conditions listed above in paragraph d. (I) of this section.

6. Upset Conditions

a. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improper designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of paragraph c. of this section are met.

c. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required under Part II.A.2; and

(4) The permittee complied with any remedial measures required under Part II.A.4.

d. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

7. Removed Substances

Solids, sludges, filter backwash or other pollutants removed in the course of treatment or control of wastewaters or intake waters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the state.

8. Power Failures

In order to maintain compliance with the effluent limitations and prohibitions of this permit, the permittee shall either:

a. In accordance with a schedule of compliance contained in Part I, provide an alternative power source sufficient to operate the wastewater control facilities; or

b. If such alternative power source as described in paragraph a. above is not in existence and no date for its implementation appears in Part I, take such precautions as are necessary to maintain and operate the facility under its control in a manner that will minimize upsets and insure stable operation until power is restored.

9. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the federal act and the Wyoming Environmental Quality Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give the administrator of the Water Quality Division advance notice of any planned changes at the permitted facility or of any activity which may result in permit noncompliance.

10. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

11. Signatory Requirements

All applications, reports or information submitted to the administrator of the Water Quality Division shall be signed and certified.

a. All permit applications shall be signed as follows:

(1) For a corporation: by a responsible corporate officer;

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively;

(3) For a municipality, state, federal or other public agency: by either a principal executive officer or ranking elected official.

b. All reports required by the permit and other information requested by the administrator of the Water Quality Division shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described above and submitted to the administrator of the Water Quality Division; and

(2) The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the company. A duly authorized representative may thus be either a named individual or any individual occupying a named position.

c. If an authorization under paragraph II.A.11.b. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph II.A.11.b must be submitted to the administrator of the Water Quality Division prior to or together with any reports, information or applications to be signed by an authorized representative.

d. Any person signing a document under this section shall make the following certification:

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

B. RESPONSIBILITIES

1. Inspection and Entry

The permittee shall allow the administrator of the Water Quality Division or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this permit; and

d. Sample or monitor, at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the federal act, any substances or parameters at any location.

2. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the regional administrator of the Environmental Protection Agency and the administrator of the Water Quality Division. The administrator of the Water Quality Division shall then provide written notification to the new owner or controller of the date in which they assume legal responsibility of the permit. The permit may be modified or revoked and reissued to change the name of the permittee and incorporate such other requirements as described in the federal act.

3. Availability of Reports

Except for data determined to be confidential under Section 308 of the federal act, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Wyoming Department of Environmental Quality and the regional administrator of the Environmental Protection Agency. As required by the federal act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the federal act.

4. Toxic Pollutants

The permittee shall comply with effluent standards or prohibitions established under Section 307 (a) of the federal act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

5. Changes in Discharge of Toxic Substances

Notification shall be provided to the administrator of the Water Quality Division as soon as the permittee knows of, or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) One hundred micrograms per liter (100 µg/l);

(2) Two hundred micrograms per liter (200 µg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21 (g) (7); or

(4) The level established by the director of the Environmental Protection Agency in accordance with 40 CFR 122.44 (f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 µg/l);

(2) One milligram per liter (1 mg/1) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21 (g) (7); or

(4) The level established by the director of the Environmental Protection Agency in accordance with 40 CFR 122.44 (f).

6. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. As long as the conditions related to the provisions of "Bypass of Treatment Facilities" (Part II.A.5), "Upset Conditions" (Part II.A.6), and "Power Failures" (Part II.A.8) are satisfied then they shall not be considered as noncompliance.

7. Need to Halt or Reduce Activity not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

8. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities or penalties to which the permittee is or may be subject under Section 311 of the federal act.

9. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities or penalties established pursuant to any applicable state or federal law or regulation. In addition, issuance of this permit does not substitute for any other permits required under the Clean Water Act or any other federal, state, or local law.

10. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights nor any infringement of federal, state or local laws or regulations.

11. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application should be submitted at least 180 days before the expiration date of this permit.

12. Duty to Provide Information

The permittee shall furnish to the administrator of the Water Quality Division, within a reasonable time, any information which the administrator may request to determine whether cause exists for modifying, revoking and reissuing or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the administrator, upon request, copies of records required by this permit to be kept.

13. Other Information

When the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or any report to the administrator of the Water Quality Division, it shall promptly submit such facts or information.

14. Permit Action

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

PART III

A. OTHER REQUIREMENTS

1. Flow Measurement

At the request of the administrator of the Water Quality Division, the permittee must be able to show proof of the accuracy of any flow measuring device used in obtaining data submitted in the monitoring report. The flow measuring device must indicate values of within plus or minus ten (10) percent of the actual flow being measured.

2. 208(b) Plans

This permit may be modified, suspended or revoked to comply with the provisions of any 208(b) plan certified by the Governor of the State of Wyoming.

3. Reopener Provision

This permit may be reopened and modified (following proper administrative procedures) to include the appropriate effluent limitations (and compliance schedule, if necessary) or other appropriate requirements if one or more of the following events occurs:

a. The state water quality standards of the receiving water(s) to which the permittee discharges are modified in such a manner as to require different effluent limits than contained in this permit;

b. A total maximum daily load (TMDL) is developed and approved by the state and/or the Environmental Protection Agency which specifies a wasteload allocation for incorporation in this permit;

c. A revision to the current water quality management plan is approved and adopted which calls for different effluent limitations than contained in this permit;

d. Downstream impairment is observed and the permitted facility is contributing to the impairment;

e. The limits established by the permit no longer attain and/or maintain applicable water quality standards;

f. The permit does not control or limit a pollutant that has the potential to cause or contribute to a violation of a state water quality standard.

g. If new applicable effluent guidelines and/or standards have been promulgated and the standards are more stringent than the effluent limits established by the permit.

4. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, suspended or revoked in whole or in part during its term for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge; or

d. If necessary to comply with any applicable effluent standard or limitation issued or approved under Sections 301(b) (2) (C) and (D), 304 (b) (2) and 307 (a) (2) of the federal act, if the effluent standard or limitation so issued or approved:

(1) Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or

(2) Controls any pollutant not limited in the permit.

5. Toxicity Limitation - Reopener Provision

This permit may be reopened and modified (following proper administrative procedures) to include a new compliance date, additional or modified numerical limitations, a new or different compliance schedule, a change in the whole effluent protocol or any other conditions related to the control of toxicants if one or more of the following events occur:

a. Toxicity was detected late in the life of the permit near or past the deadline for compliance;

b. The TRE results indicate that compliance with the toxic limits will require an implementation schedule past the date for compliance and the permit issuing authority agrees with the conclusion;

c. The TRE results indicate that the toxicant(s) represent pollutant(s) that may be controlled with specific numerical limits and the permit issuing authority agrees that numerical controls are the most appropriate course of action;

d. Following the implementation of numerical controls on toxicants, the permit issuing authority agrees that a modified whole effluent protocol is necessary to compensate for those toxicants that are controlled numerically;

e. The TRE reveals other unique conditions or characteristics which, in the opinion of the permit issuing authority, justify the incorporation of unanticipated special conditions in the permit.

6. Severability

The provisions of this permit are severable and if any provision of this permit, or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit, shall not be affected thereby.

7. Penalties for Falsification of Reports

The federal act provides that any person who knowingly makes any false statement, representation or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation or by imprisonment for not more than two years per violation or both.

/pjb
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APPENDIX D:

LIST OF HAZARDOUS AND EXTREMELY HAZARDOUS MATERIALS

Table D.1 Hazardous and Extremely Hazardous Materials Potentially Utilized or Produced During Construction, Drilling, Production, and Reclamation Operations, Seminoe Road Coalbed Methane Pilot Project, Carbon County, Wyoming, 2001.

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
Drilling Material			
Barite	--	Barium compounds	
	--	Fine mineral fibers	
Bentonite	15,000 lbs	Fine mineral fibers	
Caustic Soda	300 lbs	Sodium hydroxide	
Glutaraidehyde	--	Isopropyl alcohol	
Lime	500 lbs	Calcium hydroxide	
Mica	500 lbs	Fine mineral fibers	
Modified Tannin	--	Ferrous sulfate	
	--	Fine mineral fibers	
Phoephaza Esters	--	Mehanol	
Polyacrylamides	100 gal		Acrylamide
	--	PAHs	
	--	Petroleum distillates	
	--	POM	
Retarders	--	Fine mineral fibers	
Anionic Polyacrylamide	20 lbs		Acrylamide
Polyanionic Cellulose	600 lbs	Fine mineral fibers	
Cementing/Plugging			
Bentonite	3,115 lbs	Fine mineral fibers	
Anti-foamer	--	Glycol ethers	
Calcium Chloride Flake	1,797 lbs	Fine mineral fibers	
Cellophane Flake	231 lbs	Fine mineral fibers	
Cements	66,928 lbs	Aluminum oxide	
	--	Fine mineral fibers	
Chemical Wash	840 gal	Ammonium oxide	
	--	Glycol ethers	
Diamaceous Earth	--	Fine mineral fibers	
Extenders	22,866 lbs	Aluminum oxide	
	--	Fine mineral fibers	
Fluid Loss Additive	--	Acrylamide	
	--	Fine mineral fibers	
	--	Napthalene	
Friction Reducer	--	Fine mineral fibers	
	--	Napthalene	
	--	PAHs	
	--	POM	
Mud Flash	--	Fine mineral fibers	
Retarder	--	Fine mineral fibers	

Table D.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
Salt	--	Fine mineral fibers	
Silica Flour	--	Fine mineral fibers	
Fracturing Materials			
Biocides	4 gal	Fine mineral fibers	
	--	PAHs	
	--	POM	
Breakers	40 lbs	Ammonium persulphate	
	--	Ammonium sulphate	
	--	Copper compounds	
	--	Ethylene glycol	
	--	Fine mineral fibers	
	--	Glycol ethers	
Clay Stabilizer	--	Fine mineral fibers	
	--	Glycol ethers	
	--	Isopropyl alcohol	
	--	Methanol	
	--	PAHs	
	--	POM	
Crosslinkers	22 gal	Ammonium chloride	
	--	Methanol	
	--	Potassium hydroxide	
	--	Zirconium nitrate	
	--	Zirconium sulfate	
Foaming Agent	190 gal	Glycol ethers	
Gelling Agent	126 gal	Benzene	
	--	Ethylbenzene	
	--	Methyl tert-butyl ether	
	--	Napthalene	
	--	PAHs	
	--	POM	
	--	Sodium hydroxide	
	--	m-Xylene	
	--	o-Xylene	
	--	p-Xylene	
pH Buffers	--	Acetic acid	
	--	Benzoic acid	
	--	Fumeric acid	
	1,250 gal	Hydrochloric acid	
	27 gal	Sodium hydroxide	
Sands	170,300 lbs	Fine mineral fibers	
Solvents	--	Glycol ethers	

Table D.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
Surfactants	--	Glycol ethers	
	--	Isopropyl alcohol	
	--	Methanol	
	--	PAHs	
	--	POM	
Corrosion Inhibitor	10 gal		
Production Products			
Natural gas	--	n-Hexane PAHs POM	
Produced water/drill cuttings	--	See Appendix A, Water Management Plan	
Fuels			
Diesel fuel	--	Benzene	
	--	Cumene	
	--	Ethylbenzene	
	--	Methyl tert-butyl ether	
	--	Naphthalene	
	--	PAHs	
	--	POM	
	--	Toluene	
	--	m-Xylene	
	--	o-Xylene	
	--	p-Xylene	
Gasoline	--	Benzene	
	--	Cumene	
	--	Cyclohexane	
	--	Ethylbenzene	
	--	n-Hexane	
	--	Methyl tert-butyl ether	
	--	Naphthalene	
	--	PAHs	
	--	POM	
	--		Tetraethyl lead
	--	Toluene	
	--	m-Xylene	
	--	o-Xylene	
	--	p-Xylene	
Natural gas	--	n-Hexane	
	--	PAHs	
	--	POM	

Table D.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
Propane	--	Propylene	
Pipeline Materials			
Coating	--	Aluminum oxide	
Cupric sulfate solution	--	Cupric sulfate	
	--	Sulfuric acid	
Diethanolamine	--	Diethanolamine	
LP Gas	--	Benzene	
	--	n-Hexane	
	--	Propylene	
Molecular sieves	--	Aluminum oxide	
Pipeline primer	--	Naphthalene	
	--	Toluene	
Potassium hydroxide solution	--	Potassium hydroxide	
Rubber resin coatings	--	Acetone	
	--	Coal tar pitch	
	--	Ethyl acetate	
	--	Methyl ethyl ketone	
	--	Toluene	
	--	Xylene	
Emissions			
Gases	--	Formaldehyde	
	--		Nitrogen dioxide
	--		Ozone
	--		Sulfur dioxide
	--		Sulfur trioxide
Hydrocarbons	--	Benzene	
	--	Ethylbenzene	
	--	n-Hexane	
	--	PAHs	
	--	Toluene	
	--	m-Xylene	
	--	o-Xylene	
	--	p-Xylene	
Particulate matter	--	Barium	
	--	Cadmium	
	--	Copper	
	--	Fine mineral fibers	
	--	Lead	
	--	Manganese	
	--	Nickel	

Table D.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
Particulate matter (cont.)	--	POM	
	--	Zinc	
Miscellaneous Materials			
Acids	--	Acetic anhydride	
	--	Formic acid	
	--	Sodium chromate	
	--	Sulfuric acid	
Antifreeze, heat control,	--	Acrolein	
and dehydration agents	--	Cupric sulfate	
	--	Ethylene glycol	
	--	Freon	
	--	Phosphoric acid	
	--	Potassium hydroxide	
	--	Sodium hydroxide	
	--	Triethylene glycol	
Batteries	--	Cadmium	
	--	Cadmium oxide	
	--	Lead	
	--	Nickel hydroxide	
	--	Potassium hydroxide	
	--	Sulfuric acid	
Biocides	--	Formaldehyde	
	--	Isopropyl alcohol	
	--	Methanol	
Cleaners	--	Hydrochloric acid	
Corrosion inhibitors	--	4-4' methylene dianiline	
	--	Acetic acid	
	--	Ammonium bisulfite	
	--	Basic zinc carbonate	
	--	Diethylamine	
	--	Dodecylbenzenesulfonic acid	
	--	Ethylene glycol	
	--	Isobutyl alcohol	
	--	Isopropyl alcohol	
	--	Methanol	
	--	Napthalene	
	--	Sodium nitrite	
	--	Toluene	
	--	Xylene	
Emulsion breakers	--	Acetic acid	
	--	Acetone	

Table D.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
Emulsion breakers	--	Ammonium chloride	
(cont.)	--	Benzoic acid	
	--	Isopropyl alcohol	
	--	Methanol	
	--	Napthalene	
	--	Toluene	
	--	Xylene	
	--	Zinc chloride	
Fertilizers	--	Unk	
Herbicides	--	Unk	
Lead-free thread compound	--	Copper	
	--	Zinc	
Lubricants	--	1,2,4-trimethylbenzene	
	--	Barium	
	--	Cadmium	
	--	Copper	
	--	n-Hexane	
	--	Lead	
	--	Manganese	
	--	Nickel	
	--	PAHs	
	--	POM	
	--	Zinc	
Methanol	--	Methanol	
Motor oil	--	Zinc compounds	
Paints	--	Aluminum	
	--	Barium	
	--	n-Butyl alcohol	
	--	Cobalt	
	--	Lead	
	--	Manganese	
	--	PAHs	
	--	POM	
	--	Sulfuric acid	
	--	Toluene	
	--	Triethylamine	
	--	Xylene	
Paraffin control	--	Carbon disulfide	
	--	Ethylbenzene	
	--	Methanol	
	--	Toluene	
	--	Xylene	

Table D.1 (Continued)

Source	Approximate Quantity Per Well	Hazardous Substances[1]	Extremely Hazardous Substances
Photoreceptors	--	Selenium	
Scale inhibitors	--	Acetic acid	
	--	Ethylene diamine tetra	
	--	Ethylene glycol	
	--	Formaldehyde	
	--	Hydrochloric acid	
	--	Isopropyl alcohol	
	--	Methanol	
	--	Nitrilotriacetic acid	
Sealants	--	1,1,1-trichloroethane	
	--	n-Hexane	
	--	PAHs	
	--	POM	
Solvents	--	1,1,1-trichloroethane	
	--	Acetone	
	--	t-Butyl alcohol	
	--	Carbontetrachloride	
	--	Isopropyl alcohol	
	--	Methyl ethyl ketone	
	--	Methanol	
	--	PAHs	
	--	POM	
	--	Toluene	
	--	Xylene	
Starting fluid	--	Ethyl ether	
Surfactants	--	Ethylene diamine	
	--	Isopropyl alcohol	
	--	Petroleum naphtha	

[1] PAH = polynuclear aromatic hydrocarbons
POM = polycyclic organic matter.