ENVIRONMENTAL ASSESSMENT

Lackey A 292S

Twinned Natural Gas Well, Well Pad, and Pipeline Tie
Burlington Resources Oil & Gas Company LP

Well Pad Surface Location:
Section 12, Township 29 North, Range 10 West, NMPM

LEASE # SF-077092
BLM EA No. NM-210-2011-231

PREPARED FOR:

U. S. Department of the Interior
Bureau of Land Management
Farmington Field Office
San Juan County, New Mexico

PREPARED BY:

ENVIRONMENTAL CONSULTANTS
555 Rivergate Lane, B1-101
Durango, CO 81301

SME EA# 110002ag

June 2011

TABLE OF CONTENTS

Page

1. INTRODUCTION 1
1.1 The Proposal 1
1.2 Purpose and Need 1
1.3 Conformance with Land Use Plans and Other Environmental Assessments 2
1.4 Federal, State or Local Permits, Licenses or Other Consultation Requirements 2

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION 6
2.1 Alternative A - No Action 6
2.2 Alternative B - Proposed Action 6
2.3 Alternatives Considered but not Analyzed in Detail 11

3. DESCRIPTION OF AFFECTED ENVIRONMENT 13
3.1 General Topography 14
3.2 Air Resources 14
3.3 Water Quality: Surface and Groundwater 17
3.4 Watershed, Hydrology and Soils 17
3.5 Floodplains 19
3.6 Hazardous or Solid Waste Materials 19
3.7 Mineral Resources 19
3.8 Riparian Zones/Wetlands 20
3.9 Farmlands, Prime or Unique 20
3.10 Livestock Grazing 20
3.11 Wild Horse and Burros 20
3.12 Vegetation, Forestry 21
3.13 Invasive, Non-native Species 21
3.14 Wildlife 22
3.15 Migratory Birds 22
3.16 Threatened & Endangered Species and BLM/FFO Special Management Species 23
3.17 Visual Resources 26
3.18 Recreation 27
3.19 Congressional or Administrative Designations 27
3.20 Public Health and Safety 27
3.21 Cultural or Historical Values 28
3.22 American Indian Religious Concerns 28
3.23 Paleontology 29
3.24 Support Functions 30
3.25 Transportation and Access 30
3.26 Land Tenure, ROW, Other Uses 30
3.27 Environmental Justice/Socio-Economics 30

4. ENVIRONMENTAL CONSEQUENCES 32
4.1 General Topography 33
4.2 Air Resources 33
4.3 Water Quality: Surface and Groundwater 36
4.4 Soils - Watershed - Hydrology 37
4.5 Floodplains 38
4.6 Hazardous or Solid Waste Materials 38
4.7 Mineral Resources 38

4.8 Riparian Zones/Wetlands 39
4.9 Farmlands, Prime or Unique 39
4.10 Livestock Grazing 39
4.11 Wild Horse and Burros 39
4.12 Vegetation, Forestry 39
4.13 Invasive, Non-native Species 40
4.14 Wildlife 40
4.15 Migratory Birds 41
4.16 Threatened & Endangered Species and BLM/FFO Special Management Species 43
4.17 Visual Resources 43
4.18 Recreation 44
4.19 Congressional or Administrative Designations 44
4.20 Public Health and Safety 45
4.21 Cultural or Historical Values 45
4.22 American Indian Religious Concerns 45
4.23 Paleontology 46
4.24 Support Functions 46
4.25 Transportation and Access 47
4.26 Land Tenure, ROW, Other Uses 47
4.27 Environmental Justice 47

5. CUMULATIVE EFFECTS 48
5.1 Air Quality 48
5.2 Wildlife 49

6. CONSULTATION/COORDINATION 51
6.1 Authorities 51

7. REFERENCES 52

LIST OF FIGURES

Figure 1: Vicinity Map 5
Figure 2: Project Location Map 8
Figure 3: Project Area Map 12

LIST OF TABLES

Table 1: Cumulative Acreages for Alternative B (proposed action) Lackey A 292S Well Pad and Pipeline Tie 9
Table 2: Potentially Affected Resources 13
Table 3: Migratory Birds with Potential to Occur in the Proposed Action Area 22
Table 4: Federally Listed Threatened, Endangered, Proposed, and Candidate Species with Potential to Occur in San Juan County, New Mexico 24
Table 5: Special Management Species of the BLM/FFO and their Potential to Occur in the Proposed Action Area 25
Table 6: Summary of Disturbance 33

Table 7: Summary of Public Contacts Made During Preparation of Document and Interdisciplinary Team.....51

LIST OF APPENDICES

Appendix A: Survey Plats
Appendix B: Laws and Regulations that Govern Federal Oil and Gas Development
Appendix C: Project Area Images
Appendix D: Plants and Wildlife Observed in the Project Area

LIST OF ACROYNMS AND ABBREVIATIONS

ACEC	Areas of Critical Environmental Concern
APD	Application for Permit to Drill
BLM/FFO	Bureau of Land Management, Farmington Field Office
COA	Conditions of Approval
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FLPMA	Federal Land Policy and Management Act of 1976
FONSI	Finding of No Significant Impact
MLA	Mineral Leasing Act of 1920
NEPA	National Environmental Policy Act
NMHPD	New Mexico Historic Preservation Division
NMAQB	New Mexico Air Quality Bureau
NMWQCD	New Mexico Water Quality Control Division
PRMP/FEIS	Proposed Resource Management Plan/Final Environmental Impact Statement
ROD	Record of Decision
ROW	Right of Way
SDA	Specially Designated Areas
SMCRA	Surface Mining Control and Reclamation Act of 1977
USACE	Army Corps of Engineers
USFWS	U. S. Fish and Wildlife Service

ENVIRONMENTAL ASSESSMENT (EA)
FOR
BURLINGTON RESOURCES OIL & GAS COMPANY LP
LACKEY A 292S
TWINNED NATURAL GAS WELL, WELL PAD, AND PIPELINE TIE

1. INTRODUCTION

1.1 The Proposal

Burlington Resources Oil & Gas Company LP (Burlington) and Enterprise Field Services, LLC (Enterprise) have filed an application for permit to drill (APD) and a right-of-way (ROW) application, respectively, with the Bureau of Land Management, Farmington Field Office (BLM/FFO) for a natural gas well and associated pipeline tie. The proposed well, the Lackey A 292S, would be twinned with the existing Houck 2E and would be partially contained within the existing well pad disturbance. The proposed action would include the construction of a well pad, the drilling, production, and final abandonment of a Basin Fruitland Coal gas well, and the construction of the associated well-tie pipeline. This action is being proposed on public lands with federal minerals both administered by the Bureau of Land Management (BLM).

This site-specific analysis tiers into and incorporates by reference the information and analysis contained in the Farmington Proposed Resource Management Plan/Final Environmental Impact Statement (PRMP/FEIS) approved as per the September 29, 2003 Record of Decision (ROD) as the Farmington Resource Management Plan (RMP), pursuant to 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21 (BLM 2003a). The document is available for review at the Farmington Field Office, Farmington, New Mexico, or on the World Wide Web at http://www.nm.blm.gov/ffo/ffo_home.html. This environmental assessment (EA) addresses site-specific resources and effects of the proposed action that were not specifically covered within the PRMP/FEIS, as required by the National Environmental Policy Act of 1969 (NEPA), as amended (Public Law 91-90, 42 United States Code [USC] 4321 et seq.).

The legal coordinates for the proposed Lackey A 292S well project surface location are:

> 1120' FSL and 804' FEL of Section 12 in Township 29N, Range 10W, New Mexico Principal Meridian (NMPM), in San Juan County, New Mexico

1.2 Purpose and Need

The purpose for the proposed action is to define and produce Basin Fruitland Coal natural gas from the valid and existing federal lease, NMSF-077092. BLM is authorized under the Mineral Leasing Act of 1920 (MLA), as amended (30 United States Code [USC] 181 et seq.) to issue oil and gas leases and permit the exploration and development of those leases. The existing lease constitutes a binding legal contract that allows for mineral development by the lease holder. An approved APD, issued by the BLM, would authorize the applicant to construct, drill, operate and

finally abandon the proposed well and any on-lease access road and associated facilities. The associated pipeline tie would be authorized by a ROW grant to Enterprise.

The Lackey A 292S gas well would allow Burlington to develop their lease and provide additional natural gas for the national energy market, which would also generate federal and state tax revenue as well as revenue for Burlington.

1.3 Conformance with Land Use Plans and Other Environmental Assessments

Regulations under 43 CFR 1610.5 requires the proposed action to be in conformance with the terms and the conditions of the RMP/EIS as approved by the ROD signed September 29, 2003 (BLM 2003b). Specially Designated Areas (SDAs) and Areas of Critical Environmental Concern (ACECs) for the proposed action area were identified in the RMP/EIS under authority of the Federal Land Policy and Management Act (FLPMA) of 1976 (Public Law 94-579, 43 USC 1701 et seq.) allowing for multiple use of lands administered by the BLM. Alternative B, the proposed action, is not located within any BLM/FFO designated Area of Critical Environmental Concern (ACEC), Specially Designated Area (SDA), or otherwise specially managed area.

1.4 Federal, State or Local Permits, Licenses or Other Consultation Requirements

Burlington would comply with all applicable federal and State of New Mexico laws and regulations (Appendix B). Non-point source pollution is an identified problem in the planning area that is directly associated with soil stability and water quality. The New Mexico Energy, Minerals and Natural Resources Department requires operators to follow “pit rule” guidelines contained within NMAC 19.15.17 in an effort to reduce ground water contamination from industry related activities. Mandated by the Clean Water Act (CWA), efforts to reduce non-point source pollution through implementation of erosion control and management practices are an important part of BLM’s management activities. Industrial activities disturbing land may require permit coverage through a National Pollution Discharge Elimination System (NPDES) storm water discharge permit. Oil and gas development in New Mexico, however, is exempt from NPDES regulation per 40 CFR Part 122. Upon determination, a U.S. Army Corps of Engineers Section CWA 404 Permit for the discharge of dredge and fill materials may also be required. Operators are required to obtain all necessary permits and approvals prior to any disturbance activities.

Consultation with the U.S. Fish and Wildlife Service (USFWS) as required by Section 7 of the Endangered Species Act was conducted as part of the Farmington PRMP/FEIS (Consultation No. 2-22-01-1-389) to address cumulative effects of RMP implementation. The consultation is summarized in Appendix M of the RMP/EIS. Review of current USFWS Federally Listed Species and onsite evaluation of habitat for the proposed action indicate no need for additional Section 7 consultation.

BLM regulates oil and gas development so as to minimize environmental effects to public lands as required by numerous federal laws, including:

- The Endangered Species Act of 1973 (P.L. 94-325),

- The Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703-712),
- The Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. 668-668d),
- The Federal Water Pollution Control Act of 1948 (Clean Water Act), as amended (33 U.S.C. Chap. 26),
- The Clean Air Act of 1963, as amended (P.L. 88-206),
- The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 U.S.C. Chap. 103),
- The Antiquities Act of 1906, as amended (P.L. 52-209),
- The National Historic Preservation Act of 1966, as amended (P.L. 89-665),
- The Archaeological and Historic Preservation Act of 1974 (P.L. 86-253),
- The Archaeological Resources Protection Act of 1979, as amended (P.L. 96-95),
- The American Indian Religious Freedom Act of 1978, as amended (42 U.S.C. 1996), and
- The Native American Graves Protection and Repatriation Act of 1990 (P.L. 101-601).

The Migratory Bird Treaty Act implements various treaties and conventions between the U.S. and Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the Act, taking, killing or possessing migratory birds is unlawful. Executive Order (EO) 13186 was signed on January 10, 2001, directing executive departments and agencies of the federal government to take certain actions to further implement the MBTA including developing and implementing a Memorandum of Understanding (MOU) with the USFWS that would promote the conservation of migratory bird populations. A MOU was developed and entered into by the BLM and the USFWS on April 12, 2010 to accomplish EO 13186 and to ensure the successful implementation of BLM and USFWS migratory bird conservation responsibilities. The MOU *To Promote the Conservation of Migratory Birds* presents collaborative methods to promote the conservation of migratory bird populations by identifying and implementing strategies which avoid or minimize adverse impacts to migratory birds. The BLM and USFWS have agreed that implementation of the MOU will be in harmony with existing agency missions, and the MOU does not supersede any legal requirements or existing species conservation processes and procedures such as ESA recovery plans. It is also understood that the BLM may not be able to fulfill all aspects of the MOU upon signing (MOU Section IX (I)).

The MOU *To Promote the Conservation of Migratory Birds* entered into by the BLM and the USFWS was not completed during the development of the revised FFO RMP. Consultation on the Biological Assessment (BA) with the USFWS for the RMP was completed on October 2, 2002, the Environmental Impact Statement (EIS) was completed in March 2003, and the Record of Decision (ROD) for the RMP was signed in September of 2003. There are no management constraints or mitigation measures pertaining to the MBTA listed within the RMP, BA, EIS, or ROD. Revision and/or adoption of some elements of the MOU into the RMP may be required. Currently, effects to migratory birds are addressed and mitigated at the project level as outlined in the Migratory Bird Treaty Act – BLM/FFO Interim Management Policy (Instruction Memorandum No. NM-F00-2010-001, BLM 2010).

Until such time as further guidance related to the MOU is issued, the BLM will continue to analyze impacts to migratory birds in NEPA documents, list the MBTA as a Law the owner of

any BLM permit must comply with, and utilize best management practices and mitigation measures that minimize impacts to migratory birds as outlined in Instruction Memorandum No. NM-F00-2010-001.

Compliance with Section 106 responsibilities of the National Historic Preservation Act are adhered to by following the BLM – New Mexico State Historic Preservation Office (SHPO) protocol agreement, which is authorized by the National Programmatic Agreement between the *BLM*, the *Advisory Council on Historic Preservation*, and the *National Conference of Council of State Historic Preservation Officers.*

Additionally, the APD Operator and ROW Grant Holder shall:

- Comply with all applicable Federal, State of New Mexico and local laws and regulations. A listing of selected federal laws and regulations applicable to the proposed action can be found in Appendix B.
- Obtain the necessary permits for the construction, drilling, completion, production and abandonment of this well and pipeline tie including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
- Certify that a Surface Use Agreement has been reached with private landowners where required.
- Obtain any relevant and/or required New Mexico Environment Department (NMED) air quality permits.

The State of New Mexico Oil Conservation Commission (NMOCC) has assigned spacing rules for producing oil and gas formations. Recently, the NMOCC has authorized infill provisions for the increased density for the Basin Dakota, Blanco Mesaverde, and Basin Fruitland Coal pools. This has resulted in numerous wells being proposed and approved within the proposed project area and throughout the San Juan Basin. Minimum spacing is currently at 80 acres per well for both the Basin Fruitland Coal pool. Burlington proposes to drill one Basin Fruitland Coal natural gas well.

This EA considers the requirements of these and other laws and regulations, as applicable. The proposed action, including environmentally-protective mitigation measures, complies with the laws and regulations indicated above. Operators are required to obtain all necessary permits and approvals prior to any disturbance activities.

SME ENVIRONMENTAL CONSULTANTS 555 Rivergate Lane B1-101 Durango, Colorado 81301 www.sme-env.com (970) 259-9595	ROAD/VICINITY MAP	FIGURE 1
	LACKEY A 292S ENVIRONMENTAL ASSESSMENT	*Source: Highway Map Provided by ESRI Bing Street Maps.*

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Alternative A - No Action

The BLM NEPA Handbook (H-1 90-1) states that for Environmental Assessments (EAs) on externally initiated proposed actions, the No Action Alternative generally means that the proposed activity would not take place. This option is provided in 43 CFR 3162.3-1 (h) (2). This alternative would deny the approval of the proposed application, and the current land and resource uses would continue to occur in the proposed project area. No mitigation measures would be required. The No Action Alternative provides a baseline reference, enabling decision makers(s) to compare the magnitude of environmental effects of the alternatives.

Under the terms of valid federal mineral leases, the lessee has the right to develop mineral resources. Other laws, regulations, and policy include provisions for the economic development of existing leases. By federal law, the government must abide by the terms, conditions, and provisions agreed to when leases were issued. In the Council of Environmental Quality (CEQ) regulations (40 CFR 1500.3), it states that parts 1500-1508 of this title provide regulations applicable to and binding on all Federal agencies for implementing the procedural provisions of the National Environmental Policy Act of 1969…" except where compliance would be inconsistent with other statutory requirements".

2.2 Alternative B - Proposed Action

Burlington has proposed the construction of a well pad and the drilling, production, and final abandonment of a natural gas well. Enterprise has submitted a right-of-way application (ROW) with the FFO for the proposed construction of an associated pipeline tie. The proposed Lackey A 292S well and associated facilities are proposed to be developed within the San Juan Basin of northwestern New Mexico, approximately 0.8 mile north of Blanco, in San Juan County, New Mexico. Alternative B (proposed action) is located approximately 0.8 mile north of U.S. Highway 64 and 0.6 mile northeast of N.M. Highway 575 (see Figure 1 above).

The proposed well pad and associated facilities would be located in relatively even terrain on top of an alluvial mesa in the greater San Juan River Valley. The project area drains south toward the San Juan River (see Figure 2 below). Vegetation within the Lackey A 292S area consists of sagebrush (*Artemisia tridentata*)-grassland that transitions into juniper (*Juniperus* sp.) savannah.

The proposed Lackey A 292S well pad and pipeline tie would be located in the southeast quarter of Section 12, Township 29 North, Range 10 West, New Mexico Principal Meridian (NMPM). The project area elevation is 5,872 feet (ft) above mean sea level. The proposed action is located on the Blanco, New Mexico, 7.5-minute United States Geological Service (USGS) quadrangle map (Figure 2). The proposed action is planned for the year 2011 or later.

The GPS coordinates at the proposed wellhead (surface) are:

Latitude: 36.73560° N (NAD83)
Longitude: 107.83022° W (NAD 83)

At the onsite inspection, all areas of proposed surface disturbance were inspected to ensure that potential effects to natural resources would be minimized. Alternatives to the different aspects of the Proposed Action are always considered and would be applied as pre-approval changes, site specific mitigation and/or ROW grant stipulations if they would alleviate or minimize environmental effects of the operator's proposal. Thus, Alternative B reflects any adjustments that were made to the original proposal.

County: San Juan County, NM
Applicant: Burlington Resources Oil & Gas Company LP
Surface Owner(s): Bureau of Land Management (BLM)

PROJECT LOCATION:

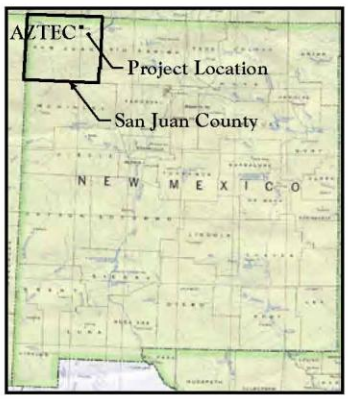
Township 29 North, Range 10 West, Section 12.
New Mexico Principal Meridian,
San Juan County, New Mexico.

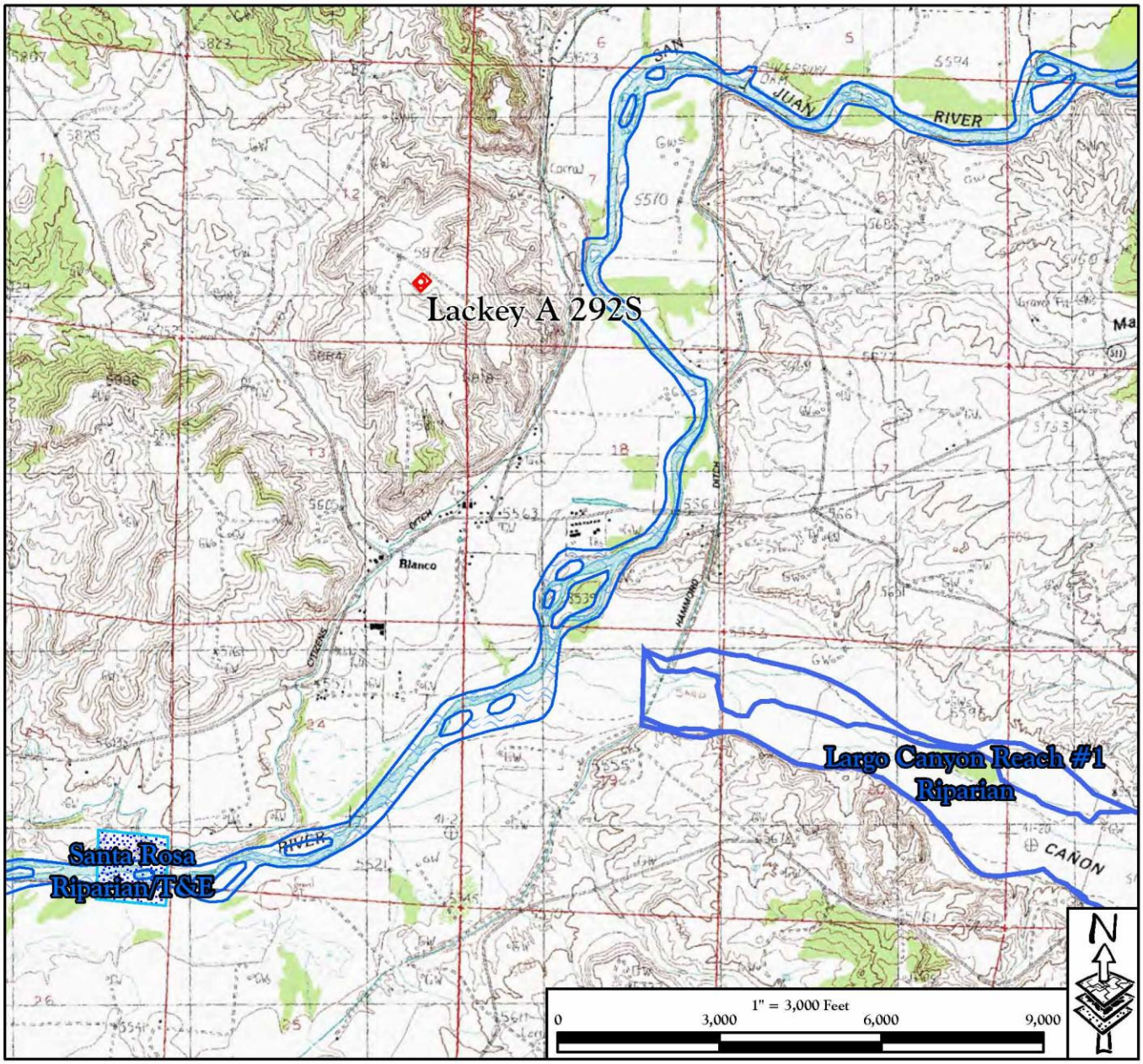
SURFACE HOLE LOCATION:

Latitude: 36.734546° N
Longitude: 107.832852° W

Legend

- Proposed Surface Hole
- Proposed Well Pad
- San Juan River
- Riparian
- Riparian/T&E





SME ENVIRONMENTAL CONSULTANTS 555 Rivergate Lane B1-101 Durango, Colorado 81301 www.sme-env.com (970) 259-9595	PROJECT LOCATION MAP	FIGURE 2
	LABKEY A 292S ENVIRONMENTAL ASSESSMENT	*Source: Blanco, New Mexico.* *7.5' USGS Quadrangle*

2.2.1 Construction Phase

Alternative B (proposed action) would include the construction of a level well pad surface of approximately 205 feet by 260 feet. Unless limited by surface resources, there would be an additional 50-foot construction zone around the perimeter of the proposed pad to contain the cut and fill slopes and top soil storage. The well pad would be constructed using a D-8 bulldozer. Clearing for the well pad is needed to provide space and a level surface for a drilling rig, completion rig and other heavy equipment to safely access and drill the well. The maximum cut would be 3 feet at the north corner (Corner No. 3) and the maximum fill would be 4 feet at the west corner (Corner No. 2). The well location, including the construction zone, would require a total of approximately 2.52 acres of land for construction, of which 1.33 acres would be constructed within the re-vegetated existing disturbance associated with the existing Houck 2E well pad and access road. The proposed Lackey A 292S well pad and associated construction zone would result in 1.19 acres of new surface disturbance.

No new access road would be required to access the proposed well pad as it would twin an existing location. An associated 50-foot pipeline tie would be constructed tying the proposed Lackey A 292S gas well to the existing Houck 2E pipeline. The pipeline would be constructed within a 40-foot wide right-of-way (ROW). The entire pipeline ROW would be contained within the proposed Lackey A 292S well pad disturbances (see Figure 3 below and the Lackey A 292S survey plats located in Appendix A).

Total surface disturbance associated with the Lackey A 292S well pad and pipeline tie would be no more than 2.52 acres as some of the proposed disturbances overlap. New surface disturbance associated with the proposed action would be 1.19 acres as the proposed action would twin an existing well pad.

For a detailed description of design features and construction practices associated with the well proposed under Alternative B (proposed action), refer to the subject APD on file at the FFO, Farmington, New Mexico. For the proposed well, recommended mitigation measures shall be implemented as Conditions of Approval (COAs) attached to the approved APD. Similarly, for the proposed pipeline tie, recommended mitigation measures would be implemented as stipulations in the ROW grant. A summary of the approximate acreage of disturbance associated with all actions under Alternative B, proposed action, is contained in Table 1 below.

Table 1: Cumulative Acreages for Alternative B (proposed action) Lackey A 292S Well Pad and Pipeline Tie

Project Components	New Disturbance Acreage	Existing Disturbance Acreage	Total Acreage* "footprint"
Well Pad	1.19	1.33	2.52
Pipeline Tie		0.05	
TOTALS	**1.19**	**1.33***	**2.52**

* Total does not include project components that overlap (see Section 2.2.1).

Site specific mitigation measures determined at the April 7, 2011 onsite include:

- All available topsoil, along with trees and brush, will be stockpiled for redistribution during reclamation. Trees and brush will be mowed or chipped for use as reclamation mulch.
- Excavated materials from the cuts shall be used on the fill portions of the location.
- The existing storm water diversion ditch on along the uphill side of the existing Houck 2E well pad will reestablished as needed to divert run-off around the pad.
- All pits will meet State of New Mexico, Oil Conservation Division (NMOCD) pit guidelines and requirements, NMAC 19.15.17.
- Cut material from the reserve and burn pits will be stockpiled on the location or used to construct the back-walls of the burn pit.
- The reserve pit will be lined with an impervious material, at least 20 mils thick.
- All pits will be fenced to exclude livestock and wildlife. A tight sheep fence shall be constructed around three sides of the reserve pit during drilling and completion and around the fourth side after the completion rig leaves the wellhead. The fences would remain until the pits are dried and backfilled.
- Pits that contain petroleum will be netted to exclude birds, especially any protected under the Migratory Bird Treaty Act (MBTA).
- The existing access road will be crowned, ditched and upgraded to meet current BLM standards from the proposed well pad 0.6 mile north to a T-intersection.
- Culverts for the access road and other necessary hydrologic BMPs will be installed as necessary for proper drainage and sediment management.
- Upon interim reclamation, the reserve and blow pits will be filled utilizing existing disturbance only.
- Slopes to be reclaimed will be re-contoured to pre-construction topographical contours.
- All disturbed areas not needed for vehicle travel surfaces or aboveground production equipment will be reclaimed and seeded with the FFO specified seed mixture, using native species only.
- Removed topsoil and vegetation will be placed on reclamation areas to aid in re-vegetation and erosion control.
- The operator will be responsible for control of invasive species and noxious weeds within the reclaimed areas of the well pad and pipeline tie.
- Above ground structures shall be painted to blend with the natural color of the landscape. Paint color will be Juniper Green Federal Standard 595a-17127.
- All aspects of the proposed action will be in compliance with all applicable federal and State of New Mexico regulations.
- All cultural resource stipulations will be followed.
- If impacts to federally threatened, endangered, proposed, or candidate species; BLM/FFO Special Management Species; or migratory birds, nests, or eggs are observed during the implementation of the proposed action, the BLM/FFO will be notified, and specific mitigation measures directed at the species' needs will be implemented under the direction of the BLM/FFO.

After the well pad is constructed, a drilling rig would be moved onto the location and assembled. Drilling to the Basin Fruitland Coal formation would require approximately 14-21 days. After the well has been drilled, completion would take approximately an additional 14-21 days. The total time for construction, drilling, and completion is expected to last four (4) to eight (8) weeks.

During the construction, drilling, and completion phase, both heavy equipment and light vehicles would use the proposed and existing BLM roads to access the well site. Traffic would include drilling rigs, large tractor-trailers, construction equipment, water trucks, drilling and production equipment and supplies, tanks, and numerous light pick-ups

2.2.2 Production Phase

After the well is completed, the portions of the pad not required for production equipment and vehicular access would be re-contoured and seeded with an approved BLM/FFO seed mix. Approximately 1.22 acres of the well location would remain in use for production equipment. These areas would not be reclaimed until final abandonment of the individual well. After production of the well begins, normal upkeep would be required. One pick-up truck would visit the well site approximately every other day during the normal work week to check on production and resolve any problems that may occur at the well. Trucks would be used to remove wastewater stored in tanks on the site. The frequency of water hauling would depend on the amount of water the well produces and may vary from once a day to once a month. Surface effects of a work-over rig would be similar to the effects described for drilling, although usually to a lesser degree. The estimated production phase of the well is 20 to 30 years.

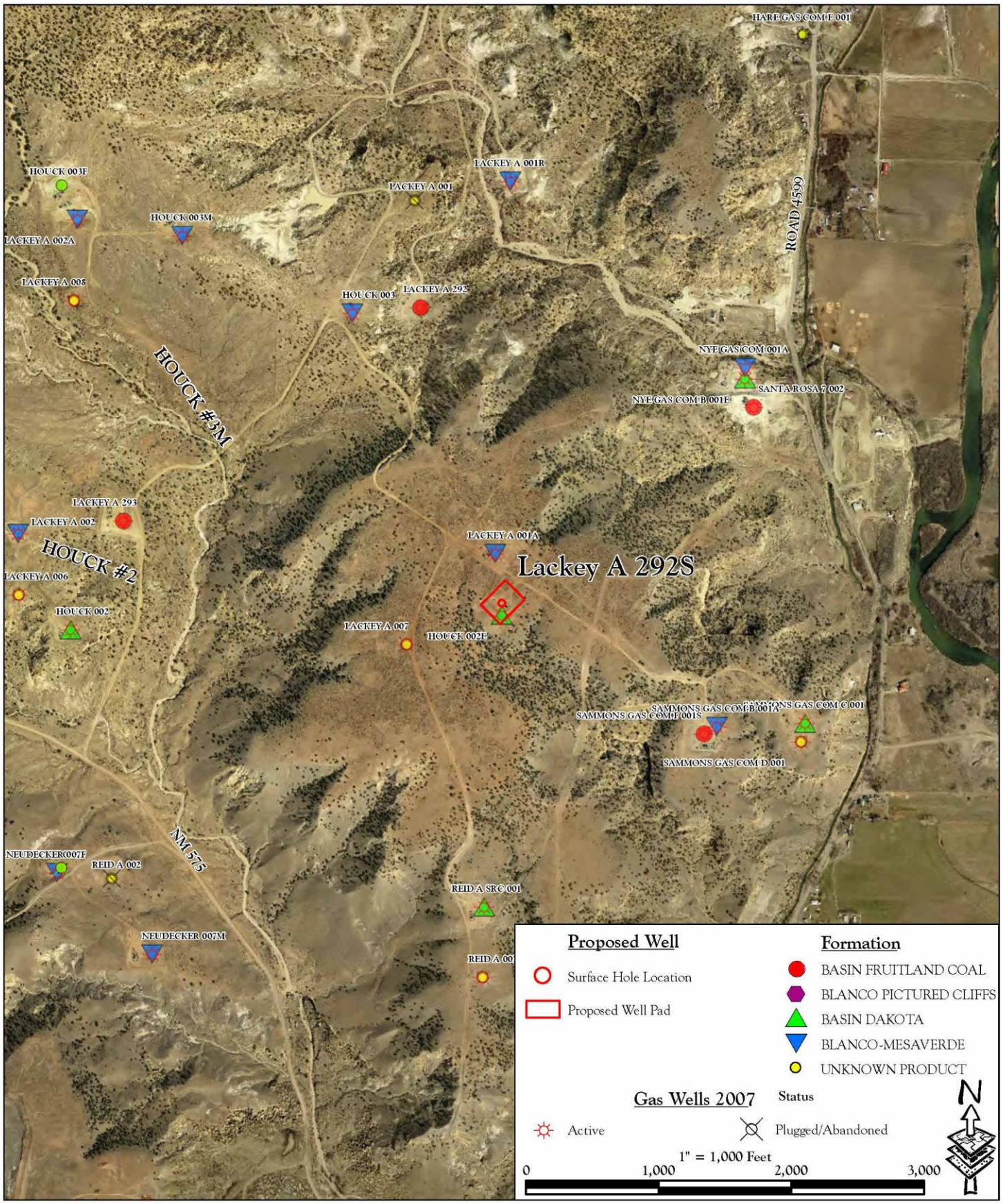
2.2.3 Abandonment Phase

When the well is no longer commercially viable, it would be plugged and abandoned. Down-hole well abandonment would be carried out under current BLM regulations for plugging of the well and surface restoration. Surface equipment would be removed, except for an aboveground marker that would contain individual well identification information including the location of the plugged hole. The underground pipeline ties are usually plugged and left in place. The well pad and access road, if not needed for other purposes, would be re-contoured and re-vegetated as specified in the approved COAs and ROW grant stipulations.

2.3 Alternatives Considered but not Analyzed in Detail

The proposed gas well was originally surveyed as a twinned location on the existing Lackey A 7 well pad approximately 860 feet west of the currently proposed location. This original staking was relocated to the currently proposed location due to operator incompatibility. Burlington was unable to acquire a twinning agreement with the operator of the existing Lackey A 7, Energen Resources Inc. The well stake is now located on the existing Houck 2E operated by Burlington (Alternative B).

No other reasonable alternatives to the proposed action were apparent during or after the on-site of the Lackey A 292S project. The proposed Lackey A 292S is a Basin Fruitland Coal natural gas well. The proposed action is a vertical well, twinned on an existing well pad, and would result in limited new long-term surface disturbance. No other alternatives were identified that would create less disturbance to the human environment while facilitating an appropriate location suitable to reach the targeted formation and drilling window.



SME 555 Rivergate Lane B1-101 Durango, Colorado 81301 www.sme-env.com (970) 259-9595 ENVIRONMENTAL CONSULTANTS	AERIAL SITE MAP	FIGURE 3
	LACKEY A 292S ENVIORONMENTAL ASSESSMENT	*Source: Aerial Photo Taken in 2009 Provided by San Juan County GIS (Imagery/SJCounty_2009_1ft).*

3. DESCRIPTION OF AFFECTED ENVIRONMENT

This section describes the environment that would be affected by implementation of the proposed action and any alternatives described in Section 2. Aspects of the affected environment described in this section focus on the relevant major resources or issues. Certain critical environmental components require analysis under BLM policy. These items are included below in Table 2. Following the table, only those resources of the environment that have the potential to be affected by the proposed action, or any alternative to the proposed action, are described. Field resource investigations of the proposed well pad were conducted on April 7, 2011 by specialists from the BLM and SME Environmental, Inc.

Table 2: Potentially Affected Resources

Resources		Potentially Affected	No Effect	Stipulations or Mitigation Necessary	Not Present On Site	Comments Included in EA Text	BLM Evaluator
Air Quality		x		x		x	
Water Quality - Surface/Ground		x		x		x	
Soils – Watershed – Hydrology		x		x		x	
Floodplains					x	x	
Hazardous or Solid Waste Materials					x	x	
Mineral Resources		x		x		x	
Riparian Zones/Wetlands					x	x	
Farmlands, Prime or Unique					x	x	
Livestock Grazing		x		x		x	
Wild Horse and Burros					x	x	
Vegetation, Forestry		x		x		x	
Invasive, Non-native Species		x		x		x	
Wildlife		x		x		x	
Special Status, T & E Species		x		x		x	
Visual Resources		x		x		x	
Recreation		x			x	x	
Congressional or Administrative Designations	ACECs				x	x	
	NLCS Units				x	x	
	Wilderness				x	x	
	Wild and Scenic Rivers				x	x	
Cultural or Historical					x	x	
American Indian Religious Concerns		x			x	x	
Paleontology					x	x	

Resources		Potentially Affected	No Effect	Stipulations or Mitigation Necessary	Not Present On Site	Comments Included in EA Text	BLM Evaluator
Support Functions	Fire	x			x	x	
	Engineering	x			x	x	
	Law Enforcement	x			x	x	
Transportation and Access					x	x	
Land Tenure, ROW, Other Uses					x	x	
Environmental Justice		x		x		x	

3.1 General Topography

The proposed action is located within the San Juan Basin of northern New Mexico, approximately one (1) mile north of Blanco, NM, on the Blanco, New Mexico 7.5 minute USGS quad. The project area is located at 5,872 feet in elevation above sea level on a small flat-topped mesa of glacial alluvium just west of the San Juan River, defining the western edge of the San Juan River Valley. The proposed project area slopes gradually south towards the San Juan River Valley. Slopes within the project area range from 0 to 3%. The general topography of the proposed project area is characterized by lo rolling hills and mesas that frame the western edge of the broad and flat bottomed San Juan River Valley.

3.2 Air Resources

The proposed action is located in San Juan County, New Mexico. Additional general information on air quality in the area is contained in Chapter 3 of the Farmington RMP/Environmental Impact Statement. In addition to the air quality information in the RMP cited above, new information about greenhouse gases (GHGs), and their effects on national and global climate conditions has emerged since this RMP was prepared. On-going scientific research has identified the potential effects of GHG emissions such as carbon dioxide (CO2) methane (CH4); nitrous oxide (N_2O); water vapor; and several trace gasses on global climate. Through complex interactions on a global scale, GHG emissions may cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and burning of fossil carbon sources have caused GHG concentrations to increase measurably, and may contribute to overall climatic changes, typically referred to as global warming.

The 2003 RMP discussed ozone in the Baseline Air Quality and Impact Assessment sections. The National Ambient Air Quality Standard (NAAQS) at the time was 0.084 ppm. In March of 2008, the Environmental Protection Agency (EPA) announced a new primary 8-hour standard of 0.075 ppm.

Increased development in the Four Corners area including a proposed new coal fired power plant, increased oil and gas development, and population growth are all contributing to air quality concerns. Many residents are concerned with potential health effects from other pollutants. An overall haze and plume of nitrogen oxides can often been seen in the skies, which

affect visibility, and there are concerns for the ecosystem due to deposition of mercury and nitrogen.

In addition, the Environmental Protection Agency (EPA), on October 17, 2006, issued a final ruling on the lowering of the National Ambient Air Quality Standard (NAAQS) for particulate matter ranging from 2.5 micron or smaller particle size. This ruling became effective on December 18, 2006, stating that the 24-hour standard for PM 2.5 was lowered to 35 ug/m³ from the previous standard of 65 ug/m³. This revised PM 2.5 daily NAAQS was promulgated to better protect the public from short-term particle exposure.

This EA incorporates an analysis of the contributions of the proposed action to GHG emissions, and a general discussion of potential effects to climate.

Air quality and climate are the components of air resources, which include applications, activities, and management of the air resource. Therefore, the BLM must consider and analyze the potential effects of BLM and BLM-authorized activities on air resources as part of the planning and decision making process.

The Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality, including seven nationally regulated ambient air pollutants. Regulation of air quality is also delegated to some states of which New Mexico is one. Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology and terrain, and also includes applications of noise, smoke management, and visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. Greenhouse gases and the potential effects of GHG emissions on climate are not regulated by the EPA, however climate has the potential to influence renewable and non-renewable resource management.

3.2.1 Air Quality

The area of the proposed action is considered a Class II air quality area. A Class II area allows moderate amounts of air quality degradation. The primary sources of air pollution are dust from blowing wind on disturbed or exposed soil and exhaust emissions from motorized equipment.

Air quality in the area near the proposed well is generally good and the proposed action is not located in any of the areas designated by the Environmental Protection Agency as “non-attainment areas” for any listed pollutants regulated by the Clean Air Act. During the summers of 2000 through 2002, ozone levels in San Juan County were approaching non-attainment. Additional modeling and monitoring was conducted by Alpine Geophysics, LLC and Environ International Corporations, Inc., in 2003 and 2004. Results of the modeling suggest the episodes recorded in 2000 through 2002 were attributable to regional transport and high natural biogenic source emissions. The model also predicted that the region will not violate the ozone NAAQS through 2007 and that the trends in the 8-hr ozone values in the region will be declining in the future. At the present time, San Juan County is classified as in attainment with the revised federal ozone standard of 0.075 ppm. Rio Arriba County is unclassified because there are no ozone monitors sited in Rio Arriba County.

Greenhouse gases, including carbon dioxide (CO2) and methane (CH4), and the potential effects

of GHG emissions on climate, are not regulated by the EPA under the Clean Air Act. However, climate has the potential to influence renewable and non-renewable resource management. The EPA's Inventory of US Greenhouse Gas Emissions and Sinks found that in 2007, total U.S. GHG emissions were over 7 billion metric tons and that total U.S. GHG emissions have increased by 17% from 1990 to 2007. Emissions increased from 2006 to 2007 by 1.4 percent (99.0 Tg CO2 Eq.). The following factors were primary contributors to this increase: (1) cooler winter and warmer summer conditions in 2007 than in 2006 increased the demand for heating fuels and contributed to the increase in the demand for electricity, (2) increased consumption of fossil fuels to generate electricity and (3) a significant decrease (14.2 percent) in hydropower generation used to meet this demand (EPA 2009).

The levels of these GHGs are expected to continue increasing. The rate of increase is expected to slow as greater awareness of the potential environmental and economic costs associated with increased levels of GHG's result in behavioral and industrial adaptations.

3.2.2 Climate

Global mean surface temperatures have increased nearly 1.0°C (1.8°F) from 1890 to 2006 (Goddard Institute for Space Studies, 2007). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) predicted a warming of about 0.2°C per decade for the next two decades, and then a further warming of about 0.1°C per decade. The National Academy of Sciences (2006) supports these predictions, but has acknowledged that there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures are more likely than increases in daily maximum temperatures.

A 2007 US Government Accountability Office (GAO) Report on Climate Change found that, "federal land and water resources are vulnerable to a wide range of effects from climate change, some of which are already occurring. These effects include, among others: 1) physical effects such as droughts, floods, glacial melting, and sea level rise; 2) biological effects, such as increases in insect and disease infestations, shifts in species distribution, and changes in the timing of natural events; and 3) economic and social effects, such as adverse effects on tourism, infrastructure, fishing, and other resource uses." It is not, however, possible to predict with any certainty regional or site specific effects on climate relative to the proposed action and subsequent actions.

In New Mexico, a recent study indicated that the mean annual temperatures have exceeded the global averages by nearly 50 percent since the 1970's (Enquist and Gori 2008). Similar to trends in national data, increases in mean winter temperatures in the southwest have contributed to this rise. When compared to baseline information, periods between 1991 and 2005 show

temperature increases in over 95 percent of the geographical area of New Mexico. Warming is greatest in the northwestern, central, and southwestern parts of the state.

3.3 Water Quality: Surface and Groundwater

Key factors that influence surface water quality in the San Juan River drainage basin, including the proposed action area, include some, or all of the following: sparse vegetative cover, highly erosive and saline soils, rapid runoff, livestock grazing, and mineral resources development. Runoff and sedimentation into washes during precipitation events can be considerable. The quantity of this surface water can reach flash flood levels during thunderstorms or rapid snowmelts. These conditions promote the formation of canyons, arroyos, and gullies further contributing to poor water quality.

No specific quantifiable water quality or quantity data is available for the proposed action area. Generally, surface water quality in drainages is extremely poor following storm/flood/rapid snowmelt events. The BLM/FFO, has estimated that surface runoff frequently contains more than 10,000 milligrams per liter (mg/L) of suspended sediment and more than 1,000 mg/L total dissolved solids (TDS). Public Law 93-320 mandated control of salinity runoff into the Colorado River Basin. A 1984 amendment to the Colorado River Salinity Control Act of 1974 "…specifically requires the Director of the BLM to develop a comprehensive program for minimizing salt contributions to the Colorado River and their tributaries from BLM administered lands" (BLM 1988).

The quality of groundwater in the San Juan Basin generally ranges from fair to poor. The Uinta-Animas aquifer contains fresh to moderate saline water and the quality of the Mesa Verde aquifer is extremely variable. In general, areas of the aquifer that are recharged by infiltration from precipitation or surface water sources contain relatively fresh water. The proposed project area overlays the Uinta-Animas aquifer.

The operator proposes to set surface casing to a depth of 250 feet, or as specified by the BLM, to protect any shallow aquifers. An operation plan with the proposed casing program to protect the aquifers would be submitted with the APD.

3.4 Watershed, Hydrology and Soils

3.4.1 Watershed and Hydrology

The San Juan Basin consists of broad mesas interspersed with many deep canyons with steep canyon walls, dry washes, entrenched narrow valleys, and alluvial fans and floodplains. Elevations range from approximately 4,800 feet, where the San Juan River flows into Utah, to approximately 8,800 feet near the Jicarilla Apache Reservation, and 7,300 feet near Lindrith, New Mexico. Most water supplies in the basin are obtained from valley fill deposits of Quaternary age along rivers, and some of the shallower Cretaceous sandstones bodies. Limited surficial and groundwater resources are available due to the arid climate. Irrigation water for agriculture comes from the diversion of the perennial streams and rivers. Outside of the river corridors, dry farming is nearly nonexistent.

The RMP planning area is divided into subbasins based on Hydrologic Units (4th level) delineated by the United States Geological Survey (USGS). These subbasin units are: (1) Middle San Juan, (2) Animas, (3) Upper San Juan, (4) Blanco Canyon, and (5) Chaco. The proposed action is within the Upper San Juan subbasin. These subbasins are further subdivided into watersheds (5th level hydrologic units). The proposed action would be located within the Upper San Juan watershed.

No perennial surface water sources in the form of ponds, seeps, springs or wetlands are located within the area of the proposed action. The San Juan River, approximately 0.6 miles to the east of the proposed well, represents the nearest source of perennial water. No erosional rills or drainages transect the project area. Surface run-off from precipitation events and snowmelt entering the project area is limited due to the mesa top location of the proposed well pad. The entire proposed project area drains south via percolation and sheet flow into an unnamed ephemeral tributary of the San Juan River. The tributary has been diverted from its original course, which has been transformed into agricultural fields, and appears to discharge into the Citizens Ditch which terminates approximately 15 miles west of the project area.

Ground water supplies are deep and limited. The major ground water aquifer beneath the proposed project area is the Uinta-Animas aquifer. Formations within this aquifer are largely untested, although known to yield numerous stockponds and springs in the region.

3.4.2 Soils

The soils in the San Juan Basin were formed primarily from two kinds of parent material: alluvial sediment and sedimentary rock. The alluvial sediment is material that was deposited in river valleys and on mesas, plateaus, and ancient river terraces. The material has been mixed and sorted in transport and is widely ranging in mineralogy and particle size. Sedimentary parent material consists mainly of sandstone and shale bedrock. These shale and resistant sandstone beds form prominent structural benches, buttes and mesas bounded by cliffs.

Surface geological material in the project area is composed of surficial deposits weathered from the San Jose formation. No biological soil crusts were observed in the project and action area during the field survey.

The United States Department of Agriculture, Natural Resources Conservation Service (NRCS) (formerly the Soil Conservation Service) has surveyed the soils in the proposed action area. Complete soil information is available online at the NRCS's Web Soil Survey website (USDA 2007). Soils of the proposed action are mapped as the Avalon loam, 0 to 3 percent slopes. The NRCS describes the soil unit as follows:

> The Avalon component makes up 90 percent of the map unit. Slopes are 0 to 3 percent. This component is on mesas, uplands. The parent material consists of eolian deposits over slope alluvium derived from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is high. Shrink-swell potential is moderate. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 1 percent. This component is in the R035XB003NM Limy

ecological site. Nonirrigated land capability classification is 7e. Irrigated land capability classification is 2e. This soil does not meet hydric criteria. The calcium carbonate equivalent within 40 inches, typically, does not exceed 15 percent. The soil has a slightly saline horizon within 30 inches of the soil surface (USDA 2007).

3.5 Floodplains

A review of Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps indicates the proposed action (Alternative B) is not located within any 100-year floodplains (FEMA 2009).

3.6 Hazardous or Solid Waste Materials

The Resource Conservation and Recovery Act (RCRA), passed in 1976, established a comprehensive program for managing hazardous wastes from the time they are produced until their disposal. U.S. Environmental Protection Agency (EPA) regulations define solid wastes as any "discarded materials" subject to a number of exclusions. A "hazardous waste" is a solid waste that: (1) is listed by the EPA as a hazardous waste, (2) exhibits any of the characteristics of hazardous wastes (ignitability, corrosivity, reactivity, or toxicity), or (3) is a mixture of solid and hazardous waste. A 1980 amendment to RCRA conditionally exempts from regulation as hazardous wastes, "drilling fluids, production waters, and other wastes associated with the exploration, development, or production of crude oil or natural gas". On July 6, 1988, EPA determined that oil and gas exploration, development and production (ED&P) wastes would not be regulated as hazardous wastes under RCRA. A simple rule of thumb was developed for determining if an ED&P waste is likely to be considered exempt or non-exempt from RCRA regulations: If (1) the waste came from down-hole, or (2) the waste was generated by contact with the oil and gas production stream during removal of produced water or other contaminants, the waste is most likely to be considered exempt by EPA. The Comprehensive Environmental Response Compensation and Liability Act (CERCLA), passed in 1980, deals with the release (spillage, leaking, dumping, accumulation, etc.) or threat of a release of hazardous substances into the environment. Despite many oil and gas constituent wastes being exempt from hazardous waste regulations, certain RCRA exempt contaminants could be subject to regulations as hazardous substances under CERCLA. The New Mexico Oil Conservation Division (OCD) administers hazardous waste regulations for oil and gas activities in New Mexico.

No hazardous or solid waste materials are known to be present at the proposed action (Alternative B) site. The notification of releases such as natural gas, natural gas liquids, and petroleum, outside a facility site is required under CERCLA and under BLM NTL-3A.

3.7 Mineral Resources

The San Juan Basin is one of the most strategic gas producing basins in the U.S. economy due to its annual volume of production and the market it supplies (BLM 2003). The primary remaining reserves in the basin are in the four major formations: Fruitland Coal, Mesaverde Group, Dakota Sandstone, and Pictured Cliffs. The proposed natural gas well would produce natural gas from a valid existing federal lease for the minerals associated with the Fruitland Coal formation. Federal lands in the San Juan Basin are also important sources of coal as well as mineral materials for construction projects in the region, including sand and gravel, rock and stone and

other fill materials. The proposed action is not located on any permitted surface mineral mining operation or free use area.

3.8 Riparian Zones/Wetlands

Field inspection of the Alternative B site and a review of GIS data indicate the proposed action is not located within or proximate to any known BLM/FFO, USFWS, or USGS designated wetlands or riparian areas.

3.9 Farmlands, Prime or Unique

Several of the watersheds within the Farmington Field Office boundaries have some soils meeting the definition of prime farmland, all of which must be irrigated to produce high quality crops (BLM 2003a, p. 3-19).

The proposed action (Alternative B) would not be located within any soil units known to contain prime or unique farmlands (BLM 2003a, p. 3-22).

3.10 Livestock Grazing

Livestock grazing is authorized by FLPMA, the Taylor Grazing Act of 1937 and the Public rangelands Improvement Act of 1978. The principle objective of the rangeland program is to promote healthy, sustainable rangeland ecosystems; to accelerate restoration and improvement of public rangeland to properly functioning condition; to promote the orderly use, improvement and development of the public lands.

There are 167 grazing allotments managed by the Farmington Field Office (FFO) with 351 grazing authorizations that permit cattle, sheep and horse grazing within the resource area. Of the 351 grazing authorizations, 317 are permitted under section 3 of the Taylor Grazing Act. Of the 167 grazing allotments, there are four authorizations issued under section 15 of the Taylor Grazing Act to the Navajo Tribe that authorizes grazing on 35 allotments. There are an additional 30 section 15 authorizations that permit grazing on 30 allotments in the Lindrith, NM area.

The proposed action is located within the FFO Blanco Community Grazing Allotment No. 5039. The grazing allotment is operated from November 1 through January 31 annually with 107 head of cattle with an additional 14 head of cattle from November 1 through November 30. The allotment also permits up to 49 head of cattle from February 2 through April 30. This allotment contains approximately 477 animal unit months (AUM) of forage and consists of 100% public land. No permanent livestock water sources are within the immediate area. Livestock may be present during construction of the proposed action and would be present during project operations as evidenced by extensive signs of cattle grazing in the project area.

3.11 Wild Horse and Burros

Bureau of Land Management, Farmington Field Office administered lands lie adjacent to the Jicarilla Wild Horse Territory (Carson National Forest, Jicarilla Ranger District). In the administration of wild, free-roaming horses and their environment (36 CFR 222.21), the Carson

National Forest is responsible for "maintaining a thriving ecological balance considering them an integral component of the multiple use resources, and regulating their population and accompanying need for forage and habitat in correlation with other uses..."

Some bands of the wild horse population move to the east onto BLM lands. Generally these horses move off the forest during the winter months and then move back onto the forest during the summer. The BLM/FFO and the Jicarilla Ranger District, Carson National Forest have written a memorandum of understanding that allows for up to 23 wild horses to graze on BLM lands as long as the horses migrate naturally.

The proposed action (Alternative B) is not located within any areas designated for wild horse and burro management.

3.12 Vegetation, Forestry

Vegetation within the proposed project area is comprised of a sagebrush (*Artemisia tridentata*)-grassland community. There are approximately 435,500 acres of sagebrush or desert scrub habitat in the BLM/FFO planning area (BLM 2003a, pg 3-31). The majority of the proposed well pad would be located within the re-vegetated disturbance of the Houck 2E well pad. Vegetation on the existing well pad consisted primarily of graminoid species with high concentrations of Russian thistle (*Salsola tragus*) in heavily trafficked areas of the pad. Vegetation downslope of the project area consists of juniper savannah. The proposed area of disturbance contains 2 mid-seral juniper trees providing less than 1% canopy cover. Overall vegetative cover was approximately 60% throughout the proposed project area. The vegetative community was generally dominated by galleta (*Pleuraphis jamesii*), sand dropseed (*Sporobolus cryptandrus*), grama (*Bouteloua gracilis*), big sagebrush, broom snakeweed (*Gutierrezia sarothrae*), and rubber rabbitbrush (*Ericameria nauseosa*). See Appendix D for a detailed list of vegetation observed in the project area.

3.13 Invasive, Non-native Species

Management of invasive and non-native species is mandated under the Lacey Act, as amended, the Federal Noxious Weed Act of 1974, as amended and Executive Order 13112 Invasive Species (February 3, 1999). Invasive plants are found in San Juan County, particularly in areas disturbed by surface activities. These plants displace native plant communities and degrade wildlife habitat. A total of 212 invasive and poisonous weeds have been identified on public land administered by the FFO (Heil and White 2000). The objective of the Farmington Field Office weed management program is to detect invasive plant species populations, prevent the spread of new invasive populations, manage existing populations using the tools of integrated weed management and eradicate invasive populations, using the safest environmental methods available. For all actions on public lands that involve surface disturbance or rehabilitation, reasonable steps would be required to prevent the introduction or spread of noxious weeds, including requirements for using weed seed–free hay, mulch and straw.

Russian thistle is present within the proposed action area. Russian thistle is an aggressive non-native species that readily establishes in disturbed area. Russian thistle is not listed by the State of New Mexico as a noxious weed (NMDA 2009).

3.14 Wildlife

The proposed action area provides habitat for resident mule deer (*Odocoileus hemionus*) and potentially for Rocky Mountain elk (*Cervus elaphus*), although elk are not known to utilize the project area (USU 2004, NMDGF 2009). Habitat utilization by deer or elk was not evident within the project area. Jack rabbit scat and the scat of coyote, a primary predator of jackrabbit, was observed in the project area. Game birds found in the area may include mourning dove. No prairie dogs or evidence of burrows or colonies were observed within the proposed action area. Appendix D provides a detailed list of local flora and fauna observed in the study area.

The proposed action would not be located in a BLM/FFO designated wildlife area (BLM 2003c).

3.15 Migratory Birds

Executive Order 13186 dated January 17, 2001 calls for increased efforts to more fully implement the Migratory Bird treaty Act of 1918. In keeping with this mandate, the BLM/FFO has issued an interim policy to minimize unintentional take as defined by the EO 13186 and to better optimize migratory bird efforts related to BLM/FFO activities (BLM 2010). In keeping with this policy, a list of priority birds of conservation concern which occur in similar eco-regions as the proposed action area was compiled through a review of existing bird conservation plans including:

- Fish and Wildlife Service (USFWS) Birds of Conservation Concern (BCC)
- New Mexico Partners in Flight (NMPIF) New Mexico Bird Conservation Plan
- Comprehensive Wildlife Conservation Strategy for New Mexico (CWCS)
- Gray Vireo Recovery Plan
- The North American Waterbird Conservation Plan
- Recovery plans and conservation plans/strategies prepared for federally-listed candidate species.

The selected species have a known distribution in the FFO area and may be affected by various types of perturbations. These species and a brief assessment of their habitat are as follows:

Table 3: Migratory Birds with Potential to Occur in the Proposed Action Area

Species Name	Habitat Associations	Potential to Occur in the Proposed Action Area
Cassin's kingbird (*Tyrannus vociferans*)	Found in open country with scattered trees (savannahs) or open woodlands including piñon-juniper.	Juniper savannah adjacent to the project area would provide suitable habitat.
Loggerhead shrike (*Lanius ludovicianus*)	Open country interspersed with improved pastures, grasslands, and hayfields. Nests in sagebrush areas, desert scrub, and woodland edges.	Potential habitat occurs in San Juan Valley below action area, marginal habitat in project area.
Western scrub-jay (*Aphelocoma californica*)	Scrub and open woodland habitats.	Juniper savannah adjacent to the project area may provide habitat.
Mountain bluebird (*Sialia currucoides*)	Open piñon-juniper woodlands, mountain meadows, and sagebrush shrublands; requires larger trees and snags for cavity nesting.	Sagebrush grassland of the project area may provide forage habitat, larger juniper trees nearby for nest habitat.

Species Name	Habitat Associations	Potential to Occur in the Proposed Action Area
Bendire's thrasher (*Toxostoma bendirei*)	On the Colorado Plateau, inhabits open sagebrush with scattered junipers; sparse or degraded understory, lower elevations.	Juniper savannah nearby may provide marginal habitat, juniper/sagebrush associations limited to narrow transitional zones..
Ferruginous hawk (*Buteo regalis*)	Grasslands and semi-desert shrub; occasionally piñon-juniper edge habitat.	Open sagebrush-grassland in the analysis area could provide marginal foraging habitat; area of habitat is relatively small and isolated.
Golden eagle (*Aquila chrysaetos*)	Open habitats including grasslands, sagebrush, farmlands, and tundra. Nests in cliffs or occasionally trees in rugged country.	Proposed action area contains suitable habitat for foraging, but not nesting.
Swainson's hawk (*Buteo swainsoni*)	A mixture of grassland, cropland, and shrub vegetation; nests on utility poles and in isolated trees in rangeland. Nest densities higher in agricultural areas.	San Juan Valley provides suitable habitat; project area habitat marginal.
Mourning dove (*Zenaida macroura*)	Open country, scattered trees, and woodland edges. Feeds on ground in grasslands and agricultural fields. Roost in woodlands in the winter. Nests in trees or on ground.	Open sagebrush-grassland in the analysis area could provide suitable habitat for the species.
Burrowing owl (*Athene cunicularia*)	Open grasslands or desert scrub. Presence of suitable nest burrow is critical prerequisite (often prairie dog burrows).	There were no suitable burrows present within the study area.
Sage thrasher (*Oreoscoptes montanus*)	Shrub-steppe dominated by big sagebrush.	Open sagebrush-grassland in the analysis area could provide marginal habitat; area is small and isolated.
Brewer's sparrow (*Spizella breweri*)	Breeds primarily in sagebrush shrublands, but also occurs in mountain mahogany or rabbitbrush.	Open sagebrush-grassland in the analysis area could provide marginal habitat; area is small and isolated.
Vesper sparrow (*Pooecetes gramineus*)	Dry montane meadows, grasslands, prairie, and sagebrush steppe; nests on ground	Open sagebrush-grassland in the analysis area could provide marginal habitat; area is small and isolated.
Black-throated sparrow (*Amphispiza bilineata*)	Xeric habitats dominated by open shrubs with areas of bare ground.	Open sagebrush-grassland and juniper savannah in the analysis area provides suitable habitat; species observed in analysis area.
Sage sparrow (*Amphispiza belli*)	Sagebrush-grassland habitat; open habitat with shrubs.	Open sagebrush-grassland in the analysis area could provide marginal habitat; area is small and isolated.

A complete list of migratory birds observed in the project area can be found in Appendix D.

3.16 Threatened & Endangered Species and BLM/FFO Special Management Species

3.16.1 Threatened & Endangered Species

According to the USFWS, there are ten (10) federally listed threatened, endangered, proposed, or candidate species with the potential to occur within San Juan County (see Table 4).

No federally-listed species were identified during the field survey. No further consultation with the USFWS is required. Table 4 provides an evaluation of the potential for these species to occur in the proposed project and action area.

Table 4: Federally Listed Threatened, Endangered, Proposed, and Candidate Species with Potential to Occur in San Juan County, New Mexico

Species Name	Conservation Status	Habitat Associations	Potential to Occur in the Proposed Action Area
Mammals			
Black footed ferret (*Mustela nigripes*)	FE	Grassland plains where it occurs in association with prairie dogs. At a minimum, the black-footed ferret requires prairie dog towns of at least 80 acres for suitable habitat.	No known prairie dog colonies are located within the proposed action area.
Birds			
Southwestern willow flycatcher (*Empidonax traillii extimus*)	FE	Riparian habitats along rivers, streams, or other wetlands with dense growths of willows or other shrubs and medium sized trees.	There are no riparian habitats suitable for willow flycatchers in the proposed action area.
Mexican spotted owl (*Strix occidentalis lucida*)	FT	Mature montane forest and in shaded, woody, and steep canyons.	No montane forests are located within the proposed action area.
Mountain plover (*Charadrius montanus*)	FP	Large, flat grassland expanses with sparse, short vegetation and bare ground.	No large expanses of preferred habitat suitable to support the species occurs in the action area.
Yellow-billed cuckoo *(Coccyzus americanus*)	FC	Low to mid-elevation riparian woodlands, deciduous woodlands, and abandoned farms and orchards.	There are no large cottonwood galleries in, or near the proposed action area.
Fish			
Colorado pikeminnow (*Ptychocheilus lucius*)	FE	Large rivers with strong currents, deep pools, and quiet backwaters.	No perennial streams exist within the proposed action area.
Razorback sucker (*Xyrauchen texanus*)	FE	Habitats include slow areas, backwaters and eddies of medium to large rivers; impoundments.	No perennial streams exist within the proposed action area.
Plants			
Knowlton's cactus (*Pediocactus knowltonii*)	FE	Alluvial deposits that form rolling, gravelly hills in piñon-juniper and sagebrush communities (6,200-6,400 ft.).	Soils in the proposed project area are aeolian and sandy in texture and do not contain a high content of organic matter
Mancos milkvetch (*Astragalus humillimus*)	FE	Cracks of Point Lookout Sandstone of the Mesa Verde series (5,000-6,000 ft.).	Point Lookout Sandstone does not occur in the proposed action area.
Mesa Verde cactus (*Sclerocactus mesae-verde*)	FT	Highly alkaline soils in sparse shale or adobe clay badlands of the Mancos and Fruitland formations (4,000-5,550 ft.)	Proposed action area surficial geology does not include Mancos or Fruitland Shale Formations

USFWS 2011

3.16.2 Special Management Species

In accordance with BLM Manual 6840, the Farmington Field Office of the Bureau of Land Management (FFO) has prepared a list of special management species to focus species management efforts toward maintaining habitats under a multiple use mandate, called FFO Special Management Species (SMS). The BLM manages certain sensitive species not federally listed as threatened or endangered in order to prevent or reduce the need to list them as threatened or endangered in the future. The authority for this policy and guidance is established by the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and Department of Interior Manual 235.1.1A. FFO SMS are listed below in Table 5.

The proposed action area provides potential habitat for American peregrine falcon (*Falco peregrinus anatum*), prairie falcon (*Falco mexicanus*), golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), and ferruginous hawk *(Buteo regalis)*. The proposed project and action area were visually scanned for raptors, raptor nests and whitewash. No raptors or their sign were observed during the on-site field survey. According to the most recent BLM/FFO raptor nest geographic information system (GIS) data, no active raptor nests are located within 1/3 of a mile of the proposed project area. The nearest recorded raptor nest, a prairie falcon nest, is located 2.6 miles north of the proposed action. A small prairie dog colony is located 3.7 miles from the proposed action. The proposed action area is not within the BLM/FFO designated potential habitat area for Brack's hardwall cactus (*Sclerocactus cloveriae* var. *brackii*) or Aztec gilia *(Aliciella formosa*).

Table 5, listed below, provides an evaluation of the potential for Special Management Species to occur in the proposed action area. None of these species were observed during the field survey of the proposed action, and their potential presence determination is based on evaluation of the proposed action area habitat and the known habitat requirements of the listed species.

Table 5: Special Management Species of the BLM/FFO and their Potential to Occur in the Proposed Action Area

Species Name	Conservation Status		Habitat Associations	Potential to Occur in the Proposed Action Area
	BLM/ FFO	New Mexico		
Birds				
Golden Eagle (*Aquila chrysaetos*)	SMS		In the West, mostly open habitats in mountainous, canyon terrain. Nests primarily on cliffs and trees.	Proposed action area contains suitable habitat for foraging, but not nesting. Concentration of nest located 4 miles north
Ferruginous hawk *(Buteo regalis)*	SMS		Grasslands and semi-desert shrub; occasionally piñon-juniper edge habitat. Nest on rock spires in NW New Mexico.	Proposed action area contains suitable habitat for foraging, no preferred nesting nearby.
Prairie falcon *(Falco mexicanus)*	SMS		Arid, open country, grasslands or desert scrub, rangeland; nests on cliff ledges, trees, power structures.	Proposed action area contains suitable habitat for foraging, known nests nearby.

Species Name	Conservation Status		Habitat Associations	Potential to Occur in the Proposed Action Area
	BLM/ FFO	New Mexico		
Mountain plover *(Charadrius montanus)*	SMS		Semi desert, grasslands, open arid areas, bare fields, breeds in open plains or prairie.	Proposed action area does not contain suitably large flat, open grasslands for habitat.
Yellow-billed cuckoo *(Coccyzus americanus*)	SMS		Low to mid-elevation riparian woodlands, deciduous woodlands, and abandoned farms and orchards. Rare in the San Juan River valley.	Proposed action area does not contain riparian areas for suitable habitat.
American peregrine falcon (*Falco peregrinus anatum*)	SMS	NM-T	Open country near lakes or rivers with rocky cliffs and canyons. Tall city bridges and buildings also inhabited.	Proposed action area contains suitable habitat for foraging, but not nesting.
Bald eagle (*Haliaeetus leucocephalus)*	SMS	NM-T	Near lakes, rivers and cottonwood galleries. Nests near surface water in large trees. May forage terrestrially in winter	Proposed action area does not contain suitable habitat for nesting, foraging opportunities unlikely, although San Juan River nearby.
Burrowing owl *(Athene cunicularia)*	SMS		Associated with prairie dog towns. In dry, open, short-grass, treeless plains	Proposed action area lack suitable nest burrows.
Plants				
Brack's hardwall cactus (*Sclerocactus cloveriae* ssp. *brackii*)	SMS	NM-E	Sandy clay of the Nacimiento Formation in sparse shadscale scrub (5,000-6,000 ft).	Nacimiento formation does not occur in the proposed action area.
Aztec gilia (*Aliciella formosa*)	SMS	NM-E	Salt desert scrub communities in soils of the Nacimiento Formation (5,000-6,000 ft).	Nacimiento formation does not occur in the proposed action area.

BLM/FFO 2008

3.17 Visual Resources

Visual Resource Management (VRM) on public lands is conducted in accordance with BLM Handbook 8410 and BLM Manual 8411. Further details of the Farmington Field Office VRM Program are contained on pages 2-9 to 2-10 and 3-61 to 3-63 of the Farmington PRMP/FEIS (BLM2003a).

The proposed action is located in a Class IV VRM area. Management objectives for Class IV designation include allowing for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements (BLM 2003a).

Visual resources and viewsheds for the project area include rolling wooded hillsides surrounding the project area. To the east and south, mid-ground views open to the San Juan River Valley with scrublands and a few agricultural fields visible as well as a short section of the San Juan River. More distant views of higher flat topped mesas are visible beyond the San Juan Valley to

the south and east as well as to the north. Distant views to the west are obscured by closer wooded hillsides. A prominent cliff complex that rings the head of Vaca Canyon is visible in the far mid-ground to the north. Surrounding views include linear scars of pipeline ROWs and access roads and vertical elements of power poles and well equipment of the twinned well pad and other area well pads. See Appendix C for select images of the project area. The area may be occasionally seen by off-highway vehicle riders and industry workers.

3.18 Recreation

The Farmington Field Office has set aside several areas for special use and manages them as Specially Designated Areas (SDA). Recreation SDA's are managed to accommodate a large variety of recreational uses and outdoor recreational experiences. Areas located outside of recreation SDAs are managed as Extensive Recreation Management Areas (ERMAs). Few recreation facilities or supervisory efforts exist on these lands and they are managed to maintain a freedom of recreation choice with limited regulatory constraints. The proposed action area would not be in a SDA for recreation. Dispersed recreational use of the areas may include occasional hunting during the hunting season, hiking, and wildlife viewing.

3.19 Congressional or Administrative Designations

3.19.1 ACECs

The proposed action (Alternative B) is not located within or proximate to any FFO designated Areas of Critical Environmental Concern (ACECs).

3.19.2 NLCS Units

No National Land Conservation System (NLCS) Units exist in the vicinity of the proposed action.

3.19.3 Wilderness

No designated Wilderness areas exist within the vicinity of the proposed action.

3.19.4 Wild and Scenic Rivers

No Wild and Scenic Rivers or associated corridors exist within the vicinity of the proposed project.

3.20 Public Health and Safety

All worker safety is governed by Occupational Safety and Health Administration (OSHA) safety laws and regulations. Worker safety incidents must also be reported to the BLM under the procedures of Notice to Lessee (NTL)-3A. Pipeline safety regulations are administered by OSHA as well as Department of Transportation (DOT) regulations. Pipeline safety regulations (49 CFR Parts 190 and 192) govern design, construction and operation of gas transmission lines. Any incidents involving DOT-regulated pipelines must be reported under these regulations (District 2003a).

Most substances and wastes generated at oil and gas facilities are exempt from regulation under the Resource Conservation and Recovery Act (1976). The Environmental Protection Agency

(EPA) and DOT regulate materials associated with well construction and production activities that are classified as hazardous. When significant amounts of chemicals are stored on-site, governmental agencies will be notified as required under the Emergency Planning and Community Right to Know Act (1986). The notification of releases such as natural gas, natural gas liquids, and petroleum, outside the facility site is required under the Comprehensive Environmental Response Compensation and Liability Act, 1980 (CERCLA) and under BLM NTL-3A. The well location must have an informational sign, as directed under 43 CFR 3160.

Additional hazards to the general public in the action area include hazards associated with gas and oil related truck traffic. General hazards around producing oil and gas fields such as accidental pipeline failures and moving equipment like pump jacks are potential/present in the action area. Hydrogen sulfide gas is not known to be or expected to be a problem at the proposed site (Alternative B).

3.21 Cultural or Historical Values

The proposed action is located within the archaeologically rich San Juan Basin of northwestern New Mexico. In general, the prehistory of the San Juan Basin can be divided into five major periods: Paleoindian (10,000 B.C. to 5,500 B.C.), Archaic (5,500 B.C. to A.D. 400), Anasazi Basketmaker II-III (A.D. 1 to 700), Anasazi Pueblo I-IV (A.D. 700 to 1540), and the historic (A.D. 1540 to present) which includes Native American, Hispanic, and Euro-American cultural components. Detailed descriptions of these various periods and phases are provided in the Bureau of Land Management, Farmington Field Office Final Environmental Impact Statement (2003) and will not be reiterated here. Additional information is also contained in the Cultural Resources Technical Report prepared in advance of the EIS (SAIC 2002).

The proposed action is located in the Upper San Juan watershed. According to data provided by the Museum of New Mexico Archaeological Records Management System (ARMS) on February 18, 2010, there are 8,394 sites within the watershed with at least 8,491 temporal/cultural components on record. The following percentages were calculated using Table 2-2 from the 2002 Cultural Resources Technical Report which obtained data from ARMS in 2001. Anasazi cultural components are most represented (28%) followed by Navajo (26%), Archaic (8%), historic Hispanic or Euro-American (3%), and Apache (3%). The remaining 32% are unknown age or cultural affiliation. Most of those are likely Native American (Navajo and Anasazi). Site types range from simple artifact scatters to multiple residences.

A cultural resource survey has been completed for the proposed well pad and pipeline tie. The survey was conducted by Aztec Archaeological Consultants (AAC) under the provision and standards of *H-8100-1 – Procedures for Performing Cultural Resource Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities.*

No cultural resources were encountered during the inventory of the proposed Lackey A 292S well pad and pipeline (AAC-2011-002; BLM 2009(IV)067.1F).

3.22 American Indian Religious Concerns

Traditional cultural properties (TCPs) is a term that has emerged in historic preservation management and the consideration of Native American religious concerns. TCPs are places that

have cultural values that transcend, for instance, the values of scientific importance that are normally ascribed to cultural resources such as archaeological sites. The National Park Service (Parker and King 1998:1) has defined TCPs as follows:

> A traditional cultural property...can be defined generally as one [a property] that is eligible for the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community (National Register Bulletin 38).

Native American cultural associations are the "communities" most likely to identify TCPs, although TCPs are not restricted to this group. Some TCPs are well known, while others may only be known to a small group of traditional practitioners with the specific site known or ambiguous. There are several pieces of legislation or Executive Order that can be linked to an evaluation of Native American religious concerns. These govern access and use of scared sites, possession of sacred items, protection and treatment of human remains, and the protection of archaeological resources ascribed with religious or historic importance and include the following:

- The American Indian Religious Freedom Act of 1978 (AIRFA; 42 USC 1996, P.L. 95-431 Stat. 469).
- Executive Order 13007 (24 May 1996).
- The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA; 25 USC 3001, P.L. 101-601).
- The Archaeological Resources Protection Act of 1979 (ARPA; 16 USC 470, Public Law 96-95).

For the proposed action, identification of TCPs included reviewing existing published and unpublished literature (e.g. Van Valkenburgh 1941, 1974; Brugge 1993; Kelly et al 2006), and the site specific cultural inventory report conducted for the proposed action. In addition, BLM/FFO archaeologists reviewed information regarding the presence of TCPs compiled during previous land use planning efforts or via direct tribal consultation. The proposed action is located in the northeastern portion of *Dinétah*, just outside Blanco, New Mexico in the San Juan River Valley. *Dinétah*, a term used to describe a portion of ancestral Navajo land and meaning "among the people", is variously defined in the literature but is generally agreed to be areas of the Upper San Juan River drainage, with particular but not exclusive association with Largo and Gobernador Canyons and their tributaries in eastern San Juan County and western Rio Arriba County. The proposed action is not located within or proximate to any more specifically detailed area known or designated as a TCP.

3.23 Paleontology

The BLM uses the Potential Fossil Yield Classification (PFYC) system to identify areas with a high potential to produce significant fossil resources (IM 2008-009). This system has ranked all lands within the FFO management area as a Class 5 designation. Class 5 designations are described as being Very High Potential paleontological resource areas, thus requiring an

assessment at the project level (IM 2008-011). The proposed action area is located within the paleontological rich area of the San Juan Basin of northern New Mexico.

The Nacimiento Formation, found within the proposed project area, has the potential to contain several important vertebrate fossils. No fossils are known to occur within or proximate to the proposed action area. Additionally, the proposed action (Alternative B) is not located within any BLM/FFO designated Paleontology SDA.

3.24 Support Functions

3.24.1 Fire

The proposed action (Alternative B) would not impede fire fighting or rescue efforts. The addition of a new well pad would create the potential for increased fire fighting and rescue frequency for the local fire department and emergency response system. Analysis was conducted in the final EIS for the Proposed Farmington Resource Management Plan (BLM 2003a).

3.24.2 Engineering

The proposed action (Alternative B) is not known to impede community engineering projects such as civil road and drainage projects. Analysis was conducted in the final EIS for the Proposed Farmington Resource Management Plan (BLM 2003a).

3.24.3 Law Enforcement

The proposed action (Alternative B) is not known to impede law enforcement efforts. However, the addition of a new well pad would create the potential for increased demands on the county law enforcement agency. Analysis was conducted in the final EIS for the Proposed Farmington Resource Management Plan (BLM 2003a).

3.25 Transportation and Access

The proposed action (Alternative B) is not known to impede upon existing or proposed road and transportation projects. Analysis was conducted in the final EIS for the Proposed Farmington Resource Management Plan (BLM 2003a).

3.26 Land Tenure, ROW, Other Uses

The proposed action (Alternative B) is not known to encroach upon any existing or proposed right of ways or other restricted land areas. Analysis was conducted in the final EIS for the Proposed Farmington Resource Management Plan (BLM 2003a).

3.27 Environmental Justice/Socio-Economics

Executive Order 12898 requires federal agencies to assess projects to ensure there is no disproportionately high or adverse environmental, health, or safety effects on minority and low-income populations. Minorities comprise a large proportion of the population residing inside the boundaries of the Farmington Field Office management area (see pages 3-106 to 3-107 of the PRMP/FEIS for more details on ethnicity and poverty rates). In the region around the proposed action, statistically significant populations consist of Native Americans, Hispanics and white

Euro-Americans. Some members of these populations are considered to be financially low-income groups.

The San Juan Basin has produced oil and gas resources for over 40 years. The extraction of this resource is an income source to the local communities as well as San Juan County, Rio Arriba County, the State of New Mexico and the federal government. Many area contractors and their employees are employed in some aspect of the oil and gas industry.

4. ENVIRONMENTAL CONSEQUENCES

Environmental resources can be affected in many ways during implementation of the proposed action. The effect is defined as any change or alteration in the pre-existing condition of the environment produced by the proposed action, either directly or indirectly. This chapter analyzes the environmental consequences of the proposed action.

Effects can be either long-term (permanent, residual) or short-term (incidental, temporary). Short-term effects affect the environment for only a limited time period, and the environment usually reverts rapidly to the pre-construction condition. Short-term effects are often disruptive and obvious. Long-term effects are substantial and permanent alterations to the pre-project environment. The BLM defines long-term effects as those effects whose results endure more than five years. Effects may be irreversible or residual and affected resources irretrievable.

For the purpose of this EA, potential effects have been divided into three categories:

- **High** - as defined in CEQ guidelines (40 CFR 1500-1508), effects which are substantial in severity and therefore should receive the greatest attention in decision-making.
- **Moderate** - effects which cause a degree of change that is easy to detect, but do not meet the criteria for significant effects.
- **Low** - effects which cannot be easily detected, and cause little change in the existing environment.

4.0.1 No Action Alternative

Under the No Action Alternative, the proposed well would not be drilled. There would be no new effects from oil and gas production to the resources. The No Action Alternative would result in the continuation of the current land and resource uses in the project area. This alternative will not be evaluated further in Chapter 4.

4.0.2 Alternative B - Proposed Action

Under the proposed action (Alternative B), the well pad and pipeline tie would be constructed as described in section 2.2. Descriptions of potential effects to individual resources by the proposed action are presented in the following text. Also described are potential mitigation measures that could be incorporated by the BLM where appropriate as Conditions of Approval attached to the permit and pipeline ROW grant stipulations to reduce the potential effect to the environment. A summary of potential surface disturbance is presented in Table 6 below.

Table 6: Summary of Disturbance

Facility	Feet		Acreage		Duration of Disturbance
	New Disturbance	Overlap of Existing Disturbance	New Disturbance	Existing Disturbance	
Well Pad (WP)	62 x 205	198 x 205	0.29	0.93	Long Term
WP Construction Zone	780 x 50	350 x 50	0.90	0.40	Short Term
Pipeline		50 x 40		0.05	Short Term
Total Disturbance			1.19	1.33*	

* Total does not include overlapping components of the proposed action (pipeline overlaps proposed well pad).

4.1 General Topography

4.1.1 Direct and Indirect Effects

New surface disturbance for the proposed natural gas well pad, the 50 ft construction zone around the perimeter of the well pad, and the proposed pipeline would total 1.19 acres. A maximum of 3 ft of cut and 4 ft of fill material would be required for well pad construction. Final slope would be 0% on the proposed well pad and up to 8% (4 ft rise over 50 ft run) in the adjacent reclaimed areas. Changes in topographic relief in the action area would be low and would be limited to the proposed well pad and construction zone.

4.1.2 Mitigation

Cut and fill slopes will be re-graded as needed upon interim reclamation. Upon final reclamation, the entire action area will be re-graded as close to the original topographical contours as possible.

4.2 Air Resources

4.2.1 Direct and Indirect Effects

4.2.1.1 Air Quality

Air quality would be temporarily directly affected with pollution from exhaust emissions, chemical odors, and dust that would be caused by the motorized equipment used to construct the well pad, and by the drilling rig that will be used to drill the well. Dust dissemination would discontinue upon completion of the construction phase of the well pad. Air pollution from the motorized equipment would discontinue at the completion of the drilling phase of the operations. The winds that frequent the northwestern part of New Mexico generally disperse the odors and emissions. The effects to air quality would be greatly reduced as the construction and drilling phases are completed. Other factors that currently affect air quality in the area include dust from livestock herding activities, dust from recreational use, and dust from use of roads for vehicular traffic.

Over the last 10 years, the leasing of the Federal oil and gas mineral estate in the Farmington Field Office has resulted in an average total of approximately 450 to 500 wells drilled on federal leases annually. These wells would contribute an incremental increase to the total emissions (including GHG's) from oil and gas activities in New Mexico.

Potential effects of development could include increased air borne soil particles blown from new well pads or roads, exhaust emissions from drilling equipment, compressors, vehicles, and dehydration and separation facilities, as well as potential releases of GHG, NOx and VOCs during drilling or production activities. The amount of increased emissions cannot be quantified at this time since it is unknown how many wells might be drilled, the types of equipment needed if a well were to be completed successfully (e.g. compressor, separator, dehydrator), or what technologies may be employed by a given company for drilling any new wells. The degree of effect will also vary according to the characteristics of the geologic formations from which production occurs.

The reasonable and foreseeable development scenario developed for the Farmington RMP demonstrated 522 wells would be drilled annually for federal minerals. Current APD permitting trends within the field office confirm that these assumptions are still accurate. This level of exploration and production would contribute a small incremental increase in overall hydrocarbon emissions, including GHGs, NOx, and VOCs released into the planet's atmosphere. When compared to total national or global emissions, the amount released as a result of potential production from the proposed action would not have a measurable effect on climate change due to uncertainty and incomplete and unavailable information; therefore is not possible to determine the effects on climate change on a regional, national, or global scale.

Consumption of oil and gas developed from the proposed action is expected to produce GHGs, NOx and VOCs. Consumption is driven by a variety of complex interacting factors including energy costs, energy efficiency, availability of other energy sources, economics, demography, and weather or climate. Regional and global transportation, metropolitan traffic, fires (including wildfires, controlled burns and use of domestic fire places), and power plant emissions from the west are all parts of the equation. Regional air quality modeling conducted for the Northern San Juan Basin Coal Bed Methane FEIS Project in August 2006, determined that potential cumulative visibility impacts to Federal PSD Class I Areas (Mesa Verde National Park and the Weminuche Wilderness Area) could occur at some unspecified time in the future

The NAAQS are set for the most common and widespread pollutants. The standards are concentrations of air pollution above which the EPA has determined that serious health and welfare consequences could occur. If the concentrations are below the NAAQS, there are no expected adverse effects to humans and the environment.

4.2.1.2 Climate

The assessment of GHG emissions and climate change is in its formative phase. It is currently not feasible to know with certainty the net effects from the proposed action on climate. The inconsistency in results of scientific models used to predict climate change at the global scale coupled with the lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future effects of decisions made at this level. When

further information on the effects to climate change are known, such information would be incorporated into the BLM's planning and NEPA documents as appropriate.

4.2.2 Mitigation

The FFO has been a participant of the Four Corners Air Quality Task Force (FCAQTF) since its inception in 2002 when it was known as the Four Corners Ozone Task Force. Because of the unanswered questions raised by these modeling efforts, the FCAQTF has continued to look at air quality issues in the Four Corners region. The FCAQTF is comprised of a broad base of representatives including federal, state, Indian, and local governments, as well as industry, interest groups, and concerned community members. The FCAQTF has several working groups, which worked on the development of a mitigation options report (completed December 2007), to serve as a resource and guide to the regulatory agencies. The responsible agencies may use the report as the basis for developing air quality management plans for the region. This may include developing new and revising existing regulations, supporting new legislation, developing new outreach and information programs, and developing and/or expanding voluntary programs for emission reductions.

Additional air quality modeling conducted since completion of the 2003 FEIS/RMP and provisions in the ROD for the FEIS/RMP provide for applications of additional emission controls if requested by the NMAQB. Based on this modeling, the NMAQB issued an interim directive that all newly issued APDs limit compressor emissions to no more than 2 grams per horsepower hour of N2O for engines of 300 horsepower or less. The FFO has complied with this directive through a condition of approval (COA) which has been in effect since August 1, 2005. To date, NMAQB has made no other such requests.

Currently, development of Federal minerals in New Mexico's San Juan Basin is at a lower level than forecast in the Reasonable Foreseeable Development (RFD) Scenario prepared in 2001 for the FFO EIS/RMP. The effects forecast by the RFD are still valid. At the time the 2003 EIS/RMP was written, ozone readings did not represent a violation of the NAAQS for this pollutant. The New Mexico Environment Department Air Quality Bureau has determined that the 2007-2009 ozone design value for San Juan County is 0.070 ppm. The design value for the county must be greater than the revised 8-hour ozone standard of 0.075 ppm for a nonattainment designation.

The EPA's inventory data describes "Natural Gas Systems" and "Petroleum Systems" as the two major categories of total US sources of GHG gas emissions. The inventory identifies the contributions of natural gas and petroleum systems to total CO2 and CH4 emissions (natural gas and petroleum systems do not produce noteworthy amounts of any of the other greenhouse gases). Within the larger category of "Natural Gas Systems", the EPA identifies emissions occurring during distinct stages of operation, including field production, processing, transmission and storage, and distribution. "Petroleum Systems" subactivities include production field operations, crude oil transportation and crude oil refining. Within the two categories, the BLM has authority to regulate only those field production operations that are related to oil and gas measurement, and prevention of waste (via leaks, spills and unauthorized flaring and venting).

The BLM's regulatory jurisdiction over field production operations has resulted in the development of "Best Management Practices" (BMPs) designed to reduce effects to air quality

by reducing all emissions from field production and operations. Typical measures may include: the flaring of hydrocarbons and gases at high temperatures in order to reduce emissions of incomplete combustion; requiring that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored; limiting NOx emissions to 2 grams per horsepower hour on new or replaced compressor engines of 300 horsepower or less; requiring areas of the pad not required for production facilities be revegetated to reduce the amount of dust from the pads; and watering dirt roads during periods of high use in order to reduce fugitive dust emission. The significant threshold for particulate matter of 35 ug/m³ daily PM2.5 NAAQS is not expected to be exceeded under the proposed action alternative.

The EPA data show that improved practices and technology and changing economics have reduced emissions from oil and gas exploration and development (Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2006). One of the factors in this improvement is the adoption by industry of the BMPs proposed by the EPA's Natural Gas Energy Star program. The Farmington Field Office will work with industry and NMAQB to help facilitate the use of the relevant BMPs for operations proposed on federal mineral leases where such mitigation is consistent with agency policy.

4.3 Water Quality: Surface and Groundwater

4.3.1 Direct and Indirect Effects

The disruption of project area soils and the increase of barren surface would result in augmented surface flows with associated increased sedimentation and total dissolved solids (TDS). Sedimentation, resulting from both wind and water erosion, could be realized down gradient of the proposed action. The quality and quantity of this surface sedimentation would be dependent upon wind and water events in relation to soil disturbance and the timing and success of reclamation and erosion control configurations. There are approximately 24,978 acres of disturbance within the Upper San Juan watershed (BLM 2003a). The proposed 1.19 acres of new surface disturbance would result in a 0.005% increase in bare ground within the Upper San Juan watershed in the short term. Short term effects to the surface water quality and quantity are assumed to be moderate under the proposed action. Because of the re-vegetation difficulty associated with disturbance of new areas with minimal top soil, long term effects to surface hydrology and the quality and quantity of surface water for the proposed action are anticipated to be moderate.

Under the proposed action (Alternative B), the storage of drilling fluids in the reserve pits and drilling represents the potential for accidental seepage of petroleum products to ground water aquifers, such as the local Uinta-Animas Aquifer. Accidental spill or discharge of drilling and production fluids stored onsite is also a latent hazard, as displaced fluids could migrate to surface or ground water resources. With mitigation, short and long term effects to ground water would be low for the proposed action.

4.3.2 Mitigation

The lining of pits including the reserve pit and the berming of storage tanks will prevent fluid seepage into washes and surface water or shallow ground water. Burlington will set surface casing at a depth specified by the FFO, to protect shallow ground water aquifers. Fresh water for

drilling and completion will be trucked to the location, from permitted sources. Fluids either stored on location or associated with the pipeline will be contained in tanks during all operations. Large permanent storage tanks(s) will be enclosed within compacted gravel covered earthen berms to contain any potential spills. The swift implementation of the mitigation measures outlined for soils (Section 4.4.2), topography (Section 4.1.2), and vegetation (Section 4.13.2) will also curtail short term and long term effects to surface and ground water quality and quantity.

For the well location and associated facilities, storm water diversions have been specified to minimize effects to surface water quality (see Section 2.2). Re-establishment of permanent, perennial vegetation and installations of functional erosion control devices outlined in BLM BMPs will decrease long term soil erosion effects and, consequently, effects to surface and ground water resources.

4.4 Soils - Watershed - Hydrology

4.4.1 Soils Direct and Indirect Effects

The proposed action would result in 2.52 acres of soil disturbance within the Avalon loam, 0 to 3 percent slopes soil unit. The proposed action is located within a contiguous 92-acre block of Avalon loam in an area of previous surface disturbance. Soils that would be disturbed would be structurally mixed, displaced and exposed to the elements of wind and water erosion. In some areas, these soils would also be compacted. Once disturbed, these soils can be subject to increased erosion, dependent upon storm events of water and/or wind. Disturbed areas, especially cut and fill slopes, would be susceptible to wind and water erosion until reseeding had been established (one to two growing seasons). The amount of soils that would be lost to erosion is unknown, however it is assumed that effects to soils would be low to moderate based on the relatively small area of disturbance, the low slope angles (0-8%), and mitigating measures. Effects would primarily be short-term until vegetation is established within reclamation areas.

4.4.2 Soils Mitigation

Site specific drainage and erosion mitigation measures for the proposed action are detailed in Section 2.2. All areas not needed for aboveground equipment or vehicular travel will be reclaimed (approximately 1.35 acres). Re-establishment of permanent, perennial vegetation and installations of functional erosion control devices outlined in BLM BMPs will decrease long term soil erosion effects.

4.4.3 Watershed/Hydrology Direct and Indirect Effects

Alternative B (the proposed action) would indirectly affect the Upper San Juan Watershed and its hydrology through sedimentation due to erosion of exposed soils as discussed in Section 4.3.1 above. Direct effects to hydrology would be limited as no defined drainages would be physically altered. Due to the leveling of the proposed well pad, the surficial hydrology of the immediate project area would be altered, but overall drainage patterns would remain the same. Effects to the Upper San Juan Watershed and its hydrology would be low to moderate with the implementation of mitigation measures.

4.4.4 Watershed/Hydrology Mitigation

Mitigation measures described in Section 4.3.2 above will be applied to mitigate and curtail effects to watershed and hydrology.

4.5 Floodplains

No effect- no floodplains were identified within the proposed action area.

4.6 Hazardous or Solid Waste Materials

4.6.1 Direct and Indirect Effect

Typical wastes associated with the proposed action would include trash, sewage, produced water, and produced hydrocarbons. With mitigation measures, hazardous or solid waste materials will be effectively managed.

4.6.2 Mitigation

During drilling and completion, a trash receptacle and a chemically treated portable toilet would be on location for trash and sewer disposal. Produced hydrocarbons would be put in tanks on location during completion work. Produced water would be put in onsite tanks or within a lined reserve pit during completion work. All wastes would be disposed of in a proper manner as required by federal and state law and as described in the COAs.

If significant amounts of chemicals are stored on-site, governmental agencies will be notified as required under the Emergency Planning and Community Right to Know Act (1986). The notification of releases such as natural gas, natural gas liquids, and petroleum, outside the facility site is required under the Comprehensive Environmental Response Compensation and Liability Act, 1980 (CERCLA) and under BLM NTL-3A. The well location will have an informational sign, as directed under 43 CFR 3160.

4.7 Mineral Resources

4.7.1 Direct and Indirect Effects

The proposed action (Alternative B) would allow for the development of the Basin Fruitland Coal reservoir and would result in the extraction of a non-renewable resource. Cross contamination between geologic zones could occur without adequate cementing and casing of the proposed well bore. With implementation of FFO standard drilling and completion requirements, short and long term effects to mineral resources and geology are anticipated to be low.

4.7.2 Mitigation

Under the proposed action (Alternative B), sufficient well control equipment and reserve pit volume are necessary to assure control of the well during drilling and completion operations. Adequate casing, cementing, mud weights, blow out preventer and reserve pit volume are proposed in the APD to mitigate any potential down-hole effects.

4.8 Riparian Zones/Wetlands

No effect – no known or designated wetlands or riparian zones present.

4.9 Farmlands, Prime or Unique

No effect – no designated prime or unique farmlands present within the proposed action area.

4.10 Livestock Grazing

4.10.1 Direct and Indirect Effects

The proposed action new surface disturbance would result in the loss of approximately 0.06 federal AUM (at an estimated 20 acres per AUM) during construction and drilling. Burlington would be responsible to ensure the grazing permittee/s are contacted prior to any construction operations. All construction activities would be confined to the permitted areas only. If the project area is successfully and immediately re-vegetated, the proposed action may benefit livestock grazing by providing additional forage, above the existing indigenous rate of production. Effects to range and grazing livestock are anticipated to be low in both the short and long term.

4.10.2 Mitigation

All hazards to livestock and wildlife will be fenced or contained. All project activities will be confined to the permitted areas only. All areas not needed for production equipment or vehicle travel surfaces will be seeded upon reclamation. No livestock improvements will be affected.

4.11 Wild Horse and Burros

No effect – no designated wild horse or burro management areas or populations are present within the proposed action area.

4.12 Vegetation, Forestry

4.12.1 Direct and Indirect Effects

Construction of the proposed action (Alternative B) would result in 2.52 acres of surface disturbance. The proposed action would remove all vegetation within the 2.52 acres of the proposed action area. Approximately 1.19 acres of new surface disturbance would remove previously undisturbed native vegetation. The remainder of the proposed action would disturb a mix of bare ground, weeds, and cultivated reclamation vegetation. During the production phase of the proposed well, vehicular activity would be restricted to the existing and proposed access roads and turn-around areas on the twinned well pad. With mitigation, the proposal is projected to have moderate short and low long term effects on area vegetation.

4.12.2 Mitigation

Following completion of the proposed well, disturbed areas not needed for operations and vehicular traffic will be immediately re-contoured and seeded with an FFO prescribed seed mixture (approximately 1.35 acres). The re-establishment of vegetation is expected to take at least three (3) to five (5) growing seasons, depending on precipitation. The remaining long term

disturbances will be reclaimed upon final project abandonment as outlined in the APD COAs and pipeline ROW grant stipulations.

4.13 Invasive, Non-native Species

4.13.1 Direct and Indirect Effects

Indirect effects of increased vehicle traffic in the area, especially any interstate traffic, may result in establishment of invasive/noxious weeds. Invasive/noxious plants generally out-compete native species where bare ground is created. Given successful mitigation measures, effects from invasive, nonnative species are expected to be low for both the short and long term for the proposed action area.

4.13.2 Mitigation

To assist in controlling invasive/noxious plants, the proposed action will be seeded with certified weed-free seed upon interim reclamation. It will be the operator's responsibility to monitor, control, and eradicate all noxious/invasive weeds within the proposed project area during the life of the project.

4.14 Wildlife

4.14.1 Direct and Indirect Effects

Effects of oil and gas development on wildlife can result from direct habitat loss, noise, increased human activity due to greater road access, and habitat fragmentation (BLM 2003a). Some wildlife species react positively to certain oil and gas activities, some negatively, and some show no reaction at all. Species would continue to inhabit the area or conversely move out of the area, and the populations may increase or decrease depending on the available adjacent forage and habitat present.

The proposed action would not increase the amount of road within the action area as no new road is proposed. The proposed action would remove approximately 1.19 acres of sagebrush-grassland habitat. The habitat types observed are not unique to the action area and are widespread and common throughout the 657,318-acre Upper San Juan watershed.

Vehicular traffic and increased human activity in the area could have a negative effect due to disturbance and potential road kills to big game and some wildlife species, especially during construction and drilling. Light truck traffic would continue yearlong, at approximately the present level following construction and drilling. There are no published studies of effects of oil and gas development on deer or elk in the San Juan Basin. Recent research in other areas may or may not be applicable. Sawyer et al. (2006) examined winter habitat selection of mule deer before and during development of a natural gas field, in the sagebrush and sagebrush-grassland communities of the Pinedale Anticline Project Area of Wyoming. Results of this study recorded mule deer avoidance of otherwise suitable habitats within 1.7-2.3 miles of natural gas wells and suggested substantial indirect habitat loss from energy development. Observed shifts in deer distribution as the study progressed were toward less-preferred and presumably less suitable habitats. Sawyer et al (2006) conducted their study in an area of extensive rolling sage brush with little topographic relief, high deer populations, and little oil and gas development. The high

level of existing development in the FFO as well as the more diverse habitat types and broken topography make assumptions of similar effects difficult.

Piñon-juniper woodland habitat in the FFO may offer greater cover and seclusion for wintering wildlife. Road densities within the FFO area are approximately 10 times greater than those in the Wyoming study, however there has not yet been a negative correlation or quantitative determination on the deer and elk populations in the area in relation to road densities and habitat fragmentation.

The project area would be re-vegetated during reclamation, but the species composition and percent cover may be different than the original vegetation. Since the vegetation removed would not necessarily be replaced with the same species, and in the same percentage, an alteration in habitat utilization could occur. Some burrowing animals may be killed or displaced, and their burrows destroyed during construction activities.

Moderate to high levels of noise would be generated in the immediate vicinity of construction, drilling, and completion activities. These effects would be temporary, lasting only the few weeks that these activities would occur. Displacement of animal species away from the well pad could occur.

Habitat fragmentation associated with the proposed action would be limited as the proposed well would twin an existing location, remaining primarily within the existing disturbance, and would only remove 2 trees. As such, the habitat removed as a result of the proposed action is already fragmented. The proposed action would add somewhat to the existing habitat fragmentation.

The proposed action would not result in the construction of a new road and the proposed well will twin an existing well pad. With implementation of proposed mitigation measures, wildlife effects are anticipated to be moderate in the short term and low in the long term for the proposed action (Alternative B).

4.14.2 Mitigation

Mitigation measures to protect wildlife and protect or restore wildlife habitat can be found in Section 2.2 above and the Farmington Resources Management Plan (December 2003) pages 2-25 and 2-26.

All construction activities will be confined to the permitted areas only. The rapid and permanent reestablishment of vegetation and cover will minimize effects to wildlife. All wildlife hazards associated with construction and operation of the proposed action will be fenced, or contained in storage tanks.

4.15 Migratory Birds

4.15.1 Direct and Indirect Effects

The proposed action would remove 2 juniper trees. No avifauna was observed utilizing the habitat within the proposed action area for nesting at the time of the survey. The proposed action would remove approximately 1.19 acres of native mixed composition understory species including sagebrush and bunch grasses. The removal of sagebrush-grassland could decrease

potential nesting habitat for birds such as the black-throated sparrow that primarily breed in such habitats. The proposed project area provides potential foraging habitat for golden eagles, peregrine falcons, ferruginous hawks, prairie falcons, and perhaps bald eagles. Effects to habitat would result in an immediate, direct, and temporary loss of no more than 2.52 acres of potential raptor foraging habitat. This loss of habitat may alter population dynamics of prey species available to raptors. In addition, a prairie dog colony has been mapped by the BLM approximately 3.7 miles from the proposed action which could offer an additional food source for foraging raptors. Raptors may avoid the area during project construction and drilling activities. Effects are expected to be low and short-term.

Based on the information available from the North American Breeding Bird Survey routes, it appears that the likelihood of more than one migratory bird nest in the project area is low. No old nests left from the previous breeding season or other evidence of these species was detected during the biological surveys conducted April 7, 2011. The amount of projected habitat removal is negligible when compared to the total amount of available habitat.

Actual potential effects on birds in the project area are difficult to predict. Ongoing studies have shown mixed effects of oil and gas development, including compressor noise on nesting migratory birds. Frances and Ortega (2006 unpublished report to BLM) found no significant difference in nest density or nest success between sites with or without wellhead compressors. Some species, such as black-chinned hummingbird (*Archilocus alexandri*) and house finch (*Carpodacus erythrinus*), were more common on sites with compressors while others, such as mourning dove (*Zenaida macroura*) and spotted towhee (*Pipilo erythrophthalmus*), appeared to either avoid or nest further from compressors. Holmes and King (2006) found that sage sparrow had lower nest survival in an area with ongoing gas development, while Brewer's sparrow (*Spizella breweri*) had higher survival rates when compared with populations in an undeveloped control area.

Due to the limited scope of the proposed action, the relatively small area of disturbance, and the availability of adjacent suitable habitat, the anticipated effects on migratory bird populations and species as a whole would be low in the short term and long term.

4.15.2 Mitigation

All construction activities will be confined to the permitted areas only. Site specific mitigation measures outlined in Section 2.2.1 and APD COAs designed to protect wildlife and migratory birds will be implemented. If an active nest is observed during construction, construction activities that could result in take as defined by the MBTA would halt until practicable or reasonable avoidance alternatives are identified, the birds have fledged, or a migratory bird take permit has been granted from the USFWS. The proposed action would result in less than 4 acres of new surface disturbance; therefore, a preconstruction migratory bird nest survey is not required per BLM/FFO Instruction Memorandum No. NM-F00-2010-001 (BLM 2010).

4.16 Threatened & Endangered Species and BLM/FFO Special Management Species

4.16.1 Direct and Indirect Effects

Federally Listed Threatened, Endangered, Proposed, and Candidate Species:

The FFO reviewed and determined that Alternative B is in compliance with listed species management guidelines outlined in the September 2002 Biological Assessment. No further consultation with the Fish and Wildlife Service is required. No known prairie-dog colonies occur within the action area to support black-footed ferret. No large, flat grassland expanses with sparse, short vegetation and bare ground occur in the action area to support mountain plover. No perennial water resources were present to support Colorado pikeminnow or razorback sucker. No riparian habitat was present to support southwest willow flycatcher or yellow-billed cuckoo. The proposed action is not located within designated critical habitat for the Mexican spotted owl or the Colorado pikeminnow.

The action area is not located within BLM/FFO designated marginal or prime habitat for Knowlton's cactus, Mancos milkvetch or Mesa Verde cactus.

BLM/FFO Special Management Species:

The proposed action would not result in direct effects on any Special Management Species or their nests, burrows, or roosts. Indirect effects of the proposed action would include changes in vegetation composition and a temporary increase of human intrusion into the area with associated increases in noise, dust, and vehicle traffic. Construction and drilling activities would potentially displace raptor prey base species until the completion of drilling. Affected raptors could include American peregrine falcon, prairie falcon, golden eagle, bald eagle, and ferruginous hawk. None of the BLM/FFO SMS were observed during the field inspection of the proposed action area. The effects to SMS are anticipated to be low to negligible in the short and long term.

4.16.2 Mitigation

Site specific mitigation measures outlined in Section 2.2.1 and APD COAs designed to protect wildlife and migratory birds will be implemented as general mitigation measures to protect SMS. If any Threatened, Endangered or FFO Special Management Species are encountered during the proposed activities, all activity shall cease and the FFO Threatened and Endangered Species specialist will be contacted immediately to stipulate site specific mitigation measures if necessary.

4.17 Visual Resources

4.17.1 Direct and Indirect Effects

The proposed action would not be visible as a foreground or middle ground feature from any highway, county road, residence, or recreation area. The proposed action would result in vegetation alteration, visual scars on the landscape, and the placement of new aboveground equipment. The effects would be less noticeable as the proposed well would twin an existing well pad. Visual scars would be expanding moderately on existing scars, and additional equipment on the twinned well pad would add to existing equipment. During construction and drilling, disturbed ground, construction equipment, machinery, drilling and completion rigs

would be highly visible. Upon completion, production equipment would be less visible. The proposed action would achieve Class IV visual resource management objectives. With the implementation of FFO standard and site specific mitigation measures, the effects of the proposed action on visual resources are anticipated to be moderate for the short term and low for the long term.

4.17.2 Mitigation

Visual changes of the proposed action will blend into the current setting, to the greatest extent possible. Twinning of the proposed well pad will help to make the visual effects less perceptible. Rapid construction, reclamation, and re-vegetation will decrease the period of moderate visual effect. Above ground production equipment will be painted Juniper Green (Federal Standard 595a-17127) to mimic the vertical elements of the surrounding vegetation. For safety purposes, some equipment or parts of equipment may be required to be painted appropriate high visibility colors. During final abandonment and reclamation, the existing cut and fill slopes, and flat well pad will be re-contoured to the existing pre-construction topography. The goal of final reclamation will be to diminish evidence of cuts, fills, and the flat well pad surfaces.

4.18 Recreation

4.18.1 Direct and Indirect Effects

The proposed action is located in a somewhat remote area not often frequented by individuals not involved in the gas and oil industry. The proposed action at the well site may affect recreation activities and the general recreational experience of the public through increased noise, dust, visual changes to the landscape (see Section 4.17 above), and a general increase in human activity in the area. The proposed activities would decrease the solitude of the immediate area. The general public may encounter heavy construction and drilling vehicles within the immediate areas of the well site, as well as along the access road to the proposed action area.

The recreational user may observe new surface disturbances, drilling activities, and additional energy production equipment. However, the proposed action would twin an existing location, and the proposed action would be consistent with the existing environment which contains energy development infrastructure and production equipment.

4.18.2 Potential Mitigation

Under the proposed action (Alternative B), production equipment will be painted Juniper Green Federal Standard 595a-17127. Disturbed areas would be quickly re-contoured, reclaimed, and seeded. These measures will decrease the visual effects to the recreating public. No other recreation resource mitigation measures are proposed at this time.

4.19 Congressional or Administrative Designations

No effects – no land designations present.

4.20 Public Health and Safety

4.20.1 Direct and Indirect Effects

The primary activities associated with public health and safety in the proposed project area are traffic and transportation to/from the site including the handling, storage, and operation of equipment associated with construction activities. Health and safety issues for construction workers include potential issues with operation of heavy equipment, potential safety issues associated with welding activities and working in the vicinity of other utilities (primarily other oil and gas gathering pipelines). Direct and indirect effects to public health and safety will be low and short term.

4.20.2 Mitigation

Adherence to OSHA regulations, company safety policies, and BLM COA and ROW grant stipulations will provide mitigation for public health and safety. In addition, hauling equipment and materials for the project on public roads would comply with all DOT regulations. BLM fire stipulation will apply.

4.21 Cultural or Historical Values

4.21.1 Direct and Indirect Effects

No direct effects to known cultural resources are anticipated from the proposed action. Indirect effects may originate from changes in drainage patterns, increased erosion, and sedimentation due to re-disturbance of surfaces, as well as the increased use of existing vicinity roads. Other potential indirect effects from the proposed action are increases in human activity in the area. This increases the possibility of irretrievable loss of information pertaining to the cultural past of the project region. Conversely, the benefits to cultural resources derived from the proposed action are the cultural and historic survey that adds to literature, information, and knowledge of these irreplaceable resources. With implementation of FFO standard and site specific cultural protection measures, the proposed action should not directly, indirectly, or cumulatively affect cultural resources**.**

4.21.2 Mitigation

No site specific protection measures have been recommended for the proposed action as a result of the cultural resources survey.

All employees, contractors, and sub-contractors of the project will be informed by the project proponent that cultural sites are to be avoided by all personnel, personal vehicles, and company equipment, and that it is illegal to collect, damage, or disturb cultural resources, and that such activities are punishable by criminal and or administrative penalties under the provisions of the Archaeological Resources Protection Act (16 U.S.C. 470aa-mm).

In the event of a discovery during construction, the project proponent will immediately stop all construction activities in the immediate vicinity of the discovery and immediately notify the archaeological monitor, if present, or the BLM. The BLM would then evaluate or cause the site to be evaluated. Should a discovery be evaluated as significant (e.g., National Register,

NAGPRA, ARPA), it will be protected in place until mitigating measures can be developed and implemented according to guidelines set by the BLM.

4.22 American Indian Religious Concerns

4.22.1 Direct and Indirect Effects

The proposed action is not known to physically threaten the integrity of any TCPs, prevent access to sacred sites, prevent the possession of sacred objects, or interfere or otherwise hinder the performance of traditional ceremonies and rituals pursuant to AIRFA or EO 13007. There are currently no known threats to remains that fall within the purview of NAGPRA or ARPA. Mitigation

No mitigation measures have been recommended for Alternative B (proposed action).

4.23 Paleontology

4.23.1 Direct and Indirect Effects

Although no paleontological resources are currently known to occur within the proposed action area, effects to paleontological resources from the proposed action implementation could possibly occur. Direct effects of the proposed action to fossil localities could result from the ground disturbing activities or the disturbance of the stratigraphic context in which they are located. This project could also create indirect effects to areas by changing erosion patterns. An increase in human activity in the area could increase the possibility of unauthorized removal or other alterations to paleontological resources in the area. Potential effects to paleontological resources as a result of the proposed action would be low and long-term.

4.23.2 Mitigation

The proposed action would be assessed individually based on BLM's PFYC system, known paleontological locality information, existing reports, and data for the area. If preliminary analysis indicates that the proposed action has a high probability of affecting paleontological resources, additional surveys, reporting and stipulations would be required.

Upon review, a determination for final project clearance and stipulations shall be issued by the BLM/FFO. All BLM/FFO paleontological resources stipulations will be followed as indicated in the COAs, attached to the APD. These stipulations may include, but are not limited to temporary or permanent fencing or other physical barriers, monitoring of earth disturbing construction, project area reduction and/or specific construction avoidance zones, and employee education.

If previously undocumented paleontological sites are encountered during construction, all activities shall stop in the vicinity of the discovery and the BLM will be immediately notified. The site will then be evaluated. Mitigation measures such as data recovery may be required by the BLM to prevent effects to newly identified paleontological resources.

4.24 Support Functions

No effect – previously reviewed and approved under RMP/FEIS.

4.25 Transportation and Access

No effects – previously reviewed and approved under RMP/FEIS.

4.26 Land Tenure, ROW, Other Uses

No new effects – previously reviewed and approved under RMP/FEIS.

4.27 Environmental Justice

4.27.1 Direct and Indirect Effects

Development of the proposed action will not result in negative effects to minority or low-income populations. No minority or low income populations will be directly affected in the vicinity of the proposed action. Indirect effects could include effects due to overall employment opportunities related to the oil and gas and service support industry in the region as well as the economic benefits to state and county governments related to royalty payments and severance taxes. Other effects could include a small increase in activity and noise disturbance in areas used for grazing, wood gathering, or hunting. However, these effects will apply to all public land users in the project area. A more detailed description of potential effects is contained in the RMP/FEIS p.4-120 and 4-129.

4.27.2 Mitigation

No disproportionate negative effects to these communities or groups are anticipated; therefore, no mitigation measures are proposed at this time.

5. CUMULATIVE EFFECTS

Cumulative effects are those determined by summarizing the incremental effects of an action added to other past, present, and reasonably foreseeable future actions. Past and existing activities on or in the vicinity of the Project Area that have a current or reasonably foreseeable major influence on the resources in the area include:

- Oil and gas exploration, production, and transport
- Livestock grazing activities (including fences, stock watering facilities, etc.)
- Recreation activities, principally hunting

Reasonably foreseeable future actions are considered to be those for which existing permits have been issued or for which application has been made. Analysis of cumulative effects for reasonably foreseeable development of 9,942 new oil and gas wells on public lands in the San Juan Basin was presented in the Farmington PRMP/FEIS (Chapter 4). This proposed action is included in the total analyzed. The reasonably foreseeable development scenario developed for the Farmington RMP demonstrated 522 wells would be drilled annually for federal minerals. Current APD permitting trends within the FFO confirm that these assumptions are still accurate. There has been no change in the basic assumptions or projections in that analysis except in regard to air quality (see Section 5.1 below).

Total surface disturbance projected by the PRMP/FEIS was 18,577 acres with 805 miles of new roads over twenty years. The Upper San Juan watershed, where the proposed action is located, contains approximately 657,318 acres with an estimated 3,853 existing oil and gas wells and 24,978 acres of existing long-term oil and gas disturbance (BLM 2003a). Based on the reasonable foreseeable development predictions in the 2003 RMP/FEIS, the projected number of wells with potential to occur in the Upper San Juan watershed is estimated to increase to 6,001 wells, an increase of 2,148 wells. With the addition of these wells and approximately 174 miles of well roads, future long-term disturbance is estimated to increase to 30,695 acres, an increase of 5,717 acres. The proposed action, at 0.29 acres of long-term disturbance, would add to the existing and future disturbance by less than 0.001%. This additional effect can be considered low for the long-term cumulative effects to the Upper San Juan watershed. The short-term use of the area for the proposed action is not expected to adversely impact or limit the long-term productivity of the land, or nearby lands. There is no irreversible or irretrievable commitment of surface resources that would occur from the proposed action.

5.1 Air Quality

The leased area of the proposed action has been industrialized with oil and gas well development. The surface disturbance for each project that has been permitted has created a spreading out of land use fragmentation. The cumulative effects fluctuate with the gradual reclamation of well abandonments and the creation of new additional surface disturbances in the construction of new access roads and well pads. The on-going process of restoration of abandonments and creating new disturbances for drilling new wells gradually accumulates as the minerals are extracted from the land. Preserving as much land as possible and applying appropriate mitigation measures will alleviate the cumulative effects.

Due to the absence of regulatory requirements to measure GHG emissions and the variability of oil and gas activities on federal minerals, it is not possible to accurately quantify potential GHG emissions in the affected areas as a result of approving this application for permit to drill. A general assumption, however, can be made: drilling this well may contribute to GHG emissions.

The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future effects. However, potential effects to natural resources and plant and animal species due to climate change are likely to be varied, including those in the southwestern United States. For example, if global climate change results in a warmer and drier climate, increased particulate matter effects could occur due to increased windblown dust from drier and less stable soils. Cool season plant species' spatial ranges are predicted to move north and to higher elevations, and extinction of endemic threatened/endangered plants may be accelerated.

Due to loss of habitat or competition from other species whose ranges may shift northward, the population of some animal species may be reduced or increased. Less snow at lower elevations would likely affect the timing and quantity of snowmelt, which, in turn, could affect water resources and species dependant on historic water conditions. Forests at higher elevations in New Mexico, for example, have been exposed to warmer and drier conditions over a ten year period. Should the trend continue, the habitats and identified drought sensitive species in these forested areas and higher elevations may also be more affected by climate change.

5.2 Wildlife

Current well density within the Upper San Juan watershed is 3.8 wells per square mile with 24 acres of disturbance per square mile (BLM 2003a, Table 3-1). There are currently 15 wells within the one square mile surrounding the proposed action. The majority of these existing wells are collocated or twinned locations. Disturbance within this square mile was estimated to be approximately 29.8 acres using GIS analysis of orthography. Using the impact thresholds as described in Tessmann et al. (2004) one can get an estimate of the level of current impacts to mule deer from current gas field development.

- Moderate* impacts are based on 1-4 wells and < 20 acres of disturbance per section. Impacts can be minimized or avoided through effective management practices and habitat treatments.
- High* impacts are based on 5-16 wells and 20-80 acres disturbance per section. Impacts are increasingly difficult to mitigate and may not be completely offset by management and habitat treatments.
- Extreme* impacts based on >16 wells or >80 acres disturbance per section. Habitat function is substantially impaired and cannot generally be recovered through management or habitat treatments.

* - The terminology for impact rating here is that used by Tessmann et al and does not coincide with the impact rating terminology described in Section 4.0 above.

Future development within the Upper San Juan watershed (including the proposed action) is expected to increase well density to 5.8 wells per square mile with 30 acres of disturbance per

square mile (BLM 2003a). Well density will increase to 16 wells within the square mile surrounding the proposed action, with 31.0 acres of disturbance, as a result of the proposed action. Future well development would not increase the effects of well development to a higher threshold as described by Tessmann et al 2004. Measures, such as twinning existing locations, would help to mitigate effects of future well development on mule deer and wildlife in general.

6. CONSULTATION/COORDINATION

This section includes individuals or organizations from the public, public land users, the interdisciplinary team, and permitees that were contacted during the development of this document.

Table 7: Summary of Public Contacts Made During Preparation of Document and Interdisciplinary Team

Public Contact	**Title**	**Organization**	**Present at Onsite?**
None	NA	NA	NA
ID Team Member	**Title**	**Organization**	**Present at Onsite?**
Roger Herrera	Resource Protection Specialist	BLM	yes
Steven Merrell	Surveyor	Daggerpoint Construction	yes
John Kendall	T&E Species Coordinator	BLM	no
Stanley Dykes	Grazing Coordinator	BLM	no
Nathan Kirker	Biologist	SME	yes

SME Environmental Inc, (SME) prepared this environmental document to the standards and under the direction of the Farmington Field Office, BLM.

6.1 Authorities

Code of Federal Regulations (CFR)
40 CFR All Parts and Sections inclusive Protection of Environment, Revised July 1, 2001
43 CFR, All Parts and Sections inclusive - Public Lands: Interior. Revised Oct. 1, 2000.

U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.

7. REFERENCES

Armstrong, D. M., R. A. Adams, and J. Freeman. 1994. Distribution and ecology of bats of Colorado. Natural History Inventory of Colorado, No. 15. University of Colorado Museum, Boulder, Colorado.

Belnap, J., 1993, Recovery rates of cryptobiotic crusts: Inoculant use and assessment methods: Great Basin Naturalist, v. 53, p. 89-95.

BISON (Biota Information System of New Mexico). Inter-net accessed October 2008.

Brugge, David M. 1993. *An Investigation of AIRFA Concerns Relating to the Fruitland Coal Gas Development Area*. Office of Contract Archaeology, University of New Mexico. Ms. on file, Bureau of Land Management, Farmington, New Mexico.

Degenhardt, G. W., Painter, W. C., Price, A. H. 1996. Amphibian and Reptiles of New Mexico, 1st addition., University of New Mexico Press. USA

DeGraaf, R. M., V. E. Scott, R. H. Hamre, L. Ernst, and S. H. Anderson. 1991. Forest and Rangeland Birds of the United States, Natural History and Habitat Use. Agriculture Handbook 688.

Dunn, J. and Alderfer, J. 2006. National Geographic Field Guide to the Birds of North America. Washington, DC.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The birder's handbook. Simon & Schuster Inc., New York, NY.

Enquist, Carolyn and Gori, Dave. Implications of Recent Climate Change on Conservation Priorities in New Mexico. April 2008.

Goddard Institute for Space Studies. 2007. Annual Mean Temperature Change for Three Latitude Bands. Datasets and Images. GISS Surface Temperature Analysis, Analysis Graphs and Plots. New York, New York. (Available on the Internet: h http://data.giss.nasa.gov/gistemp/graphs/Fig.B.lrg.gif.)

Grubb, T.G., and C.E. Kennedy. 1982. *Bald Eagle Winter Habitat on Southwestern National Forests*. General Technical Report RM-237. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station. Fort Collins, Colorado.

Ivey, R. D. 2003. Flowering Plants of New Mexico. RD & Ivey, Publishers Albuquerque, New Mexico.

Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: The Physical Basis (Summary for Policymakers). Cambridge University Press. Cambridge, England

and New York, New York. (Available on the Internet: http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-w g1-spm.pdf)

Intergovernmental Panel on Climate Change (IPCC). Climate Change 2007, Synthesis Report. A Report of the Intergovernmental Panel on Climate Change.

Johnsgard, P. A. 1986. Birds of the Rocky Mountains. Colorado Associated Press. Boulder, Colorado.

Kaufmann, K. 1996. Lives of North American Birds. Sponsored by the Troy Peterson Institute. Houghton Mifflin Company. Boston and New York.

Kelly, Klara, Rena Martin, Richard Begay, Ted Neff, and Clifford Werito. 2006. *"We Will Help You With What We Know": Diné Traditional Cultural Places in Dinétah*. Museum of Northern Arizona Environmental Solutions, Inc., Flagstaff. Manuscript on file at Bureau of Land Management, Farmington, New Mexico.

Kendall, John. 2008. Personal communication. BLM/FFO Biologist.

Kochert, M. N., K. Steenhoff, C. L. McIntyre, and E. H. Craig. 2003. Golden Eagle (*Aquila chrysaetos*). *In* The Birds of North America, No. 684 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

National Academy of Sciences. 2006. Understanding and Responding to Climate Change: Highlights of National Academies Reports. Division on Earth and Life Studies. National Academy of Sciences. Washington, D.C. (Available on the Internet: http://dels.nas.edu/basc/Climate-HIGH.pdf.)

New Mexico Department of Agriculture (NMDA). 2009. New Mexico Noxious Weed List, update April 2009. Available at http://www.nmda.nmsu.edu/media-releases.

New Mexico Department of Game and Fish (NMDGF). 2009. Elk range geospatial data of New Mexico. NMDGF Elk Program. Santa Fe, New Mexico

New Mexico Natural Heritage Program. 2004. http://nmnhp.unm.edu.

New Mexico Oil Conservation Division (NMOCD) 2008. Air quality Database and information available at http://www.nmenv.state.nm.us/aqb/monitor/index.`html and http://www.emnrd.state.nm.us/ocd/

New Mexico Rare Plant Technical Council. 1999. http://nmrareplants.unm.edu.

Page, L.M. and B.M. Burr. 1991. A field guide to freshwater fishes. Houghton Mifflin Company, Boston, MA

Parker, Patricia L. and Thomas F. King. 1998. Guidelines for Evaluating and Documenting Traditional Cultural Properties. National Park Service, *National Register Bulletin 38.* Washington.

Sawyer, H., R. Nielson, F. Lindzey, and L. McDonald. 2006. Winter Habitat Selection of Mule Deer Before and During Development of a Natural Gas Field. Journal of Wildlife Management 70:396-403.

Science Applications International Corporation (SAIC). 2002. Cultural Resources Technical Report; Background Information on Cultural Resources for the Farmington Draft RMP/EIS. Unpublished report available from the BLM Farmington Field Office. Farmington, New Mexico.

Sibley, D. A. 2000. National Audubon Society. The Sibley Guide to Birds. Alfred A. Knopf. New York, New York.

Stebbins, R. C. 2003. Peterson Field Guides. Western Reptiles and Amphibians, Third Edition. Houghton Mifflin Company. Boston. New York.

Terres, J.K. 1980. *The Audubon Society Encyclopedia of North American Birds*. Alfred A. Knopf, Inc. New York, New York. 1,109 pp.

Tessmann, S., J. Bohne, B. Oakleaf, B. Rudd, S. Smith, V. Stetler, D. Stroud, S. Wolff. 2004. DRAFT: Minimum recommendations to sustain important wildlife habitats affected by oil and gas development: a strategy for managing energy development consistently with the FLPMA principles of multiple use and sustained yield. Wyoming Game and Fish Department, Cheyenne, Wyoming, USA. *as cited in: Watkins, B.E., C.J. Bishop, A. Bronson, B. Hale, B.F. Wakeling, L.H. Carpenter, and D. W. Lutz. 2007. Habitat Guidelines for Mule Deer – Colorado Plateau Shrubland and Forest Ecoregion. Mule Deer Working Group, Western Association of Fish and Wildlife Agencies.*

U.S. Department of Agriculture, Soil Conservation Service (SCS). 1980. Soil Survey of San Juan County New Mexico (Eastern Part). Natural Resources Conservation Service

U.S. Department of Agriculture (USDA). 2007. Natural Resource Conservation Service Web Soil Survey. Available at http://websoilsurvey.nrcs.usda.gov/app/.

U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS). 2011. The PLANTS Database (http://plants.usda.gov, 16 March 2011). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA). 2009. FEMA Map Service Center. Available at http://www.fema.gov/hazard/flood/fl_before.shtm.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2001 Oil and Gas Resource Development for San Juan Basin, New Mexico: A 20-year, Reasonable Foreseeable Development (RFD) Scenario Supporting the Resource Management Plan FFO/BLM, Engler, July 2, 2001. See: http://www.blm.gov/pgdata/etc/medialib/blm/nm/field_offices/farmington/farmington_planning/ffo_rmp_docs.Par.59812.File.dat/RFD.pdf

U.S. Department of the Interior, Bureau of Land Management (BLM). 2002. *Biological Assessment: Impacts to Threatened and Endangered Species Related to the Resource Management Plan, BLM Farmington Field Office.* Farmington, New Mexico

U.S. Department of the Interior, Bureau of Land Management (BLM). 2003a. *Farmington Proposed Resource Management Plan and Final Environmental Impact Statement*. Farmington, New Mexico.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2003b. *Record of Decision; Farmington Proposed Resource Management Plan and Final Environmental Impact Statement*. Farmington, New Mexico.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2003c. *Farmington Resource Management Plan with Record of Decision*. Farmington, New Mexico.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2007. Farmington Field Office raptor data GIS layers. Unpublished data. Farmington, NM.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2008a. Special status species management policy 2008 update. Instruction Memorandum No. IM-NM-200-2008-001. Farmington Field Office, Farmington, NM.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2008b. *EA Guidance for Cultural Resources, Cultural ACECs, & Native American Religious Concerns.* Manuscript on file at Bureau of Land Management, Farmington, New Mexico.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2008c. Farmington Field Office Grazing Schedule. Unpublished data. Farmington, NM.

U.S. Department of the Interior, Bureau of Land Management (BLM). 2010. Migratory Bird Treaty Act – BLM/FFO Interim Management Policy. Instruction Memorandum No. NM-F00-2010-001. Farmington Field Office, Farmington, NM.

U.S. Environmental Protection Agency (EPA) Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2007. EPA, Washington, D.C. April 2009.

U.S. Environmental Protection Agency (EPA) website: http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsGHGEmissionsUSEmissionsInve

ntory2003.html Inventory of Greenhouse Gases and Sinks: 1990-2001 2-41) http://www.epa.gov/gasstar/bmp.htm.

U.S. Fish and Wildlife Service. 1985. Knowlton cactus (*Pediocactus knowltonii*) recovery plan. Albuquerque, New Mexico. 53 pp.

U.S. Fish and Wildlife Service. 1995. Recovery plan for the Mexican spotted owl. Volume I. Albuquerque, NM.

U.S. Fish and Wildlife Service. 1997a. Draft razorback sucker *Xyrauchen texanus* recovery plan. Denver, Colorado.

U.S. Fish and Wildlife Service. 1998. Black-footed ferret (*Mustela nigripes*) fact sheet. Available at http://endangered.fws.gov/i/A07.html.

U.S. Fish and Wildlife Service. 2002. Southwestern Willow Flycatcher Recovery Plan. Albuquerque, New Mexico. i-ix, 210 pp. Appendices A-O.

U.S. Fish and Wildlife Service. 2004. Environmental assessment for designation of critical habitat for the Mexican spotted owl. Albuquerque, New Mexico. 67 pp.

U.S. Fish and Wildlife Service (USFWS). 2011. Southwest Region Ecological Services. Endangered Species List. Available at http://www.fws.gov/southwest/es/EndangeredSpecies/lists/ListSpecies.cfm.

United States Geographical Survey (USGS). 2007. National Cooperative Geologic Mapping Program. Available at http://ncgmp.usgs.gov/ncgmpproducts/.

Utah State University (USU), Mule Deer Mapping Project. 2004. Mule Deer Habitat of North America (geospatial data). RS/GIS Laboratory, USU. Logan, Utah

Van Valkenburgh, Richard F. 1941. *Diné Bikeyah*. Department of the Interior, Office of Indian Affairs, Navajo Services, Window Rock. Ms. on file, Bureau of Land Management, Farmington, New Mexico.

Van Valkenburgh, Richard F. 1974. *Navajo Sacred Places*. Edited by Clyde Kluckhohn. Garland Publishing. New York.

Wheeler, B.K. 2003. Raptors of Western North America. Princeton University Press, Princeton, NJ.

APPENDIX A

SURVEY PLATS

APPENDIX B

LAWS AND REGULATIONS GOVERNING FEDERAL OIL AND GAS DEVELOPMENT

Laws and Regulations that Govern Federal Oil and Gas Development

LAW/REGULATION	RESOURCE PROTECTED	AUTHORITY
Clean Air Act (CAA)	Air Quality, Air Emissions and Permits.	New Mexico Environment Department (NMED)
Clean Water Act (CWA) 1977, as amended. Section 404 Permits.	Surface waters of the U.S., crossing/diversion of ephemeral washes	U.S. Army Corps of Engineers
Federal Water Pollution Control Act and Section 404 of the CWA.	Discharges into surface waters from point sources	New Mexico Water Quality Control Commission (NMWQCC)
Storm Water Pollution Prevention Plan (SWPPP), Section 402 of the CWA	Construction projects disturbing greater than 5 acres. Minimize erosion	USEPA
Safe Drinking Water Act 1974, as amended.	Surface and ground water	U.S. Environmental Protection Agency (USEPA)
Colorado River Salinity Control Act 1974, amendment of 1984: Public Law 93-320	Mandated Control of Salinity Runoff into the Colorado River Basin	BLM
Federal Land Management and Policy Act (FLPMA) of 1976.	BLM unique areas, ACECs. Issuing of energy related ROWS. Wilderness Areas	BLM
Surface Mining Control and Reclamation Act (SMCRA) of 1977.	Prime and Unique Farm Lands.	Natural Resource Conservation Service (NRCS)
Executive Order 11988 as amended.	Floodplains	All Agencies
Executive Order 11990.	Wetlands/Riparian Zones	All Agencies
Wild and Scenic Rivers Act of 1968 as amended.	Wild and Scenic Rivers	All Agencies
National Historic Preservation Act of 1966 as amended. Antiquities Act of 1906.	Cultural resources	All Agencies
American Indian Religious Freedom Act 1978. Native American Graves Protection and Repatriation Act (NAGPRA) 1990.	Native American Religious Concerns	All Agencies
Endangered Species Act (ESA) 1973 as amended. (Section 7)	Threatened and Endangered plant and animal species	U. S. Fish and Wildlife Service (U.S. FWS)
Bald and Golden Eagle Protection Act	Protection of Eagles	
Migratory Bird Treaty Act	Protection to Migratory Birds, Nests and Eggs.	U.S. FWS
National and New Mexico BLM Instruction Memoranda	BLM and New Mexico State Sensitive Species and Habitat.	BLM
Resource Conservation and Recovery Act (RCRA) of 1976	Use of Hazardous Materials	USEPA
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 660 as amended.	Use and Disposal of listed Hazardous Materials.	USEPA
Executive Order #22898, February 1994.	Environmental Justice for environmental and health conditions in minority and low-income communities.	All Agencies
Federal Noxious Weed Act 1974, as amended and Executive Order 13112.	Designated Certain Plants as Noxious Weeds.	All Agencies
New Mexico Noxious Weed List	Noxious weeds for the State of New Mexico.	New Mexico Department of Agriculture.
Mineral Leasing Act (MLA) 1929, as amended. Associated Onshore Orders; National, State and Local.	Issue and managed federal oil and gas leases and related transportation pipelines.	BLM

APPENDIX C

PROJECT AREA IMAGES

Photo from corner #3 of the proposed pad facing south to the existing Houck 2E well pad and the proposed well head (arrow). Note native sagebrush-grassland in the foreground.

Photo from corner #5 facing west towards the proposed wellhead (arrow). Again, note native vegetation in foreground.

Photo from corner #2 facing northeast towards corner #3 (arrow). Note disturbed/reclaimed nature of existing well pad vegetation.

Photo from corner #2 facing southeast towards corner #1 (arrow) and corner #6 (approximately 80 feet in front of the distant junipers).

APPENDIX D

PLANTS AND WILDLIFE OBSERVED IN THE PROJECT AREA

PLANT SPECIES

Scientific Name	**Common Name**
Graminoid	
Achnatherum hymenoides	Indian ricegrass
Aristida purpurea	Red threeawn
Bouteloua gracilis	Blue grama
Pleuraphis jamesii	Jame's galleta
Sporobolus cryptandrus	Sand dropseed
Forbs	
Erodium cicutarium	Redstem filaree
Lappula squarrosa	Stickseed, beggars tick
Sisymbrium altissimum	Tumblemustard
Gutierrezia sarothrae	Broom snakeweed
Mentzelia albicaulis	Whitestem blazingstar
Salsola kali	Russian thistle
Solanum elaeagnifolium	Silver-leaf nightshade
Sphaeralcea coccinea	Scarlet globemallow
Shrubs	
Artemesia tridentata	Big sagebrush
Ericameria nauseosa	Rubber rabbitbrush
Trees	
Juniperus monosperma	one-seed juniper
Juniperus osteosperma	Utah juniper

WILDLIFE SPECIES

Scientific Name	**Common Name**
Mammals	
Lepus californicus	Black-tailed jackrabbit
Canis latrans	Coyote
Birds	
Amphispiza bilineata	Black-throated sparrow
Archilochus alexandri	Black-chinned hummingbird
Carpodacus mexicanus	House finch
Chondestes grammacus	Lark sparrow
Corvus corax	Common raven
Myiarchus cinerascens	Ash-throated flycatcher
Spizella passerine	Chipping sparrow
Zenaida macroura	Mourning dove