

ENVIRONMENTAL ASSESSMENT
EOG Resources Wildcat Well APDs for
North Mail Trail #5, North Mail Trail #6, and Cannonball Unit 1-18
December 2004

ENVIRONMENTAL ASSESSMENT (EA) NUMBER: CO-800-2004-062 EA

CASEFILE/PROJECT NUMBER: Oil and Gas Leases # COC-56438, COC-56439, and COC-58384

PROJECT NAME: EOG Resources Application for Permit to Drill (APD), three wildcat oil & gas wells - North Mail Trail #5, North Mail Trail #6, and Cannonball Unit 1-18

ECOREGION/PLANNING UNIT: Canyons of the Ancients National Monument Planning Unit

LEGAL DESCRIPTIONS:

North Mail Trail #5
Section 3, T35N, R20 W
2462' FNL, 455' FEL

North Mail Trail #6
Section 11, T35N, R20 W
1170' FNL, 935' FEL

Cannonball Unit 1-18
Section 18, T35N, R19W
1993' FSL, 237' FWL

APPLICANT: EOG Resources

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1 INTRODUCTION

EOG Resources (EOG) has submitted applications for permits to drill (APDs) three wildcat oil and natural gas exploration wells identified as the North Mail Trail #5, North Mail Trail #6, and Cannonball Unit 1-18 wells. The project is located in Canyons of the Ancients National Monument (the Monument) approximately 26 miles, by road, west-southwest of Cortez, Colorado (see Appendix A, Figures and Maps).

This Environmental Assessment (EA) has been prepared to document anticipated impacts associated with approval of the APD and associated road use and improvements. Since these wells are wildcat wells, pipelines for transport of product will not be analyzed in this EA. If the wells prove to be producers, pipeline right-of-ways will be analyzed, as needed, in a subsequent environmental assessment. The term “wildcat” means that the well in question is an exploratory well in an area of potential, but unknown, oil & gas resources. Typically, about 10 percent of all wildcat wells are successful and become producing wells.

EOG Resources has indicated that they want to drill Cannonball Unit #1-18 first to see what results are achieved. They would then use that information to decide whether to drill the other two wildcat wells.

The intent of this EA is to: 1) inform the public of the Proposed Action and alternatives, 2) analyze the impacts associated with the Proposed Action and alternatives, 3) identify mitigation practices that reduce or eliminate impacts, and 4) provide agency decision makers with information upon which to base the decision to approve or deny the Proposed Action or a reasonable alternative.

1.1 Purpose and Need for the Proposed Action

Approval of the Proposed Action would allow construction of three wildcat exploration wells to test the potential for natural gas production on Oil and Gas Lease numbers COC-56438, COC-56439, and COC-58384. EOG Resources is the operator of these leases. Oil and gas leases issued by BLM under the Mineral Leasing Act of 1920 are contractual agreements between the United States and the lessee, granting the right to extract the oil and gas and to occupy as much of the lease surface as is reasonable for the extraction.

1.2 Plan Conformance Review

The 1985 San Juan/San Miguel Resource Management Plan (RMP) states that "The BLM actively encourages and facilitates the development by private industry of public land mineral resources so that national and local needs are satisfied and economically and environmentally sound exploration, extraction and reclamation practices are provided." (BLM, 1985) The RMP was amended by the 1991 Oil and Gas Leasing and Development Amendment which had as its objective to “Facilitate orderly, economic, and environmentally-sound exploration and development of oil and gas resources using balanced multiple-use management.” (BLM 1991) The 1991 amendment indicates further that "In addition to this EIS, an environmental assessment (EA) will be completed on each Application for Permit to Drill (APD) or group of APD's." (BLM, 1991, page 2-2)

The Proposed Action would fulfill the intent and the objectives of the San Juan/San Miguel RMP that public land mineral resources be developed by private industry in an environmentally sound way and is thus in conformance with the RMP.

Additionally, the proposed action has been reviewed for conformance with the Monument Proclamation (9 June 2000). The Monument was created to protect cultural, geologic, and biologic resources, and the highest known density of archaeological sites in the Nation, geology that is remarkable for its landforms, and crucial habitat for several unique reptiles. The proclamation addresses oil and gas development as follows:

“Because most of the Federal lands have already been leased for oil and gas, which includes carbon dioxide, and development is already occurring, the Monument shall remain open to oil and gas leasing and development; provided the Secretary of the Interior shall manage the development, subject to valid existing rights, so as not to create any new impacts that interfere with the proper care and management of the objects protected by this proclamation; and provided further, the Secretary may issue new leases only for the purpose of promoting conservation of oil and gas resources in any common reservoir now being produced under existing leases, or to protect against drainage.”

The Monument is currently in the process of preparing a new Resource Management Plan (RMP). Until this RMP is implemented, management of the Monument is guided by the 1985 San Juan/San Miguel Resource Management Plan (BLM, 1985) and the 1991 Oil and Gas Amendment to the RMP (1991 O+G Amendment). Interim management guidance is provided in an Oct. 5, 2000, BLM State Director’s Guidance memorandum and a Sept. 13, 2000, BLM Washington Office memorandum “Interim Management Guidance for Oil and Gas Leasing and Development of the Canyon of the Ancients National Monument”. A reprint of the Interim Guidance can be found at the following web site: www.co.blm.gov/canm/canmoginterim.htm.

1.3 Conformance with Statutes or Other Regulations

This Environmental Assessment (EA) is prepared under the authority of the National Environmental Policy Act (NEPA) and federal regulations found in 40 CFR, Chapter V.

Federal leases are issued and administered by the BLM under the authority of the Federal Oil and Gas Leasing Reform Act of 1987 and the Federal Oil and Gas Royalty Management Act of 1982 (43 CFR Part 3160). Federal ROWs are issued under provisions of the Federal Land Policy and Management Act (FLPMA) as amended. The development and long term management of these resources is also subject to and must comply with a wide array of federal laws and regulations. The most relevant to the proposed project are:

- Onshore Oil and Gas Order No. 1, Onshore Oil and Gas Order No. 2
- The Endangered Species Act of 1973 (PL 94-325)
- The Migratory Bird Treaty Act (16 USC 703-71L) and the Bald and Golden Eagle Protection Act (16 USC I.S.C. 668a-668b)
- The Federal Water Pollution Control Act (40 CFR Part 112)
- The 1972 Clean Air Act, as amended (EPA 1990)
- The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980
- The Antiquities Act of 1906, [Public Law (PL) 52-209], the National Historic Preservation Act of 1966 (PL 89-665), Archaeological and Historical Preservation Act of 1974 (PL 86-523). Archaeological Resources Protection Act of 1979 (PL 96-95), the American Indian Religious Freedom Act (48 USC 1996), the Native American Graves Protection and Repatriation Act of 1990 (PL 101-601).

This EA includes consideration of the requirements of these laws and regulations as applicable.

1.4 Oil and Gas Lease Status

The APD portion of the Proposed Action is pursued under federal oil and gas lease numbers COC-56438, COC-56439, and COC-58384. No lease stipulations are associated with these leases.

2 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

Copies of the APD submittals are available, in part, in the San Juan Public Land Center files. The applicant has requested proprietary status for portions of the APDs. This section summarizes the APD submittals, the No Action Alternative, Proposed Action Alternative with Conditions of Approval (COA's), and alternatives considered but dropped from detailed analysis. No other reasonable alternatives have been identified.

2.1 Alternatives Considered but Dropped from Further Consideration

2.1.1 North Mail Trail #5 – Access Using Existing Road

The original access plan for this well was to follow an existing 2-track road, the origin of which is unknown. The 2-track is not an established official road in the Monument. Upon inspection during the on-site field visit, it was determined that the 2-track road is in a very poor location for well-pad access. The 2-track road crosses and re-crosses a drainage several times, crosses a very rough, rocky ridge, and would be very difficult to maintain. EOG Resources agreed to reclaim this old 2-track and build a new access road across an open, flat area (Construction & Drilling COA #5). Given that, the original access alternative was dropped from consideration.

2.1.2 North Mail Trail #6 – Original Staked Location and Original Access Route

Upon inspection of the original staked location, it was determined and agreed that the original proposed well-pad location was staked in a poor location that caused numerous problems with local drainages. It was obvious that moving the well-pad location about 250 feet north of the original location would avoid these problems. EOG agreed to the new location and subsequently re-staked the well. The original location was dropped from consideration.

Subsequent to re-staking the location, it was discovered that the center stake and part of the well pad were located about 150 feet north of the lease boundary. To avoid moving the well location back to the original poor location, it was decided to grant a right-of-way to drill from the off-lease location and to drill the well at a southerly off-set angle so that production, if any, would be from the lease. The right-of-way agreement and associated conditions of approval are discussed in section 3.4.16 – Lands and Rights of Way.

2.2 Modified-Proposed-Action Alternative with Conditions of Approval (COA's)

The Proposed Action Alternative analyzes the North Mail Trail #5, North Mail Trail #6, and Cannonball Unit 1-18 proposals and the related access roads with Conditions of Approval (COA's). The conditions of approval in Appendix B are impact-mitigation measures that will be attached to the approval documents to minimize anticipated environmental impacts. The duration of construction activities would be approximately five weeks for each well and access road.

The applications for permits to drill were submitted on March 10, 2004. The initial onsite field examination was conducted on April 14, 2004 and two follow-up field visits were conducted by BLM

personnel on June 14 and November 5, 2004. Representatives from EOG Resources and the Bureau of Land Management (BLM) were present at the initial on-site field exam to discuss issues. Cultural inventories were conducted by La Plata Archaeological Services at the well pad sites and along the access roads, on April 6, and 20, 2004 and on other unspecified dates in March and April 2004. The inventories found no National Register eligible cultural sites. The results of the inventory are covered in the cultural section (3.4.2) of this EA.

The proposed North Mail Trail #5 well site is located in SE NE, Sec. 3, T35N, R20W (see Appendix A, Maps and Figures). The site is in a relatively flat area and the excavation for the well pad will result in a projected maximum cut of 6 feet at the southwest corner of the pad and a projected maximum fill of 3 feet at the northwest corner of the pad. The proposed pad is in an area of the shadscale community vegetation type.

The proposed North Mail Trail #6 well site is located in the NE NE Sec. 11, T35N, R20 W (see Appendix A, Maps and Figures). The site is in an area of slightly rolling terrain and the excavation for the well pad will result in a projected maximum cut of 10 feet at the northeast corner of the pad and a projected maximum fill of 4 feet at the southwest corner of the pad. The proposed pad is in an area of the shadscale community vegetation type.

The proposed Cannonball Unit #1-18 well is located in the NW SW Sec. 18, T35N, R19W (see Appendix A). The site is in flat terrain and the excavation for the well pad will result in a projected maximum cut of 2 feet along the east side of the pad and a projected maximum fill of 2 feet at the northwest corner of the pad. The proposed pad is in an area of the shadscale community vegetation type.

Access to the proposed sites is along existing Montezuma County and BLM roads as described below: From US Highway 491 (formerly 666) at the intersection with Montezuma County Road G (CR G) (also known as McElmo Canyon Road), proceed west on CR G 25.2 miles to BLM road 4524 and turn left and through the gate in the fence. BLM road 4524 is not marked at the intersection with CR G, but it is 0.4 miles east of the Ismay Trading Post. Cross Mc Elmo Creek at the ford crossing and follow BLM road 4524 to marker flags for proposed access roads to each well (0.7 miles to N. Mail Trail #5 turnout, 2.7 miles to N. Mail Trail #6 turnout, and 3.5 miles to Cannonball Unit # 1-18 turnout).

A second on-site examination was held on June 14, 2004 to examine right-of-way issues related to North Mail Trail #6 and Cannonball Unit 31-18. Moving North Mail Trail #6 to avoid surface drainage problems resulted in the surface location being outside of the lease and unit boundaries by about 150 feet. From this off lease/unit location, the well will be spudded and drilled at an off-set angle to the south so that production occurs from within the lease (see section 3.4.16). Therefore, a right-of-way is needed for that portion of the well pad outside of the unit/lease boundary.

BLM personnel conducted a follow-up on-site examination on November 5, 2004 to examine the drainage crossings and drainage issues, if any, at each well site. Vegetation and wildlife surveys were also conducted on the same date. As a result of this examination, BLM asked EOG to move the Cannonball Unit #1-18 well location 225 feet to the southwest into an area of less vegetation and to avoid rerouting drainages around the well pad. However, EOG asked that they not move the Cannonball Unit #1-18 location because the geologic target formation is very small and moving the well even a short distance will make it more difficult to hit that target. BLM agreed to leave the well in its original staked location. Specifications for drainage crossings, vegetation survey results and wildlife survey results are discussed further in the appropriate sections of this EA.

The approximate amount of surface disturbance related to the three wells is summarized in Table 2.2-1, below.

Table 2.2-1 Summary of New Surface Disturbance for Three Wells: North Mail Trail #5, North Mail Trail #6, and Cannonball Unit # 1-18

Well Name	Surface Location	Road Length (ft)/Disturbance (acres)	Well pad Disturbance (acres)	Total Disturbance (acres)
North Mail Trail #5	SE NE, Sec. 3, T35N, R20 W, 2462' FNL, 455' FEL	1,100 ft/0.1.01 acres	1.52	2.53
North Mail Trail #6	SE NE, Sec.11, T35N, R20 W, 1170' FNL, 935' FEL	1,600 ft/1.47 acres	1.52 (1.25 off lease/unit)	2.99
Cannonball Unit #1-18	NW SW, Sec. 18, T35N, R19W, 1993' FSL, 237' FWL	4,600 ft/ 2.32 ac.	1.52	3.84
Totals		7,300 ft./4.80 ac.	4.56	9.36

Descriptions of proposed well drilling, testing, and completion operations are included in the APD submittal. A general description of oil and gas activities on Federal Leases is available in BLM's Surface Operating Standards for Oil and Gas Exploration and Development, known as "the Gold Book" (BLM, 1989).

Since these proposed wells are wildcat wells, no definite pipeline route has been proposed at this time. Therefore, environmental effects of pipeline construction will be analyzed in a separate EA.

Following drilling of each well, it will be tested for oil and/or natural gas production potential. If the well is deemed unproductive, final reclamation will proceed as soon as practical and no environmental assessment for a pipeline will be needed. If the well is a producer, the well pad size will be reduced, all unneeded areas will be reclaimed, and application would most likely be made for the pipeline right-of-way. Final reclamation will occur after the well is no longer economically productive. All reclamation will involve re-contouring of disturbed areas to blend with the natural topography, re-vegetation with native plant species (Reclamation COA #5), monitoring of noxious weeds and non-native species Reclamation COA #3), and monitoring to ensure re-vegetation is successful. Reclamation efforts will continue until all related COA's are satisfied (Reclamation COA #8).

2.3 No Action Alternative

The No Action Alternative would mean the wells would not be drilled at the proposed locations. Denial of any of the APDs would be based on an analysis of the impacts that would indicate an unacceptable level of impact at the selected location. Under terms of federal oil and gas leases, BLM cannot deny the right to drill and develop the leasehold but can require relocation of the well by up to 200 meters (656-foot). The No Action Alternative would mean that permits to drill would not be granted, and 9.36 acres of new disturbance would not occur. The economic consequences would be to forgo the possible energy reserves that might be obtained from these wells.

3 AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES

Through this NEPA analysis, BLM has determined that the mitigation measures listed in EOG’s 13-point surface use plan (SUP) and the surface use conditions of approval (COA’s) included with this environmental assessment (Appendix B) will provide adequate protection for the environment and none of the critical environmental elements shown in Table 3.1-1 will be impacted by the proposed action.

3.1 Critical and Non-Critical Resource Elements

Table 3.1-1 lists resource elements considered in this EA. Table 3.1-1 identifies which are critical elements (elements that must be either discussed or a no-impact declaration made), which are non-critical elements, and which elements may be affected by this action. Designation as “No” under the Potentially Affected column is considered a “no-impact” declaration for that element.

Elements indicated as not potentially affected in Table 3.1-1 have not been identified in or near the project area, or are not affected by the Proposed Action or alternatives. They are not addressed further in this EA.

Critical Element	Potentially Affected		Non-Critical Element	Potentially Affected	
	Yes	No		Yes	No
Air Quality	X		Cadastral Survey		X
Areas of Critical Environmental Concern (ACEC)		X	Forest Management		X
Cultural Resources	X		Fire		X
Environmental Justice		X	Geology and Minerals	X	
Floodplains	X		Health and Safety	X	
Invasive Non-Native Species	X		Hydrology/Water rights	X	
Migratory Birds	X		Lands and Rights-of-way	X	
Native Am. Religious Concerns	X		Law Enforcement		X
Prime and Unique Farmlands		X	Noise	X	
Threatened, Endangered, & Sensitive Species (TE&S)	X		Paleontology	X	
Wastes, Hazardous or Solid	X		Rangeland Management	X	
Water Quality (Surface and Ground)	X		Recreation	X	
Wetlands		X	Socioeconomic Values	X	
Wild and Scenic Rivers		X	Soils	X	
Wilderness		X	Sensitive Species	X	
			Vegetation	X	
			Visual Resources	X	
			Wildlife, Aquatic & Terrestrial	X	

3.2 No Action Alternative

Unless specifically identified in the following sections, the No Action Alternative would have no impact on any resource element.

3.3 Resources Potentially Affected and Relevant Impacts

Impact mitigation measures include COA's (Appendix B) and APD measures included in the Surface Use Plan of the APD. This analysis assumes successful application of all mitigation measures.

The potential impact is defined as any change or alteration in the existing condition of the environment related to implementation of the alternative, either directly or indirectly. Impacts can be beneficial to the resource (positive) or adverse (negative), and can be either long-term (more than 5 years) or short-term (incidental, temporary). Short-term impacts may be disruptive and obvious but they affect the environment for only a limited time, and the environment generally reverts to the pre-project condition. Long-term impacts can range from "low" to "significant" impacts levels (see below) and can sometimes result in permanent alterations to the pre-project environment. With long-term impacts, the environment would potentially not revert to pre-existing conditions during the lifetime of the proposed project and beyond. Long-term impacts are defined as those impacts whose results endure more than five years. For the purpose of this EA, potential impacts have been divided into four categories:

Significant - as defined in CEQ guidelines (40 CFR 1500-1508) are impacts that are substantial in severity and therefore should receive the greatest attention in decision-making;

Moderate - impacts which cause a degree of change that is easy to detect but do not meet the criteria for significant impacts;

Low - impacts which cannot be easily detected and cause little change in the existing environment;

None or Negligible – no increased impact would occur to this element under the identified alternative

3.4 Critical Elements

3.4.1 Air Quality

Affected Environment The project site is within the West Slope Colorado Air Quality Control Region, where the primary sources of air pollutants are unpaved roads and streets, seasonal sanding for winter travel, motor vehicles, and wood-burning stove emissions. The 1972 Clean Air Act, as amended, regulates national ambient air quality standards (NAAQS) to control air pollution. The Colorado Department of Public Health and Environment, Air Quality Division regulates air-quality impacts from oil and gas activities and develops mitigation measures on a case-by-case basis. Impacts are evaluated to see if they are allowable or unacceptable. Natural gas and associated fluids are produced from the wells. Produced natural gas is metered prior to entering pipelines that transport gas to central processing and compression facilities. Air emissions associated with natural gas production include hydrocarbons, carbon monoxide (CO) and nitrogen oxides (NO_x) associated with production equipment vents (separators), compressor plants, and production equipment (pump-jacks), and vehicle exhaust.

Environmental Consequences Air-quality impacts associated with natural gas wells derive from several sources:

- Suspended particulates (dust) during construction and from vehicular traffic on unpaved roads;

- Suspended particulates (dust) from wind erosion on bare construction areas;
- Hydrocarbon emissions from service vehicles (primarily pickup trucks and vans of 1-ton capacity, or less), and operation of gasoline and diesel engines (i.e. drill rigs, heavy equipment related to drilling and construction, generators, pumps, and pump-jacks).
- Venting gas during well completion and development activities or work-over activities.

Impacts from the proposed project, primarily from vehicle exhaust and increased fugitive dust during construction, will be low and short-term. During production, the impacts would be negligible and long-term, resulting from a daily inspection visit (one pickup truck) by well maintenance personnel.

Gas production from the well pads may also result in localized reductions in air quality due to odors and emissions from the well pad sites. Wind dispersion and dilution will reduce these impacts, and the impacts are considered negligible beyond the well site boundaries.

Table 3.2-3 summarizes typical impacts and mitigation measures for air quality.

Table 3.2-3 Typical Air Quality Impacts and Mitigation		
Impacts – Construction	Mitigation	Effectiveness
Heavy equipment exhaust	None	
Dust from traffic	Water roads and pad	Can suppress dust effectively
Light vehicle exhaust	None	Emissions meet EPA requirements
Flaring	None	Flares meet API guidance
Impacts – Operation	Mitigation	Effectiveness
Exhaust from pump motors	None	
Fugitive emissions at well	Inspections and maintenance	Regular maintenance of valves and fittings is very effective at reducing fugitive emissions.

Mitigation The following measures would minimize air quality impacts:

- Reclamation requirements will reduce the impacts of dust created from wind erosion (Reclamation COA’s 5-10).
- Suspended dust will be reduced through sprinkling of disturbed areas during construction. (Construction and Drilling COA’s 10 & 11).
- Operators are required to be in compliance with the Colorado Department of Public Health and Environment (CDPHE) standards for gas emissions.

3.4.2 Cultural Resources and Native American Religious Concerns

Affected Environment Human groups have inhabited the area for the past 10,000 to 12,000 years. They are characterized as Paleo-Indian hunters of big game; Archaic small game hunters and gatherers; and Formative, sedentary agriculturalists and prehistoric hunters and gatherers.

La Plata Archaeological Consultants performed Class III (intensive) archaeological surveys of the proposed well pad locations, and access roads (Fuller, 2004 and Hovezak, 2004a & b). No eligible sites were found during the Cultural Resource Surveys of the well pads and access roads. According to the Cultural Resource reports for the three well locations, the following findings were made:

North Mail Trail #5 – Four isolated finds were located and recorded. They include an isolated flake, two small scatters of flaked lithic and ceramic artifacts, and one isolated white ware bowl sherd. All four isolated finds are ineligible for nomination to the National Register of Historic Places.

North Mail Trail #6 – One historic artifact scatter and one isolated find consisting of four pieces of flaked lithic material were located and recorded. The site and the isolated find are ineligible for nomination to the National Register of Historic Places.

Cannonball Unit #1-18 – One previously recorded site consisting of a lithic scatter was located and re-recorded. This site is ineligible for nomination to the National Register of Historic Places.

No traditional cultural properties, sacred sites, or traditional use areas were identified. Native Americans are being consulted through the request for comments on this environmental assessment. Comments and suggestions will be considered by the decision making official prior to preparation of the Finding of No Significant impact and signing of the Decision Record. A list of the Native American tribes and pueblos being consulted is provided in the Consultation and Coordination section of this document.

Environmental Consequences Based on the findings of the cultural resource survey and the relevant mitigation measures (COA's) attached as Appendix B to this EA, no primary impacts to cultural resources are anticipated. However, increases in vehicle access into areas previously inaccessible or with limited access have been known to cause secondary impacts to sites adjacent to these access roads or visible from them. The impacts are primarily from surface collection, but looting and vandalism also occur. Because the primary access road into the area has been established for many years, there should not be much increased traffic except for oil and gas-related traffic. Increased access by project personnel and the new access routes into the well pads could result in secondary impacts to sites located within, or in the immediate vicinity of these facilities. However, no eligible or highly visible resources were located during the cultural resource surveys for these areas. "Tailgate briefings" provided to all crew members and subcontractors by the monitoring archaeologist can provide the education necessary to prevent project personnel from collecting or disturbing sites near the project area.

Mitigation Education of project personnel as to the significance and sensitivity of the resource, and construction monitoring in identified areas will be components of successful site protection from direct and indirect impacts. Measures to minimize impacts include:

- A permitted archaeologist will be on site during initial clearing and topsoil removal operations in the vicinity of all well pads, access roads, to monitor for subsurface cultural resources (Construction & Drilling COA #2, Appendix B).
- If previously unidentified surface or subsurface cultural resources are discovered during construction, activity in the vicinity of the resource will cease, the resource will be protected, and the Authorized Officer with the BLM will be notified immediately. The operator shall take any additional measures requested by the BLM to protect the resources until they can be evaluated and treated. The discovered resources would be evaluated by a permitted archaeologist. The permitted archaeologist, in consultation with the BLM archaeologist, would make a determination of the nature and significance of the discoveries, and would determine the appropriate method of treatment for them. Avoidance of the resources by project re-design would be the preferable treatment. However, if the resources could not be avoided, then the appropriate treatment method would be determined, and a permitted archaeologist would prepare any and all necessary treatment plans. These plans would be reviewed by, and approved by the BLM. Treatment activities would be conducted after all necessary consultations had been completed as required by Section 106 of the National Historic Preservation Act, the Native American Graves Protection

and Repatriation Act, and the Archaeological Resources Protection Act. The BLM would be responsible for conducting all necessary consultations. Construction within the area of the discovered resources would be allowed to proceed after the appropriate treatments had been completed (Construction & Drilling COA #2, Appendix B).

- Pursuant to 43 CFR 10.4, the holder of this authorization must notify the BLM Authorized Officer, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, the operator must stop activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the authorized officer (Construction & Drilling COA #2, Appendix B).
- All employees of the operator and any subcontractors must be informed by the operator before commencement of operations that any disturbance to, defacement of, or collection or removal of archaeological, historic, or sacred material will not be permitted. Violation of the laws that protect these resources will be treated as law enforcement/administrative issues (Construction & Drilling COA #2, Appendix B).
- Disclosure or release of information regarding the nature and location of archaeological, historic, or sacred sites without written approval of the Bureau of Land Management is prohibited under provisions of the Archaeological Resources Protection Act. Cultural resource permittees of the Bureau of Land Management are allowed to use this information during the course of the project for site protection purposes only. Unauthorized use or distribution of this information (which includes location information present in cultural reports) is considered a violation of Federal statute (Construction & Drilling COA #2, Appendix B).

3.4.3 Hazardous and Solid Wastes; Health and Safety

Affected Environment EOG Resources maintains a file, per 29 CFR 1910.1200(g), containing current Material Safety Data Sheets (MSDS) for all chemicals, compounds, and/or substances which are utilized during the course of construction, drilling, completion and production operations for this project. Hazardous materials which may be found at the site include drilling mud and cementing products, which are primarily inhalation hazards, fuels (flammable and/or combustible), materials that may be necessary for well completion and stimulation activities such as: flammable or combustible substances, acids/gels (corrosives), and proprietary treating chemicals.

All hazardous substances and commercial preparations will be handled in an appropriate manner to minimize the potential for leaks or spills to the environment. Any spills or releases will be cleaned up and disposed of in accordance with State and Federal regulations. Human solid and liquid wastes will be generated primarily during the construction and drilling phases of the project, will be contained within portable facilities at the site and disposed of at an approved facility.

Environmental Consequences The impact of the proposed action on exposure to hazardous or solid wastes would be low to moderate and short-term during construction and low and long-term during production operations.

Natural gas production equipment operates under high pressures that can cause failed components to become hazardous flying objects in the case of a sudden rupture or failure. High-pressure leaks could also result in an injection hazard to unprotected skin.

Production fluids may contain low concentrations of potentially hazardous substances but consist mainly of brackish water. After the well has produced for several months, the produced water contains only naturally-occurring ions such as sodium, chlorine, and bicarbonate. Hazards include ingestion, eye contact, or skin contact. However, exposure to the produced water is not lethal due to the non-toxic nature

of the produced water, and reactions stemming from contact would be temporary.

Mitigation Signs will be posted that identify potential hazards associated with the operation, and Material Safety Data Sheets will be maintained for all chemicals and substances used on site. Equipment operators will be required to wear appropriate personal protective equipment to minimize exposure to these hazards.

- A 1-foot earth berm will be constructed around the perimeter of the well site (Construction & Drilling COA #4).
- Tank and tank battery berms are required (Production COA #6).
- Prompt clean-up of accidental spills is required. (Construction & Drilling COA #12).

3.4.4 Minerals and Geology

Affected Environment The well will be spudded into the Jurassic-age Morrison Formation at the surface.

Environmental Consequences The proposed action, assuming producing wells are obtained, would result in the production of natural gas and/or oil from some combination of one or all of the potential production formations. Under the No Action Alternative, the natural gas or oil located in these formations (if any) would not be recovered via the proposed wells and made available to regional and national markets.

Mitigation None

3.4.5 Noise

Affected Environment Under existing conditions, there is minor oil & gas-related noise in the vicinity of this well site. The noise from pump-jacks on the north end of Mail Trial Mesa can be heard if atmospheric conditions are such where sound travels well. Traffic along County Road G is the principle existing noise source in the area. This traffic noise can easily be heard from the North Mail Trail #5 well site, but it is not noticeable at the other two well sites covered in this action.

Noise levels in the vicinity of the well sites and along the access roads will increase during site construction, drilling, testing of the proposed wells. This noise will likely be generated by the increased traffic to the sites and from the construction and drilling equipment on site. Drilling activities are conducted 24-hours per day, seven days per week until the well is completed. It will take four to five weeks to construct each well pad and drill and test each well. According to the surface use plan in the APD, likely production facilities at these wells will be: two 400-barrel oil tanks, one 400-barrel production-water tank, a pump-jack, a three-phase separator, and a meter run. If the wells go to production, there will most likely be some noise associated with the pump-jacks and the separators. The separators are relatively quiet and the sound rarely carries much beyond the immediate vicinity of the well pad. The pump-jacks, on the other hand, are powered by a one- or two-cylinder engine that can be heard for considerable distances if not muffled sufficiently.

Environmental Consequences An increase in noise, similar to that associated with drilling of typical wells of this depth will occur during the construction, drilling, and testing phase of the operation. Duration of this phase is projected to be four to five weeks and impacts from the associated noise would be moderate and short term. Production facilities will generate noise levels that will carry depending upon variations in weather conditions including temperature, wind and humidity and the general topography of the area. This noise will be mitigated as needed as per the mitigations measures below and in Appendix B.

Mitigation

- Hospital-type mufflers will be required on all equipment used at the site, regardless of the phase of the operation (Production COA #2).
- If, during any phase of the operation, noise becomes a nuisance, adequate muffling techniques will be required (Production COA #2).

3.4.6 Paleontology

Affected Environment The three well pads and access roads in this proposed action are located on the Morrison Formation which is mainly known for its deposits of dinosaur fossils and is classed as a “number 1 formation” for vertebrate fossil finds. Although no fossils were found during the on-site field inspections or during the cultural inventories, it is possible that fossils are present in the subsurface.

Environmental Consequences It is possible that vertebrate fossils are present in the subsurface at the well-pad or access-road locations. Mitigation measures are as shown below.

Mitigation

- If subsurface paleontological resources are unearthed during operations, activity in the vicinity of the resource will cease and a BLM representative (Laura Kochanski, (970) 882-5614, or Lucas Vargo (970) 882-6845) will be notified immediately. The BLM archaeologist will notify the state paleontologist (Construction and Drilling COA #14).
- The operator shall inform all persons associated with the project that they will be subject to prosecution for knowingly disturbing Native American shrines, historic and prehistoric archaeology sites, or for collecting artifacts of any kind (Construction & Drilling COA #2).

3.4.7 Rangeland Management

Affected Environment The North Mail Trail #5 and Cannonball Unit #1-18 well sites are both located within the Flodine Park (#08066) grazing allotment which is currently permitted to Wesley Wallace. The allotment is permitted for 143 head of cattle or 600 Animal Unit Months (AUMs). An AUM is the amount of forage needed to sustain a cow and calf for a period of one month. The period of grazing use authorized for this allotment is from December 14th through May 31st annually.

The North Mail Trail #6 is located within the Hamilton (#08035) grazing allotment which is permitted to Steve, Tim, and Jay Wallace. The allotment is permitted for 107 cattle or 600 AUMs. The period of grazing use authorized for this allotment is also from December 14th through May 31st annually.

Environmental Consequences

Initial impacts from construction activities related to the proposed wells and the associated facilities would disturb an estimated 9.36 acres of rangeland on BLM land. If these wells are not producers, all of the 9.36 acres at the well sites and access roads will be fully reclaimed as specified by BLM. If any of the wells are producers, the well-pad sites will be reduced in size to the minimum size needed to accommodate the production and maintenance equipment and the rest of the site will be reclaimed as specified by BLM (Reclamation COA’s 1-10). The amount of forage for livestock that will be temporarily lost due to implementation of these projects is insignificant.

The access road to the North Mail Trail #6 well site crosses a fence. The fence will need to be cut and a gate and cattle guard, if appropriate, will be installed. Fence improvements should be made according to the fencing specifications in Appendix C

Mitigation

- If any of the wells are not producers, all of the appropriate well site and access road will be fully reclaimed as specified by BLM (Reclamation COA's 1 - 10).
- If any of the wells are producers, the appropriate well-pad sites will be reduced in size to the minimum size needed to accommodate the production and maintenance equipment and the rest of the site will be reclaimed as specified BLM (Reclamation COA #9)
- Any disturbed and reclaimed areas will be reseeded with the seed mix specified in Table B-1 of Reclamation COA #5 of Appendix B.
- Weeds will be treated as necessary at all disturbed areas until successful reclamation, as specified in Reclamation COA's 2, 3, and 5-10 of Appendix B, is achieved.

3.4.8 Recreation and Visual Resources

Affected Environment County Road G provides the only paved access through the area and is used for access to recreation areas in the Four Corners Region and by tourists, industry, and local commuting between Colorado and Utah. BLM Road 4524 provides access to Rincon Canyon, Hamilton Mesa, and vicinity. The road is used by local ranchers, grazing-permit holders, and for recreation in the Monument. The area is not heavily used for recreation.

The proposed project is within a VRM Class III area (BLM 1984). The VRM III objective is to partially retain the existing character of the landscape. Changes in the landscape character can be moderate; activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features.

If any of the wells are producers, the visual resources of the land within the immediate vicinity of each producing well would be altered for the life of the wells by the proposed action. The project area occurs within the boundaries of the Monument; therefore impacts to visual resources may be more significant because of the public's attention to the area. During construction activities, machinery emissions, dust, disturbed ground, drilling and construction equipment, and pipe staging in the project area would result in moderate and short-term, visual impacts. These impacts would be low to moderate and long-term. Individually, the drilling and production facilities at each well site would cause the following visual impacts.

North Mail Trail #5 – This well site will be obviously visible From County Road G (CR G). The height of the drilling rig will make it visible for some distance along the road – possibly as much as four miles or more – from the west in Utah and the east along CR G. The rig will also be visible from various points on Cannonball Mesa, Hamilton Mesa, and Mail Trail Mesa including lands in the Monument and some private lands. Cannonball Mesa is in a Class 2 visual resource inventory area, while Hamilton and Mail Trial Mesas are both in Class 4 visual resource inventory areas. The production facilities at the same well would also be visible from CR G, but the impacts would be mitigated through the conditions of approval discussed below, and in Appendix B.

North Mail Trail #6 – This well site is tucked back in a box canyon on the south side of Hamilton Mesa and will not be visible from many points in the immediate vicinity. The production facilities should not be visible even from BLM Road 4524. The site will be visible from the southern edge of Hamilton Mesa

in the immediate vicinity, possibly from strategic vantage points on the northern end of Mail Trail Mesa, and from aircraft.

Cannonball Unit #1-18 – As with the #5 well, this well site is tucked well back from any public roads and is behind a low ridge that will hide it from view except for from some vantage points in the immediate vicinity. The drill rig will be tall enough to be visible from BLM Road 4524, but the production facilities will be mostly hidden. The site will be visible from some vantage points on the southern edge of Hamilton Mesa in the immediate vicinity, probably from strategic vantage points on the northern end of Mail Trail Mesa, and from aircraft.

Environmental Consequences As described above, North Mail Trail #5 will be easily visible from County Road G. Production facilities at North Mail Trail #6 and Cannonball Unit 1-18 will not be visible from any public roads. And will only be visible from vantage points in the immediate vicinity and from aircraft. Mitigation measures described below and in Appendix B will further reduce visual impacts from these wells.

Mitigation Not much can be done about the short-term visual impacts created by the drilling and completion rigs. However, as mentioned above, that impact is short term (four to five weeks, initially, and then very occasionally for well maintenance). If these wells prove to be a producers, visual impacts will be mitigated by painting all permanent structures (on site for six months or longer) a flat, non-reflective, earth-tone color which will be Carlsbad Canyon (from the list of 10 standard environmental colors designated by the Rocky Mountain Regional Coordinating Committee) as specified in Production COA #1 of Appendix B. Also, disturbed areas at the well pad will be re-contoured to blend as nearly as possible with the natural topography (Reclamation COA #5, Appendix B)

3.4.9 Socioeconomics

Affected Environment Oil and gas development in the San Juan Basin makes the industry a large employer in southwestern Colorado. The State of Colorado, Montezuma County, and the Federal government collect revenues from mineral development royalties in the project area. These revenues fluctuate with volumes generated, weather, world affairs, market prices for oil and natural gas, and other variables.

Temporary jobs would be generated by construction of the proposed action. Restaurants and other service businesses in the vicinity may benefit in the short-term from the presence (purchasing) of work crews in the project area.

Environmental Consequences The proposed action would further add to local economic diversity and would provide additional local expenditures in the trade and service sectors. One-half of the royalties received by Federal government from oil and gas production at these wells would be disbursed to the State of Colorado and a portion of that would be disbursed to jurisdictions within Montezuma County.

The No Action Alternative would mean no opportunity for revenue distribution to the Federal, State, and County governments, and forgoing local expenditures by the oil and gas operators. Another economic consequence of the no-action alternative would be to forgo the possible energy reserves that might be obtained from this well. The no-action alternative would also mean that there would be no development in this area of the Monument.

Mitigation None

3.4.10 Soils

Affected Environment Soils in the project area are derived from sandstone and shale parent materials associated with the Dakota Sandstone, Burro Canyon Formation, and Morrison Formation. The soils at each well site are as follows.

North Mail Trail #5 - Soils are somewhat sandy with a substantial amount of shale and fragmented sandstone (-2 inches). They are deep and well-drained with slow permeability. Hazard of water and wind erosion are moderate (Ramsey, 1977).

North Mail Trail #6 - Soils are sandstone derived sandy clay loam. They are very deep and well-drained with moderate permeability. Hazard of water and wind erosion is moderate (Ramsey, 1977).

Cannonball Unit #1-18 - Soils are sandy loam, derived from sandstone and shale. They are very deep and well drained with moderately slow permeability. Hazard of water erosion is slight, hazard of wind erosion is moderate (Ramsey, 1977).

Environmental Consequences In many places, the soils at these sites and along the access roads contain expansive clays that become slippery and sticky when wet. Unimproved roads over these soils are nearly impassible when wet. Drivers who attempt to negotiate wet roads and trails can cause extensive damage characterized mostly by deep, sinuous ruts.

Mitigation

- Vehicles shall be restricted to the well pads, and access roads. (Construction & Drilling COA #10 and Production COA #8).
- No fill will be allowed in ephemeral drainages (Construction & Drilling COA #6).
- All road design and construction standards specified in the BLM Gold Book will be implemented, unless specifically exempted by the Authorized Officer (Production COA #8).

3.4.11 Migratory Birds

The Migratory Bird Treaty Act provides oversight for the taking of native birds. Concern would be in regard to disturbance and destruction of nesting birds. The Birds of Conservation Concern (U.S. Fish and Wildlife Service 2002) which may be in this project's vicinity are: gray vireo, western burrowing owl, and ferruginous hawk. Birds within the project area are typical of those associated with shrubsteppe habitats. According to Brock et al. (1993), the most important shrubsteppe neotropical migrant birds are horned lark, sage thrasher, Brewer's sparrow, vesper sparrow, and western meadowlark, all of which are ground nesting birds. The sage thrasher and Brewer's sparrow are more linked to sagebrush communities and have not been located during casual bird counts (Leslie Stewart and Cliff Stewart pers. comm). Other neotropical birds that have been noted in the vicinity include the uncommon black-throated sparrow, gray flycatcher and gray vireo; and the more common Bewick's wren, black-throated gray warbler, blue bird, Say's phoebe, and ash-throated flycatcher. Birds in this environment are primarily influenced by extreme and irregular fluctuations in precipitation and ecosystem productivity. As a result, they are highly opportunistic and ecologically adaptable (Brock et al. 1993).

This project would occur prior to nesting season and would not result in the destruction or disturbance of nesting birds. There would be no impact to migratory birds.

3.4.12 *Special-Status Species*

3.4.12.1 *Threatened and Endangered Species*

Affected Environment The Project Area falls within the overall range of several listed Threatened or Endangered Species. The Project Area does not provide suitable habitat for the following listed species: Mexican spotted owl, black-foot ferret, or Canada lynx. Bald eagles are occasionally seen foraging along McElmo Creek during the winter but are not known to nest within the vicinity of the project so there should be no effect on bald eagle. The black-footed ferret's historic distribution included southwest Colorado but there are no known ferrets currently occupying this area (Fitzgerald et al. 1994).

Habitat has been identified in McElmo Creek as suitable and potential habitat for the threatened southwestern willow flycatcher habitat and surveys have been conducted in areas of both creeks. (Bob Ball, pers. comm). There is no suitable habitat for the willow flycatcher associated with these proposed well pad locations.

Since no water depletions would occur, there would be no effect to listed San Juan River drainage fishes.

Three candidate species may occur in this area: yellow-billed cuckoo, Gunnison sage grouse, and the boreal toad. The yellow-billed cuckoo and boreal toad are rare and not likely to be found in this ecosystem. There is no suitable habitat for these species within the project area. The project area falls within the historic range of the Gunnison sage grouse. No grouse are known to occur and no suitable habitat is within the project area.

The ferruginous hawk, a BLM-listed sensitive species, is uncommon to fairly common during the winter in southwest Colorado (Andrews and Righter 1992). Foraging birds may be disturbed by this project if it occurs during the winter months.

The longnose leopard lizard is on the State Director's Sensitive Species List but was incorrectly omitted from the San Juan Resource Area. Until the list is corrected, it is being considered sensitive for this Resource Area. It was identified in the CANM proclamation. This lizard is known to occur in southwest Colorado and was observed near the Project Area on Hamilton Mesa (Leslie Stewart, pers. comm). Habitat for the leopard lizard is flat or gently sloping shrublands with a large percentage of open ground. They frequently use rodent burrows. During field reconnaissance for this project, no suitable habitat was observed and rodent burrows were not noted. Hammerson (1999) describes other habitat associations in southwest Colorado including areas along the Dolores River where leopard lizards inhabit areas with sandy-rocky soils and scattered sagebrush, junipers, and skunk brush in canyon bottoms. Other habitats within Montezuma County include mesa tops above canyons. These habitats are found within the project area, mostly north of Rincon Canyon.

The desert spiny lizard is also on the State Director's Sensitive Species List, and is listed in the CANM proclamation. The primary period of activity is from May to September with some activity in April and October, during warm weather (Hammerson 1999). Habitat includes shrub-covered dirt banks and sparsely vegetated rocky areas near flowing streams or arroyos (Hammerson 1999). This type of habitat was not observed during field reconnaissance. It is unlikely this lizard occurs in the vicinity of this proposed action.

The Mesa Verde night snake is not on the State Director's Sensitive Species List and may be found adjacent to the Project Area. This snake inhabits landscapes (rocky slopes and canyons) that are generally not suitable for extensive development (Hammerson 1999). According to Hammerson (1999), the habitat

for this snake is largely intact and not threatened, and the distribution of this snake in western Colorado is probably more extensive than is now known.

Because no riparian vegetation would be removed, the BLM has determined that the Proposed Action or the alternatives would have no effect on the southwestern willow flycatcher. No consultation would be required with the U.S. Fish and Wildlife Service.

Environmental Consequences Wildlife in the area could be affected by increased noise, human activity and habitat fragmentation. These impacts are expected to be low and short-term. The duration of construction activities at each well would be 4-5 weeks for the drilling and testing of the well. Some small-burrowing animals and reptiles may be killed or displaced during blading and trenching of the proposed well pad and access road.

Mitigation Measures

- Vehicles shall be confined to the work area (Construction & Drilling COA #10).
- Removal of vegetation will be mitigated through the implementation of the reclamation conditions of approval measures (Reclamation COA's 2, 3, and 5, -10).
- Reserve pits shall be either closed and reclaimed or fenced and bird-netted when the drilling rig is not on location (Construction & Drilling COA #4, Production COA #5, and Reclamation COA #4).

3.4.13 Vegetation and Invasive Non-native Species

Affected Environment The proposed wells are located in the Canyons of the Ancients National Monument, south of Mc Elmo Creek in the Rincon Canyon area. Elevation of all the wells is approximately 5000'. They are all located in relatively flat areas in the shadscale community vegetation type. Utah juniper (*Sabina osteosperma*) are scattered on slopes of the Dakota sandstone-capped mesas above the well pads. Vegetation of the project areas and surrounding lands has been severely impacted by grazing.

North Mail Trail #5 - This proposed well is located on soils derived from sandstone and Morrison Shale formation. Soils are somewhat sandy with a substantial amount of shale and fragmented sandstone -2 inches. They are deep and well-drained with slow permeability. Hazard of water and wind erosion are moderate. Vegetation is dominated by galleta grass (*Hilaria jamesii*) and shadscale (*Atriplex confertifolia*). Four-wing saltbush (*Atriplex canescens*), six-weeks fescue (*Vulpia octiflora*), broom snakeweed (*Gutierrezia sarothrae*), alkali sacaton (*Sporobolus airoides*), greasewood (*Sarcobatus vermiculatus*), hornhead (*Ceratocephalus orthocerus*), plantain (*Plantago sp.*), filaree (*Erodium cicutarium*) and cheatgrass (*Anisantha tectorum*) are also present.

Minor microbiotic crust development is present, mostly cyanobacteria and moss.

A shallow drainage runs to the west and north of the proposed pad and access road along the toe of two mesas.

North Mail Trail #6 - Soils are sandstone derived sandy clay loam. They are very deep and well-drained with moderate permeability. Hazard of water and wind erosion is moderate. Vegetation is similar to that of North Mail Trail #5. Cheatgrass, filaree, hornhead, plantain and alkali sacaton are more prevalent here. A shallow wash runs through the project area. Rubber rabbitbrush (*Chrysothamnus nauseosus*) occurs in the wash. An existing two-track is utilized for most of the

proposed access road. This two-track crosses the wash several times to reach the pad. Russian-thistle (*Salsola australis*) is scattered along this two-track.

Cannonball Unit #1-18 - Soils are sandy loam, derived from sandstone and shale. They are very deep and well drained with moderately slow permeability. Hazard of water erosion is slight; hazard of wind erosion is moderate. Vegetation is most severely impacted by grazing on this site. It is dominated by filaree and hornhead with frequent patches of cheatgrass. Shadscale, galleta grass, greasewood and alkali sacaton are sparse. There are two patches of wolfberry (*Lycium pallidum*) in the project area. One is located within the area where the hydrologist suggested moving the proposed pad. This patch is in poor shape.

A stock pond is located where the proposed access road takes off from the established road. At the time of my site visit, it was very full and almost flowing onto the road. There is a very dense patch of tall Russian-thistle surrounding the pond. The Russian-thistle was still green at the time of my site visit.

Environmental Consequences Constructing the proposed pads and access roads will involve ground disturbance ranging from 2.5 to 3.8 acres for each well, plus increased vehicle traffic during all phases of the project. These activities are known to promote the establishment and spread of invasive weeds. Invasive weeds can negatively alter the integrity of native plant communities and wildlife habitat. Ultimately these changes can result in losses of biodiversity, rare species, forage value and soil stability, changes in fire regime, and other important ecosystem attributes. Executive Order 13112 states that all federal agencies must prevent the spread of invasive species.

North Mail Trail #6 - The proposed access road crosses the wash two times. This situation further increases the likelihood of establishing and spreading invasive weeds. Weeds are often dispersed by vehicle traffic, and weed propagules (seeds and vegetative parts that may sprout) can take advantage of increased soil moisture in and around the wash to establish and thrive. Weed infestations can then be spread downstream by intermittent above-ground water flow in the wash.

Cannonball 1-18 - The Russian-thistle infestation surrounding the stock pond is likely to be spread due to increased vehicle traffic.

Mitigation Executive Order 13112 states that all federal agencies must prevent the spread of invasive species. To this end the following mitigation measures are planned for this well site and the access road.

- The Russian-thistle infestation surrounding the stock pond near the take-off point for the access point for the road to Cannonball Unit #1-18 should be treated before increased construction-vehicle traffic begins (Construction & Drilling COA #17).
- Stripped topsoil and vegetation shall be stockpiled for subsequent reclamation (Construction & Drilling COA #8).
- Reclamation requirements, including seeding of native species, would mitigate vegetation impacts (Reclamation COA's 2, 3, and 5-10).
- Monitoring for noxious weeds and appropriate treatment and controls are required (Reclamation COA #3 and Production COA #3).
- When the site is reclaimed the stockpiled slash and vegetation will be spread across the site to provide microsites for seeded species (Reclamation COA #7 and Construction & Drilling COA #8)
- Seeding with the designated seed mix will occur as many times as necessary to establish the vegetation successfully (Reclamation COA's 5 - 10).

- Heavy equipment shall be pressure washed at an offsite location prior to entering the site to remove mud and noxious weed seeds (Construction & Drilling COA #7).

3.4.14 Water Quality - Surface Water and Ground Water

3.4.14.1 Surface Water

Affected Environment Primary surface-water resource in the vicinity of the project area includes Mc Elmo Creek located about 850 feet north of the proposed North Mail Trail #5 site. The proposed #5 well pad is located between two small ephemeral drainages that join into a single, unnamed, tributary drainage to Mc Elmo Creek about 200 feet north of the site. The access road into the pad will require one low water crossing.

The proposed well site for North Mail Trail #6 is located on a relatively flat area between two unnamed ephemeral drainages that receive their runoff from the small box-canyon watershed in which the well site is to be located. One of these drainages is located about 200 feet south of the well pad and the other is about 25 feet west of the well pad. Overland flow from higher ground northeast of the well pad will be routed around the well pad. The proposed #6 well pad site is located about 2200 feet from the ephemeral wash in Rincon Canyon and from there about 3 miles west along Rincon Canyon wash to its confluence, in Utah, with Mc Elmo Creek. The access road into the pad will require culverts at three 3 crossings.

The proposed well site for Cannonball Unit #1-18 is located about one mile southeast of the upper reaches of the ephemeral wash in Rincon Canyon. The small shallow drainage in the immediate vicinity of the well pad will have to be temporarily rerouted around the pad. Mc Elmo Creek is about 5.5 miles west, of the #1-18 well pad, via Rincon Canyon wash. The access road into the pad will require 2 low water crossings.

No wetlands, riparian zones, or perennial water resources exist within the project area. However, BLM Road 4524, the access road to all three well sites, crosses Mc Elmo Creek, a perennial stream. The hydrologic regimes in the vicinity of all of the wells are such that surface water flows only on an intermittent basis in conjunction with significant precipitation events.

BLM Road 4524, the primary access road, crosses nine ephemeral drainages to access the three well sites. As shown on Figure 2 of Appendix A, eight of these crossings will be low-water crossings and one will require a culvert. Most of the crossings will require some improvements to insure safe crossings by the numerous drilling, construction and production vehicles.

Environmental Consequences Impacts on surface water may occur as a result of disturbed soils eroding by wind and/or water into nearby ephemeral washes as a result of surface disturbance. The impact is increased sediment delivery to ephemeral streams in close proximity to the well pads and in the event of a large precipitation event in which the ephemeral streams discharge into Mc Elmo Creek, suspended sediments in Mc Elmo Creek will increase slightly above natural conditions. These impacts are low and short-term. The actual effects on surface-water quality depend on the proximity of the pads and support facilities to surface water, and on the best management practices used for pollution control. Absence of surface waters near the well pads reduces the potential for surface-water quality impacts at those sites. Given the mitigation measures listed below and in Appendix B, runoff from the project wells would be localized and not likely to affect surface waters.

Crossing Mc Elmo Creek at the ford on BLM Road 4524 presents a spill hazard to surface-water quality and the riparian zone. The Corp of Engineers has jurisdiction over crossings of perennial streams and

they indicated (Kara Hellige, personal communication) that an individual permit was not necessary for the purposes of this project. The action is covered by the Nation-wide Permit Number 14.

On-going production traffic and short-term drilling traffic present potential spill hazards at the Mc Elmo Creek ford crossing and at the various low-water crossing along BLM Road 4524. Due to constantly changing weather and stream-flow rates, to varying road conditions at crossing approaches, and direct contact by vehicles with water in the stream, ford crossings are inherently more prone to surface-water quality contamination than bridge crossings. Crossing through flowing water will tend to wash dust, grease, road dirt, oil, and other potential contaminants off of vehicles as they make the crossing. These potential contaminants would be very similar to those that wash off of parking lots and contaminate surface waters. Also, the materials being transported by drilling and production equipment such as gasoline, diesel fuel, lubrication oil, bags of drilling mud and concrete, production water, produced oil, and other products could be spilled into the creek or drainages as crossings are made.

Mitigation

- The reclamation, construction & drilling, and production conditions of approval provide mitigation for surface water impacts (Construction & Drilling COA's 3, 4, & 6-11; Production COA's 4, 6, & 8; and Reclamation COA's 4, 5, & 11).
- Berms will be constructed at the perimeters of the well pads to prevent sediment from washing into nearby ephemeral drainages
- Low-water crossings and culverts, the locations of which are shown on Figure 2, Appendix A, will be built as per the standards specified in the "Gold Book" (BLM, 1989) (Construction & Drilling COA #15).
- The approaches to the ford crossing of Mc Elmo Creek, particularly on the south side, will be modified to make the approach grade less steep so that drilling equipment and support vehicles can make the crossing safely and with minimum chance of spills or lost equipment. The changes to the ford approaches will be made in such a way as to minimize introduction of sediment into the stream (Construction & Drilling COA #16).
- No modifications will be made to the bottom Mc Elmo Creek. If it is determined that the existing road base in the crossing is not adequate, the authorized BLM representative (Lucas Vargo 970-882-6845) will be notified 48-hours prior to any changes being made. Any significant changes to the road base in the ford crossing will likely require approval from the Corp of Engineers (Construction & Drilling COA #16).
- All vehicles will be inspected daily for leaks of oil, grease, transmission fluid, antifreeze, window-washer fluid, and the like. Any leaks on all vehicles must be repaired and cleaned prior to entering the project area (prior to crossing Mc Elmo Creek) (Construction & Drilling COA #16).
- The number of vehicles crossing Mc Elmo Creek will be minimized by using only the vehicles absolutely needed and carpooling personnel to the well sites (Construction & Drilling COA #16).
- Since the water level in McElmo Creek can change dramatically in a relatively short time period, a staff gage will be installed at the ford crossing. This gage will provide a reference point from which personnel can determine the relative depth of the creek and the relative safety of a crossing (Construction & Drilling COA #16).

3.4.14.2 Ground water

Affected Environment Water for domestic use in the area is generally obtained from individual wells tapped into ground-water aquifers of the Morrison Formation or Entrada Sandstone. Only two water

wells are known in the area, both at the Ismay Trading Post. These wells are 597 and 619 feet deep and obtain their water either from sandstone layers in the lower Morrison Formation or the Entrada Sandstone. Alluvium adjacent to Mc Elmo Creek has the potential to provide ground water to shallow wells. However, no wells completed in these deposits are known in the vicinity of the project area.

Environmental Consequences Ground-water impacts associated with oil and gas wells and related facilities include:

- Possible cross-contamination of aquifers across geologic strata due to improper sealing of aquifers encountered by the well bore.
- Possible contamination of shallow drinking water aquifers due to surface spills and accidental releases.
- Ground-water contamination could potentially occur as the result of improperly sealed surface casing, well bore stimulation activities, production, and abandonment activities.
- Shallow ground-water quality could be impacted by leakage of fluids from transfer and transporting of produced water.

Theoretically, shallow ground-water aquifers could be impacted in the long-term by surface oil and gas activities and accidental spills of toxic and/or hazardous materials. However, spills at the surface would be unlikely to affect ground-water supplies in the area because:

1. All three wells are located on Morrison Formation shale and mudstone which are poor water conductors and would provide natural protection to ground water.
2. The mitigation measures identified below and in Appendix B will provide adequate ground-water protection.

Given the above points and the mitigation measures listed in Appendix B, it is unlikely that a spill could migrate to ground water in the area. Therefore, the impacts from surface spills related to oil & gas would be low and short term.

Drilling and completion procedures outlined in the drilling plan of the APDs combined with the conditions of approval in Appendix B should provide sufficient protection of ground-water quality. BLM personnel will monitor all aspects of the drilling program for compliance with drilling and completion requirements. The potential impact on ground-water quality would be low and short-term during construction and low and long term during production operations.

Mitigation

- The reserve pit will be lined as specified in the conditions of approval (Appendix A) to contain drilling fluids and to prevent any contaminants from migrating into the surface formation or soils (Construction & Drilling COA # 3).
- Releases of hazardous substances or fuels during construction and operation will be contained and disposed in accordance with State and Federal regulations (Production COA #4). Personnel working at the site shall be informed of spill-control procedures in accordance with a written plan.
- Contamination of shallow ground water shall be prevented by placing surface casing to 330-foot depth as proposed in the APD drilling plans and cementing the annular space behind the casing to ground surface (APD Drilling Plan).
- A second string of nominal 5 1/2-inch casing will be set in the surface casing extending to the total well depth and cemented to the surface to prevent cross contamination (APD Drilling Plan). The production casing cementing will be completed as a staged cement job and a Cement Bond

Log will be run to confirm the integrity of the cement – especially across all known sandstone strata above the Chinle Formation (at an estimated depth range of 1, 450 to 1,750 feet).

3.4.15 Wildlife

Affected Environment There were no emphasis areas (e.g. critical or severe big game winter ranges) identified within the project area in the 1985 RMP. Resident deer can be found within and adjacent to the project area throughout the year. Wintering deer also utilize the area.

Several species of reptiles and amphibians are likely to be found within the project area including the bull snake, striped whipsnake, red-spotted toads, and collared lizards. Most are either highly mobile, have a large home range, or are likely to be found in riparian areas.

Mammals that may be within the vicinity of this project area include: red and gray fox, raccoon, desert shrew, possibly the Merriam 's shrew, black-tailed jackrabbit, desert and mountain cottontail, chipmunks, ground squirrels, prairie dogs, woodrats, several species of mice, and the ringtail (Fitzgerald et al. 1994). The condition of the grasses and forbs throughout the project area would affect the rodent, rabbit, and prairie dog populations, since these vegetation types are the forage base for these animals. Available forage is limited and in poor condition as evidenced by the results of the Land Health Assessment. Animals that utilize these vegetation types can illustrate extremes in numbers, fluctuating with available food resources and weather conditions. Rodents and rabbits, in turn, are prey for the carnivores likely to be found within the Monument. Numerous studies have illustrated the cause and effect relationship between healthy carnivore populations and availability of prey.

Environmental Consequences Wildlife in the area could be affected by increased noise, human activity and habitat fragmentation. These impacts are expected to be low and short-term. The duration of construction activities at each well would be 4-5 weeks for the drilling and testing of the well. Some small-burrowing animals and reptiles may be killed or displaced during blading and trenching of the proposed well pad and access road.

Mitigation Measures

- Vehicles shall be confined to the work area (Construction & Drilling COA #10).
- Removal of vegetation will be mitigated through the implementation of the reclamation conditions of approval measures (Reclamation COA's 2, 3, and 5, -10).
- Reserve pits shall be either closed and reclaimed or fenced and bird-netted when the drilling rig is not on location (Construction & Drilling COA #4, Production COA #5, and Reclamation COA #4).

3.4.16 Lands and Rights of Way

Affected Environment All three wells proposed as part of this project are located on lands administered by BLM and are within Canyons of the Ancients National Monument. BLM road 4524, the primary access road to the three well sites, crosses Mc Elmo Creek at a ford crossing. The Corp of Engineers has jurisdiction over crossings of perennial streams, but as mentioned in section 3.4.14.1, above, The Corp indicated that no permits are required for crossing McElmo Creek associated with this proposed action.

Moving North Mail Trail #6 to avoid surface drainage problems resulted in the surface location being off-lease by about 150 feet. Therefore, a right-of-way permit is included with this EA to allow EOG to spud

the well from an off-lease location and drill at a southerly-trending off-set angle so that production occurs from within the lease.

Other rights-of-way in the vicinity include: COC 58805, an oil/gas access road to Merrion O&G Corp for the Hamilton Mesa #1, and; COC 010306, a 345 KV Power Transmission line to PACIFICORP and Utah Power and Light.

Environmental Consequences No environmental consequences, beyond those already associated with this action, result from these right-of-way permits.

See the surface-water quality section (3.4.14.1), above, for a discussion of impacts related to the Mc Elmo Creek crossing.

Mitigation Measures None

3.4.17 Cumulative Impacts

Cumulative impacts are the environmental impacts that result from the proposed activity, added to the impacts from all other activities in the vicinity of the proposed project. For the purposes of this EA, the area considered for cumulative effects analysis is the area along the designated access road (BLM Rd 4524) as described herein, and the immediate vicinity of the well sites. In addition, EOG Resources has filed APDs for two other proposed oil and gas wells in the vicinity of Rincon Canyon and Hamilton Mesa. Analyses of both of these APDs are temporarily on hold by mutual agreement between EOG and BLM. Since, if drilled, these two wells, known as North Mail Trail #3 and # 4, will contribute to the overall impacts in the area, they will be included in this cumulative-impact analysis.

The five proposed wells will be in addition to a number of existing and proposed wells located south of Mc Elmo Canyon Road (County Road G). County Road G is the primary arterial access to the area. Therefore, the addition of new wells will increase oil and gas-related traffic on the area roads and will add to the overall impacts from oil and gas activities in the area.

Since all of the proposed wells are wildcat wells, there are two scenarios to consider when assessing cumulative impacts for these wells.

Scenario 1 – Dry Holes: The proposed wells are “wildcat” wells, which means they are exploratory wells in an area of potential, but unknown oil & gas resources. About 10 percent of all wildcat wells are successful and become producing wells. Therefore, it is possible that these wells could yield “dry holes” (non-producer) and be plugged and abandoned soon after completion of the drilling. Since there are a total of five potential wells proposed in the area, the impacts from drilling and production could be slight or could be incremental depending upon the number of successful wells. Under this scenario, EOG Resources will drill one of the three wells analyzed in this EA (probably Cannonball Unit 1-18) first and will make decisions about subsequent exploration drilling based on the results of that well. If the first well turns out to be a “dry hole”, EOG may or may not decide to drill another exploration well at one of the other two sites. If a second exploration well were to be a dry hole, it may be less likely that any further drilling would occur. Of course, EOG would have the right to drill all three sites plus the other two (assuming they are approved in the future), if they wish. However, economics would probably argue against drilling more wells if previous wells were not economic producers.

Therefore, under this scenario, one or more of the wells could be dry holes and as such would be plugged, abandoned, and reclaimed within a short time frame (less than one year). If no

economic producing wells were developed, overall cumulative impacts would most likely be low and short term (only as long as it takes to drill and test the wells, plug and abandon the wells, complete reclamation and seeding of the well pads and access roads, and monitor the sites to assure reclamation success).

Impacts on County Road G and along the access roads, under this scenario, would also be short term with increased traffic during the drilling, testing, and initial reclamation phases. After the drill rig and reclamation equipment are gone, there would be an almost immediate reduction in traffic back to pre-drilling levels.

Scenario 2 – Producing wells: As described above, one exploration well will be drilled and subsequent drilling will depend upon the success and geologic findings of the first well. If the first well is an economic producer, it is likely that EOG will pursue drilling of a second well. If the second well is also a producer, they will likely drill the third well and will likely pursue drilling the other two wells (North Mail Trail #3 & #4), mentioned above. If scheduling goes according to plan, the environmental assessment for the two additional wells will begin in early 2005 and, barring unforeseen complications, will likely be completed in the spring of 2005.

Under this scenario, cumulative impacts from the project would be more significant than in scenario 1. The first well drilled, if deemed economically productive, would be completed and temporarily shut in. The well pad would be partially reclaimed back to a minimum size needed for production activities and maintenance work (about 1/3 the size of the original pad). EOG would probably decide to proceed with drilling a second permitted site. They would also probably make applications to BLM for a pipeline network to transport gas from the wells to tie-ins with existing natural-gas pipelines in the area. The tie-in point would possibly be to the southwest on Mail Trail Mesa where R.L. Bayless has some natural gas pipelines. Barring unforeseen complications, the NEPA process for the pipeline applications would probably be complete in the summer of 2005.

If the gas field proved to be a good producer, EOG may eventually pursue additional in-fill wells to completely and efficiently develop the field.

In this scenario, traffic would increase along County Road G and the local access roads for the duration of the drilling. Once all wells had been drilled and completed, traffic would decrease and traffic would consist of well maintenance and production traffic that would include pickup trucks, 1-ton work trucks, and tanker trucks to transport production water and, possibly, oil from the sites.

On-going production traffic and short-term drilling traffic present potential spill hazards at the Mc Elmo Creek ford crossing and at the various low-water crossing along BLM Road 4524. Ford crossings are inherently more prone to surface-water quality contamination than bridge crossings due to constantly changing weather and stream-flow rates, to varying road conditions at crossing approaches, and direct contact by vehicles with water in the stream. Vehicles crossing through flowing water will tend to wash dust, grease, road dirt, oil, and other potential contaminants off of vehicles as they make the crossing. These potential contaminants would be very similar to those that wash off of parking lots and contaminate surface waters. Additionally, potential contaminants picked up on wheels at the well sites may be deposited in the stream as vehicles exit the project area. Materials being transported by drilling and production equipment such as gasoline, diesel fuel, lubrication oil, bags of drilling mud and concrete, production water, produced oil, and other products could be spilled into the creek or drainages as crossings are made.

Any sort of increased development can result in fragmentation of wildlife habitat and migration corridors. Since the proposed wells (with the exception of North mail Trail #4) are near an established access road, new habitat fragmentation would be limited to the well sites themselves and to the access road spurs off of BLM Road 4524. As shown in Table 2.2-1, new access roads for the three wells analyzed with this EA, would create a total of 7,300 feet of new roads and 4.80 acres of new disturbance. If the additional two wells (North Mail Trail #3 & #4) are permitted and drilled, the access roads to #3 and #4 would be roughly 1,000 feet and 14,300 feet (2.7 miles) long, respectively. These numbers are rough estimates because the final locations of these wells have not been determined, the access roads have not been staked, and neither on-site field visits nor cultural inventories have been conducted for the well sites or access roads. Assuming about 1.5 acres of new disturbance at each well pad, plus a forty-foot wide corridor of disturbance along each new access route, the total estimated surface disturbance for these two wells would be 17 acres (2.4 acres for North Mail Trail #3 and 14.6 acres for North Mail Trail #4). Obviously, the addition of the North Mail Trail #4 well, in particular, would significantly add to the overall surface disturbance in the area, and to the wildlife-habitat fragmentation.

Visual resources in the area would be impacted in that BLM Road 4524 would show obvious signs of heavier use and therefore would be more visible. This could result in more curiosity and recreation use by the public. The drill rig for well # 5 would be visible for the duration of the drilling for some distance both east and west along County Road G. The production facilities at the same well would also be visible from CR G, but the impacts would be mitigated through the conditions of approval discussed in the visual resources section, above, and in Appendix B. None of the production facilities at the other four other well sites would be visible from County Road G due to the distance from the road and landforms serving as natural visual blocks. Due to the height of drill rigs, one or two of the rigs may be visible from CR G. All of the well pads and access roads will be visible from certain vantage points on Mail Trail Mesa and Hamilton Mesa. Again though, the long-term impacts of production facilities will be mitigated through the conditions of approval discussed in the visual resources section, above, and in Appendix B. Access roads will be visible from aircraft.

4 CONSULTATION AND COORDINATION

Individuals listed in Table 4.0-1, below, have been consulted in the preparation and review of this EA. The Application for Permit to Drill (APD) was posted for 30 days of public notice as per standard BLM procedures. This EA and the conditions of approval will be made available to the public for a 30-day review and comment period.

Table 4.0 - 1 - Contributors

Name	Position	Organization/Company
Jamie Sellar-Baker	Field Office Manager	BLM/USFS, Dolores Public Lands Office
Robert Garrigues	Natural Resource Specialist	BLM, Dolores Public Lands Office
Matt Janowiak	Geologist	BLM, Durango Public Lands Center
Lou Ann Jacobson	Manager	Canyons of the Ancients Nat'l Monument
Steve Kandell	Planner	Canyons of the Ancients Nat'l Monument
Laura Kochanski	Archeologist	Canyons of the Ancients Nat'l Monument
Shauna Jensen	Hydrologist	USFS, Dolores Public Lands Office
Kathy Nickell	Wildlife Biologist	BLM, Dolores Public Lands Office
Cara Gildar	Ecologist	USFS, Dolores Public Lands Office
Mike Jensen	Range Specialist	BLM, Dolores Public Lands Office
Penny Wu	Recreation Specialist	BLM, Dolores Public Lands Office
Kim Round	Visual Resources Specialist	USFS, Durango Public Lands Center
Charlie Higby	Realty Specialist (Lands)	BLM, Durango Public Lands Center
Dan Rabinowitz	Petroleum Engineer	BLM, Durango Public Lands Center
Kara Hellige	Engineer	Corp. of Engineers, Durango, CO
Andrew Ross	?	Colorado State Health Department, Denver, CO
Sheila Bremer	Regulatory Coordinator	EOG Resources, Denver, CO
Steven Bennett	Construction Supervisor	EOG Resources, Denver, CO

4.1 Native American Tribes Being Consulted Through Review of this Environmental Assessment

The Northern Ute Tribe

The Ute Mountain Ute Tribe

The Southern Ute Tribe

The Navajo Nation

The Hopi Tribe

The Jicarilla Apache Tribe

The Pueblos of Acoma, Cochiti, Isleta, Jemez, Laguna, Nambe, Picuris, Pojoaque, Santa Ana, Santo Domingo, Sandia, San Felipe, San Juan, San Ildefonso, Santa Clara, Taos, Tesuque, Zia, and Zuni

5 REFERENCES CITED

Andrews, A. and R. Righter, 1992, Colorado Birds: Denver Museum of Natural History, 442 p.

BLM, 1984, San Juan/San Miguel Resource Management Plan and EIS: U. S. Department of the Interior, Bureau of Land Management, Montrose District Office, Montrose, Colorado.

BLM, 1991, San Juan/San Miguel Resource Management Plan Amendment / Final Environmental Impact Statement Colorado Oil & Gas Leasing and Development, U. S. Department of the Interior, Bureau of Land Management, Colorado State Office, Lakewood, Colorado.

BLM, 1989, Surface Operating Standards for Oil and Gas Exploration and Development, Third Edition (the Gold Book) 1989.

- Brock, C.E., V.A. Saab, T.D. Rich, and D.S. Dobkin, Effects of livestock grazing on neotropical migratory landbirds in western North America, *in* Finch, D.M. and P.W. Stangel, eds. 1993, Status and management of neotropical migratory birds; 1992 September 21-25, Estes Park, CO, Gen. Tech. Rep. RM-229: Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, 422 pp.
- Fitzgerald, J.P., C.A. Meaney, D.M. Armstrong, 1994, Mammals of Colorado: Denver Museum of Natural History and University Press of Colorado, 467 pp.
- Fuller, 2004, Cultural Resources Survey of EOG Resources Proposed Cannonball Unit Number 1-18 Well Pad and Access Road, Canyons of the Ancients National Monument, Montezuma County, Colorado. April 28, 2004. La Plata Archaeological Consultants Report 2004-20c.
- Hammerson, G.A., 1999, Amphibians and reptiles in Colorado: University Press of Colorado, 484 p.
- Haynes, D.D., Vogel, J.D., and Wyant, D.G., 1972, Geology, structure, and uranium deposits of the Cortez Quadrangle, Colorado and Utah: U.S. Geological Survey Miscellaneous Investigations Series Map I-629, 1:25,000, 2 maps.
- Hovezak, Tim, 2004-a, Cultural Resources Survey of EOG Resources Proposed North Mail Trail Number 6 Well Pad and Access Road, Canyons of the Ancients National Monument, Montezuma County, Colorado, April 15, 2004: La Plata Archaeological Consultants Report 2004-20a.
- Hovezak, Tim, 2004-b, Cultural Resources Survey of EOG Resources Proposed North Mail Trail Number 5 Well Pad and Access Road, Canyons of the Ancients National Monument, Montezuma County, Colorado, April 15, 2004: La Plata Archaeological Consultants Report 2004-20b.
- Ramsey, Douglas, K., 1977, Soil survey of Cortez area, Colorado, parts of Dolores and Montezuma Counties: U.S. Department of Agriculture, Natural Resources Conservation Service.
- U.S. Fish and Wildlife Service, 2002, Birds of Conservation Concern: Division of Migratory Bird Management.

APPENDIX A

Maps and Figures

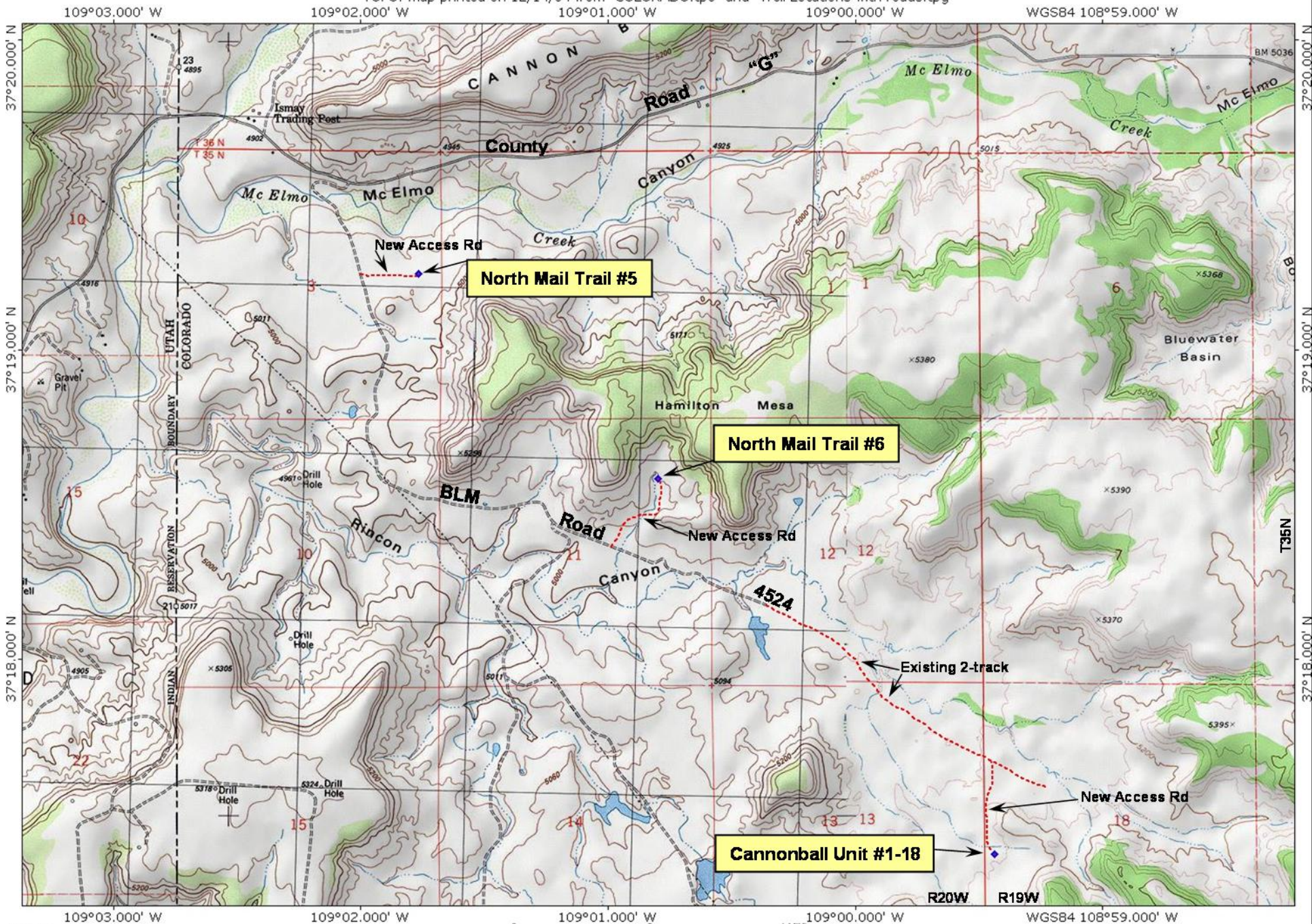
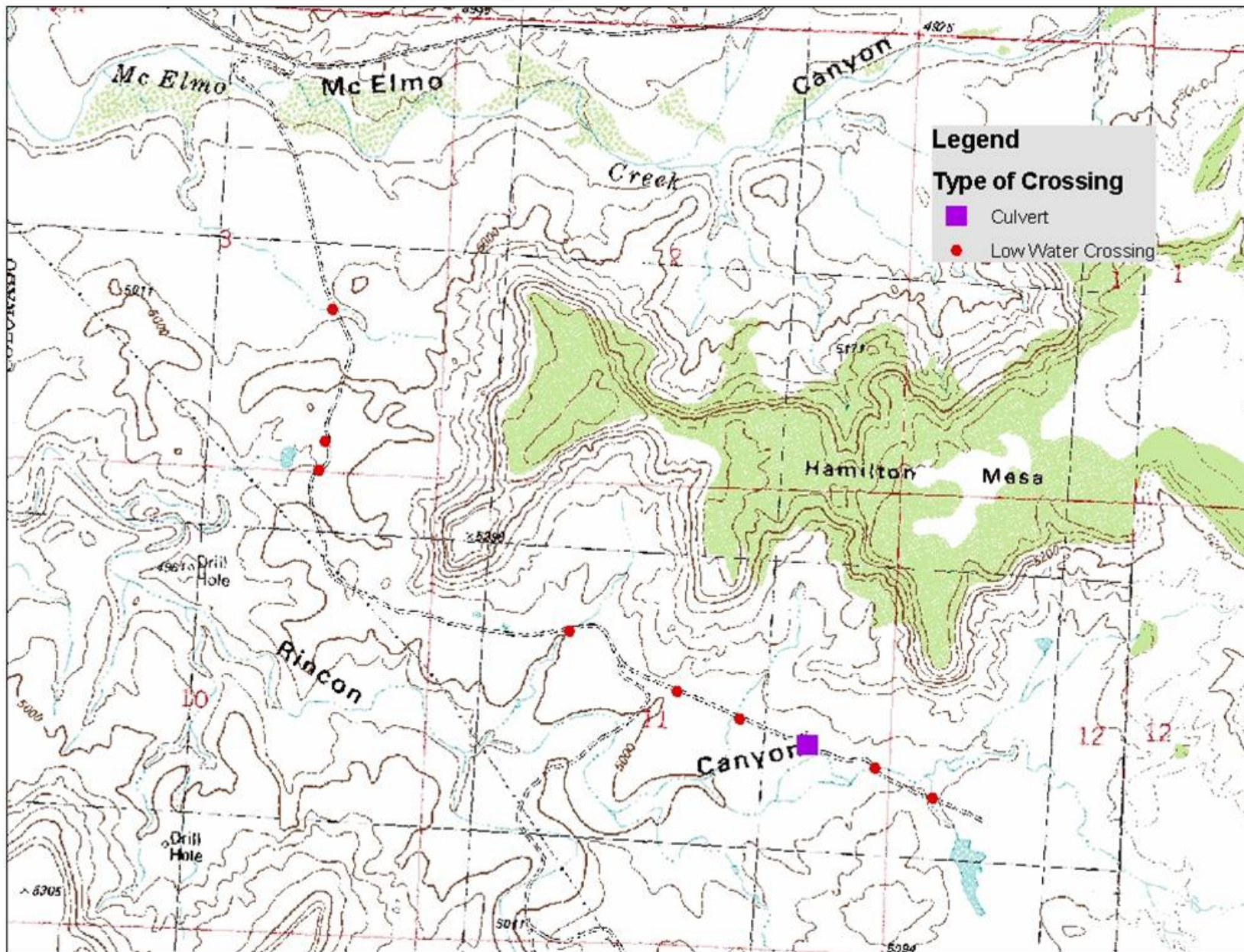


Figure 1 – Well & Access Road Locations



Appendix B

Surface Use Conditions of Approval

Surface Use Conditions of Approval

EOG Resources Montezuma County, Colorado

Well Name	Surface Location
North Mail Trail #5	2462' FNL, 455' FEL, Sec. 3, T35N, R20W
North Mail Trail #6	1170' FNL, 935' FEL, Sec. 11, T35N, R20W
Cannonball Unit #1-18	1993' FSL, 237' FWL, Sec. 18, T35N, R19W

Approval of this APD is subject to all terms and conditions set forth in the APD surface use plan, and the following conditions of approval which take precedence.

Construction and Drilling:

Construction and Drilling Mitigation Measures:

1. The operator or his contractor will contact the authorized BLM representative (Lucas Vargo) at the Dolores Public Lands Office in Dolores, Colorado (970) 882-6845, 48 hours before beginning any surface-disturbing activities and before beginning any reclamation.
2. As per the Cultural Resource Action Memorandum (CRAM), signed July 19, 2004, cultural mitigation is as follows:
 - A permitted archaeologist will be on site during initial clearing and topsoil removal operations in the vicinity of all well pads, access roads, to monitor for subsurface cultural resources.
 - If previously unidentified surface or subsurface cultural resources are discovered during construction, activity in the vicinity of the resource will cease, the resource will be protected, and the Authorized Officer with the BLM will be notified immediately. The operator shall take any additional measures requested by the BLM to protect the resources until they can be evaluated and treated. The discovered resources would be evaluated by a permitted archaeologist. The permitted archaeologist, in consultation with the BLM archaeologist, would make a determination of the nature and significance of the discoveries, and would determine the appropriate method of treatment for them. Avoidance of the resources by project re-design would be the preferable treatment. However, if the resources could not be avoided, then the appropriate treatment method would be determined, and a permitted archaeologist would prepare any and all necessary treatment plans. These plans would be reviewed by, and approved by the BLM. Treatment activities would be conducted after all necessary consultations had been completed as required by Section 106 of the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, and the Archaeological Resources Protection Act. The BLM would be responsible for conducting all necessary consultations. Construction within the area of the discovered resources would be allowed to proceed after the appropriate treatments had been completed.

- Pursuant to 43 CFR 10.4, the holder of this authorization must notify the BLM Authorized Officer, by telephone, with written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, the operator must stop activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the authorized officer.
 - All employees of the operator and any subcontractors must be informed by the operator before commencement of operations that any disturbance to, defacement of, or collection or removal of archaeological, historic, or sacred material will not be permitted. Violation of the laws that protect these resources will be treated as law enforcement/administrative issues.
 - Disclosure or release of information regarding the nature and location of archaeological, historic, or sacred sites without written approval of the Bureau of Land Management is prohibited under provisions of the Archaeological Resources Protection Act. Cultural resource permittees of the Bureau of Land Management are allowed to use this information during the course of the project for site protection purposes only. Unauthorized use or distribution of this information (which includes location information present in cultural reports) is considered a violation of Federal statute.
3. The reserve pit will be sealed in such a manner as to prevent leakage of the fluids and to protect surface-water and ground-water quality. Methods available to insure containment of drilling fluids in the reserve pit include lining the inside of the pit with at least 10 mil plastic. If a plastic liner is used, the bottom of the pit shall be smooth and free of any sharp rocks. If the pit has a rocky bottom, it shall be bedded with a material such as soil, sand, straw or hay to avoid the possibility puncturing the liner. A minimum of not less than a 2-foot freeboard will be maintained in the pit at all times. All oil or floating debris will be removed from the pit immediately after the drilling phase or the well.
 4. The reserve pit will be fenced, “stock-tight”, on three sides with four strands of barbed or twisted wire, prior to rig move in. The fourth side of the pit will be fenced “stock tight” when the drilling rig is released. Fencing will be built as described in Reclamation COA #10. The pit will remain fenced until it is reclaimed. If fluids are present in the pit after drilling and testing are complete, bird netting will be placed over the pit to keep birds out of the pit and the fluids.
 5. As agreed upon during the on-site field visit, EOG Resources will build a new access road to North Mail Trail #5, in approximately the location shown on Figure 1, Appendix A, and will reclaim the old, 2-track road that was originally proposed as the access. That reclamation will include: re-contouring to restore natural topography as nearly as possible – particularly in areas where the road is interfering with natural flow in drainages; seeding the reclaimed areas with the seed mix shown in Table B-1 of Reclamation COA #5.
 6. Prior to rigging up, a one foot high berm will be constructed around the perimeter of the well pad in such a manner as to contain all storm events/spills from going downstream of the well pad. A lined sump pit may be utilized to contain such fluids. The well pad will be designed in such a manner as not to allow runoff water to enter the pad. The need for the berm will be reassessed upon the completion of the well and production is established.

No fill will be allowed in ephemeral drainages.

7. Heavy equipment will be pressure washed at an offsite location prior to working on road improvements, construction at the well site, or on the pipelines. This is a preventive measure for reducing noxious weed infestation at the drilling sites. If equipment is moved directly from site to site while on this project, pressure washing between sites is not required. However, if equipment is removed from the site, used elsewhere, then brought back to the project area, pressure washing is required before the equipment can be used in the project area. This pertains

to heavy equipment such as bulldozers, backhoes, etc. Pickup trucks and passenger vehicles do not require pressure washing prior to entering these sites.

8. All brush, limbs, and other woody material must be stockpiled separately from the topsoil just outside the well pad perimeter. The stripped vegetation and 6 inches of topsoil should be stockpiled separately just outside the well pad perimeter. The stripped vegetation should not be removed from the location (it will be used later for reclamation). If the topsoil stockpile is not used within six months it should be seeded to insure topsoil integrity and prevent erosion.
9. Water withdrawals from surface waters require prior approval from the State of Colorado regardless of private land ownership along or around the water source. Colorado requests notification two weeks prior to the beginning of surface waters withdrawals to determine if there is a call on or below the withdrawal point. Regardless of when or how fresh water is used, the State of Colorado will be notified and will respond before water is withdrawn from any surface waters in Colorado. The contact office for South Western Colorado is the Division of Water Resources in Durango, Colorado (970-247-1845), and for the Water Commissioner for the Dolores River is (970) 533-1333.
10. The operator shall assure that all vehicle traffic is limited to the bladed/traveled road surface on any road within the Monument. No pullouts or off-road parking will be allowed unless specifically authorized. "Keep vehicles on the road surface" signs may be installed by the operator to assist with compliance as needed. No shortcutting by any motor vehicles, operated by employees or contractors, is allowed on roads not identified as access routes in APD. Vehicular access to the well pad should be strictly limited to authorized vehicles only; these vehicles are restricted to use on the well pad only -- no off-pad or off-road parking.
11. All roads used for access to the well site will be wetted down and compacted where needed to avoid dust and loss of soil. This includes the access road through the Navajo Indian Reservation – especially in the vicinity of the residences adjacent to the road.
12. Accidental spills will be cleaned up immediately, and contaminated soils will be removed to a State Permitted disposal site. BLM reporting procedures will be followed.
13. The well-site plats, provided with the Surface Use Plan in the APDs, do not show the location and extent of the topsoil stockpile, the reserve-pit fill material stockpile, or the fill slopes. Prior to commencing construction at the well site, EOG and the dirt contractor must meet with a BLM authorized representative (Lucas Vargo at 970-882-6845 or Robert Garrigues at 970-385-1342) at the well site to determine the exact locations and lateral extent of the stockpiles and fill slopes. The boundaries of the well site will be staked and clearly marked during that on-site meeting so that the dirt contractor understands and can readily identify the limits of the well-pad site.
14. If subsurface paleontological resources are unearthed during operations, activity in the vicinity of the resource will cease and a BLM representative (Laura Kochanski, (970) 882-5614, or Lucas Vargo (970) 882-6845) will be notified immediately. The BLM archaeologist will notify the state paleontologist.
15. The BLM, "Gold" book (BLM/USFS, 1989) shall be followed for specifications on road design and culvert installation for the new access roads to well pads and for road repairs or improvements on BLM Road 4524. The operator is required to correct maintenance deficiencies when documented and directed by the Authorized Officer.
16. Several conditions of approval are necessary to mitigate and lessen the potential impacts from crossings of Mc Elmo Creek at the ford. These are:
 - The approaches to the ford crossing of Mc Elmo Creek, particularly on the south side, will be modified to make the approach grade less steep so that drilling equipment and support vehicles can make the crossing safely and with minimum chance of spills or lost equipment.

The changes to the ford approaches will be made in such a way as to minimize introduction of sediment into the stream.

- No modifications will be made to the bottom Mc Elmo Creek. If it is determined that the existing road base in the crossing is not adequate, the authorized BLM representative (Lucas Vargo 970-882-6845) will be notified 48-hours prior to any changes being made. Any significant changes to the road base in the ford crossing will likely require approval from the Corp of Engineers.
 - All vehicles will be inspected daily for leaks of oil, grease, transmission fluid, antifreeze, window-washer fluid, and the like. Any leaks on all vehicles must be repaired and cleaned prior to entering the project area (prior to crossing Mc Elmo Creek).
 - The number of vehicles crossing Mc Elmo Creek will be minimized by using only the vehicles absolutely needed and carpooling personnel to the well sites.
 - Since the water level in McElmo Creek can change dramatically in a relatively short time period, a staff gage will be installed at the ford crossing. This gage will provide a reference point from which personnel can determine the relative depth of the creek and the relative safety of a crossing.
17. The Russian-thistle infestation surrounding the stock pond (located near the take-off point for the new access road to Cannonball Unit #1-18) should be treated before increased construction-vehicle traffic begins.
18. No surface-disturbing activities shall take place on the North Mail Trail #6 well site or access road until the associate BLM right-of-way grant has been approved and the Notice to Proceed (NTP) has been issued.

Production:

Production Mitigation Measures:

1. All permanent structures (on site for six months or longer) constructed or installed will be painted a flat, non-reflective, earth-tone color which will be Carlsbad Canyon (from the list of 10 standard environmental colors designated by the Rocky Mountain Regional Coordinating Committee).
2. All production equipment shall be equipped with hospital type mufflers. Regardless of whether the operation is at the construction, drilling, or production phase, if the BLM determines that noise has become a nuisance, additional muffling techniques will be applied to achieve adequate noise reduction and acceptable noise levels.
3. Noxious weeds which may be introduced due to soil disturbance or reclamation will be treated by methods to be approved by the Authorized Officer. These methods may include biological, mechanical, or chemical treatments. Should chemical or biological treatment be requested, the operator must submit a Pesticide Use Proposal to the Authorized Officer 60 days prior to the planned application date (see Reclamation COA No's 2 & 3).
4. Accidental spills will be cleaned up immediately, and contaminated soils will be removed to a State Permitted disposal site. BLM reporting procedures will be followed.
5. The reserve pit and that portion of the location and access road not needed for production or production facilities will be reclaimed as described in the reclamation section. Enough topsoil will be kept to reclaim the remainder of the location at a future date. This remaining stockpile of topsoil will be seeded in place using the prescribed seed mixture.

6. Compaction and construction of the berms surrounding the tank or tank batteries will be designed to prevent lateral movement of fluids through the utilized materials, prior to storage of fluids. The berms must be constructed to contain, at a minimum, 120 percent of the storage capacity of the largest tank within the berm. All load lines and valves shall be placed inside the berm.
7. No gravel or other related minerals from new or existing pits on Federal land will be used in construction of roads, well sites, or other structures, without prior approval from the Surface Managing Agency.
8. The roads shall be maintained reasonably smooth, and free of ruts, soft spots, chuckholes, rocks, slides and washboards. The BLM, "Gold" book (BLM/USFS, 1989) shall be followed for specifications on road design and culvert installation for the new access roads to well pads and for road repairs or improvements on BLM Road 4524. The operator is required to correct maintenance deficiencies when documented and directed by the Authorized Officer. All vehicles servicing the well are restricted to use of the approved access road and well pad.
9. Harden the low water crossing at N. Mail Trail #5 if well goes into production.
10. Harden the 3 low water crossings at Cannonball Unit 1-18 if well goes into production.

Reclamation:

Reclamation Mitigation Measures:

1. Immediately on completion of the well, all trash and debris will be collected from the location and the surrounding area and removed to an approved sanitary landfill.
2. Whether the seed mix used is the one recommended by BLM or one specified by the land owner, the mixture used must be *certified* weed free. There shall be NO primary or secondary noxious weeds in the seed mixture. Seed labels from each bag shall be available for inspection while seeding is being accomplished. Additionally the seeding contractor should keep a record of the dates seeding was accomplished for the site and send that information along with the seed labels from each bag to Lucas Vargo or Cara Gildar at the Dolores Public Lands Office (P.O. Box 210, 100 N. 6th Street, Dolores, CO 81323).
3. The Permit Holder (Holder) shall be responsible for control of all State listed noxious weed species on all disturbed areas. The Holder is responsible for consultation with the Authorized Officer and local authorities for acceptable weed control methods, and shall comply with the following:

Use of pesticides shall comply with all applicable Federal and State laws. Pesticides shall be used only in accordance with their registered uses within limitations imposed by the Secretary of the Interior. Prior to the use of pesticides, the Holder shall obtain approval from the Authorized Officer of a Pesticide Use Proposal showing the type and quantity of material to be used, pests to be controlled, method of application, locations of storage and disposal of containers, and any other information deemed necessary by the Authorized Officer.

All pesticide applicators must hold a valid Colorado Qualified Supervisor license or Certified Operator license, and the license must be valid for the applicable pesticide application category. For all areas treated, Pesticide Application Records (BLM Form 3-3-94) must be submitted to the BLM Dolores Field Office by November 1 of each year. Pesticide Application Records must be completed no later than 14 days following the pesticide application and must be maintained for ten years.

4. All reserve pit fluids must be removed or evaporated from the pit before starting reclamation procedures. Enhanced evaporation of the reserve pit fluids shall have prior approval of the authorized officer. The liner shall be cut off at the mud level and removed to an approved disposal site. The reserve pit must be reclaimed within 12 months (but no later than the following August 31) from the date the well is spudded. The reserve pit solids will not be squeezed out of pit, however the solids may be mixed with stockpiled materials as the pit is reclaimed. Mixing stockpiled materials and reserve pit solids can facilitate drying the reserve pit solids (by mixing damp solids with dry dirt), aid in compaction of materials in the pit, prevent subsequent settling of the pit, and shorten the time needed for the reserve pit reclamation. There will be a minimum of 2 feet of overburden on the pit prior to replacing the topsoil and seeding.
5. All disturbed areas shall be re-contoured to blend as nearly as possible with the natural topography and smoothed, as necessary, and seeded with the seed mixture shown in Table B-1, below. Seed may be distributed by either drilling or broadcasting. Whichever method is used, any woody materials stockpiled during construction be spread evenly back over the reclaimed and seeded areas (see COA #7, below).

Table B-1 Seed Mix

Common Name	NRCS Variety	Pure Live Seed (PLS) lbs/acre (drilled rate)
Indian ricegrass	Rimrock	4.3
Squirrel tail	Bottlebrush	3.2
Winterfat	VNS ⁽¹⁾	0.8
Four-wing saltbrush	VNS ⁽¹⁾	5.1
Galleta	Viva, florets	3.8
Alkali sacaton	VNS ⁽¹⁾	0.3
Total		17.5 lbs/acre

(1) VNS = Variety not stated (by local seed supplier)

6. If the seed is broadcast, application rates shall be twice the drilled rate shown in Table B-1 and some means such as a rake or harrow shall be used to incorporate the seed into the soil
7. Brush, limbs, crushed stumps and other woody material, stockpiled during construction, if any, shall be spread evenly back over the reclaimed area after seeding. This organic debris will provide cover and stabilizing material for the soil, seed mix, and young plants.
8. The following standards shall be applied to determine the success of reclamation efforts. Reclamation should be considered successful when the desired vegetative species are established, erosion is controlled, weeds are considered a minimal threat, and it is likely that ground cover will return to a desirable condition. The following parameters should be used to determine the success of re-vegetation efforts.
 - a. Successful onsite establishment of species included in the planting mixture or other desirable species.
 - b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production

The operator should continue re-vegetation efforts, at the direction of BLM, until these standards are met.

9. If the well is a producer, the well-pad site will be reduced in size to the minimum size needed to

accommodate the production and maintenance equipment and the rest of the site will be reclaimed as specified herein.

10. A fence shall be installed around the perimeter of the area undergoing reclamation. This fence will give grasses and other vegetation a chance to get established without grazing cattle concentrating on the young plants. The fence shall be maintained in a manner to prevent cattle from entering the area, and be constructed as follows: Posts no more than 16' apart; fence wire: four wires of at least 12.5 gauge, double strand twisted; two stays between posts; wire stretched taut between brace panels, wire spacing from the ground up: 14", 22", 30", 42". BLM further recommends that the fence be maintained in place for a minimum of 3 years.

References Cited:

BLM/USFS, 1989, Oil and gas surface operating standards for oil and gas exploration and development, Third edition (Gold Book): Rocky Mountain regional Coordinating Committee

Appendix C

Fencing Specifications

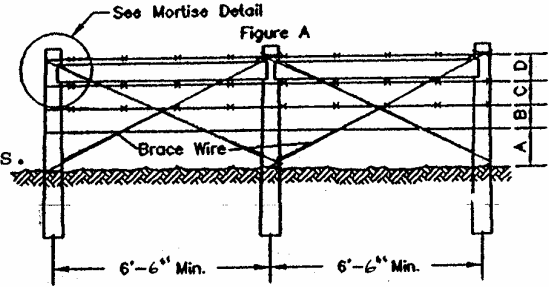
Brace Wire: Barbless wire, two strands of smooth 12 1/2 gauge galvanized wire, shall be used as brace wire. End panels, corner panels and stress panels shall be diagonally braced, with two full wraps of brace wire. A full wrap consists of the following: brace wire shall be stretched from the top of the first post to the bottom of the second post, then back to the top of the first, including a full wrap around each post at the top and bottom. Wires shall be twisted tight with a lever. Leave one end for a lever long enough to fasten behind the horizontal brace to prevent the wire from unwinding. (Figure A, Figure B and Typical drawing 02834-9)

Before existing fences are cut stress panels must be constructed on each side of the cut and existing wire stapled to panels.

New Fence Installation: Post spacing may be shortened to better fit the ground line and to help keep the wire spacing correct.

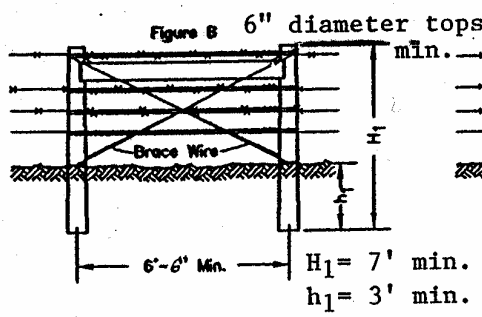
Stress Panels: Shall be built at grade breaks. A stress panel shall be built a minimum of every 1000 feet on a uniform gradient.

Barbed or Barbless Wire: Stretch tightly and staple to wood posts or securely attach to steel posts with approved wire clips. Wire is properly stretched when it is springy to the touch. Drive staples into the wood until the staple comes in contact with the wire against the post, but not so tight as to crimp the wire or prevent free movement of the wire between the post and the staple. Do not drive staples parallel to the grain of the wood. Terminate the wire at each end post, gate post, corner post, or stress panel by wrapping wire around the post two times and tie off by wrapping the incoming wire a minimum of four times.

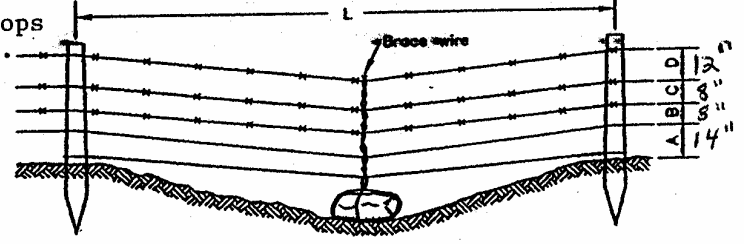


END PANEL-TYPE II

Stress, end and corner panel posts must be at least 7' long with 6" tops



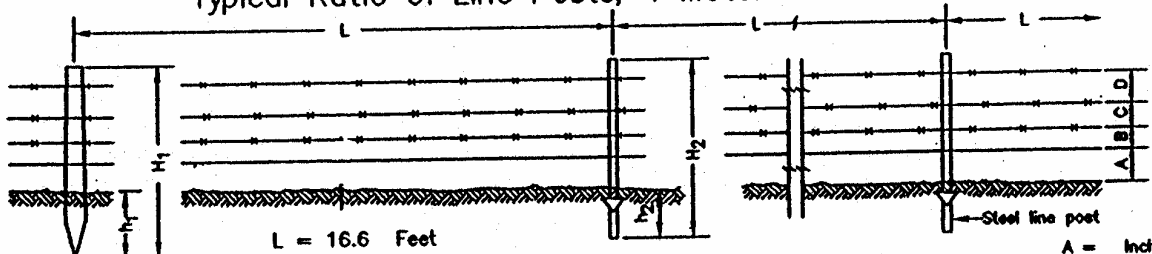
STRESS PANEL



PANEL AT MINOR DEPRESSION

Add additional wire of the same material as bottom wire of fence or a rock deadman (min. weight 50 lbs.) when space between bottom wire and ground exceed 20 inches. A driven metal or wood post may be used as an anchor.

Typical Ratio of Line Posts, 4 Metal to 1 Wood Post



$H_1 = 6.5$ Feet
 $h_1 = 30$ Inches
 Wood Post 6 Inch Nominal Diameter
 CCA Treatment. No Penta or Creosote allowed.

LINE PANELS

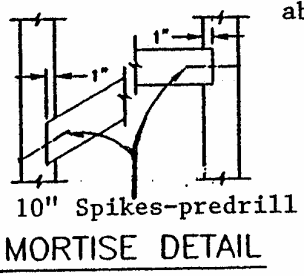
$H_2 = 5.5$ Feet
 $h_2 = 18$ Inches
 Metal Fence Posts
 Shall Be 1.33 lbs./LnFt.

A = Inches
 B = Inches
 C = Inches
 D = Inches

Maximum height of top wire 42" above ground surface.

NOTE:

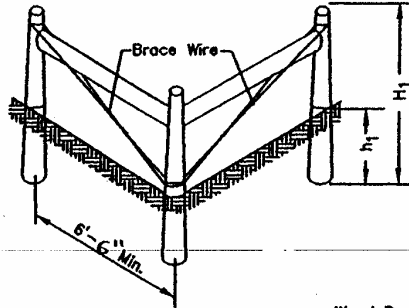
1. See specifications for the following:
 - a. Ratio of steel to wood line posts. may vary.
 - b. Post spacing, length and depth in ground.
 - c. Spacing between wires.
 - d. Type of wire to be used.



All cut or notched treated wood posts shall be swabbed with an approved wood preservative.

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT DIVISION OF TECHNICAL SERVICES SERVICE CENTER	
TYPICAL BARBED WIRE FENCE	
DESIGNED	by others _____
REVIEWED	_____
APPROVED	_____
DRAWN	SCALE NONE
DATE FEBRUARY 25, 1991	SHEET OF
DRAWING NO.	

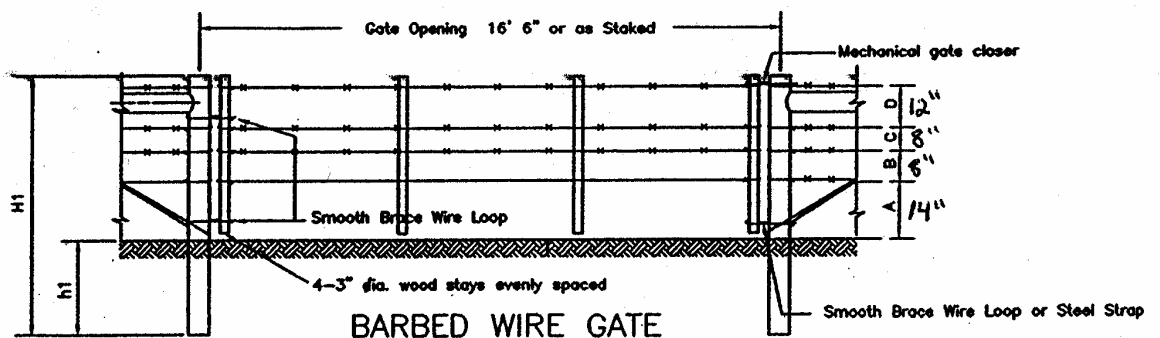


H₁ = 7.0 Feet
h₁ = 36 Inches

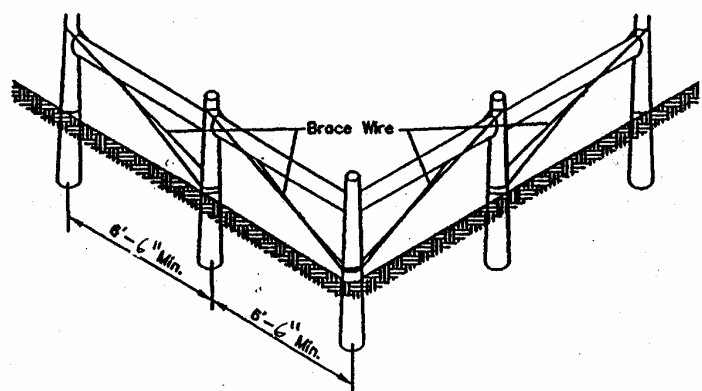
All cut or notched treated wood posts shall be swabbed with an approved wood preservative. Contact Hazmat Coordinator

Wood Post 6 inch Nominal Diameter
CCA Treatment. No Penta or Creosote allowed.

3-POST
CORNER PANEL



BARBED WIRE GATE



5-POST
CORNER PANEL
(TYPE II)

NOTES:

1. Use Five Post Coners when conditions require more support.
2. Corners and gates shall have the number of wires, type of wire, and wire spacing same as for fence.
3. Posts shall be set 6 inches deeper than line posts.
4. Use spikes at junctures and mortise 1" deep at junctures of posts and braces.
5. Construct Gates between, end, stress or corner panels of the type required in the specifications.

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT DIVISION OF TECHNICAL SERVICES SERVICE CENTER	
CORNER and GATE PANELS	
DESIGNED	by others
REVIEWED	
APPROVED	
DRAWN	SCALE NONE
DATE FEBRUARY 25, 1991	SHEET 2 OF 3
DRAWING NO.	