

ENVIRONMENTAL ASSESSMENT
BLM Office: Carlsbad Field Office

DOI-BLM-NM-P020-2010-0346-EA
Lease #: NMNM 120349
Murchison Oil & Gas, INC.
Carbon Valley 26 Fed Com #1H

1.0 Purpose and Need for Action

Murchinson Oil & Gas, INC has applied for a permit to drill a horizontal oil well and construct the associated access road. The location for the proposed well is as follows:

Carbon Valley 26 Fed Com #1H:

Surface Location: 1980' FSL & 250' FEL, Section 26, T. 16 S., R. 27 E.

Bottom Location: 1980' FSL & 330' FWL, Section 26, T. 16 S., R. 27 E.

- 1.1** The need for this proposed action is for further development of a federal oil and gas lease.
- 1.2** The Carlsbad 1988 Resource Management Plan (RMP), 1997 RMP Amendment (RMPA), and the 2008 Pecos District Special Status Species RMPA have been reviewed, and it has been determined that the proposed action conforms with the land use plan terms and conditions as required by 43 CFR 1610.5.
- 1.3** The Carlsbad Field Office utilizes a resource conflict map that was prepared by an interdisciplinary team showing areas of concern. These areas of concern include Special Management Areas (SMA's), Threatened and Endangered (T&E) Habitat, known locations of Threatened and Endangered (T&E) species, areas with other Special Status species, Wildlife Habitat projects, Riparian/Wetland habitat, 100-year floodplains, etc. The conflict map is reviewed, and the author of the EA signs off the projects shown to be outside of the areas of concern. The projects, which occur in the areas of concern depicted on the map, are reviewed and signed off only by the resource specialist with the expertise for that area.

The critical elements subject to requirements specified in statute, regulation, or executive order listed below are either not present or not affected by the proposed action or alternative.

Areas of Critical Environmental Concern

Hazardous/Solid Wastes

Environmental Justice

Floodplains

Prime/Unique Farmlands

Threatened & Endangered Species

Water Quality

Wilderness

Wild/Scenic Rivers

Wetlands/Riparian

1.4 Legal requirements or considerations

All State and Federal requirements have been met.

2.0 Alternatives Including the Proposed Action

2.1 Alternative A – Proposed Action

Murchinson Oil & Gas, INC proposes to drill a horizontal oil well utilizing a closed loop system. A caliche pad with dimensions of 310 x 330 feet will be required for drilling operations. The access road will be 34 feet in length and will connect the southeast corner of the well pad with the existing lease road to the east. The overall surface disturbance of the proposed construction activities will be 2.37 acres. The well pad will be constructed with the V-door to the east.

If the well is productive there could be a need for oil pipelines, tank batteries, electric lines and salt water disposal pipelines, and there may be an increase in applications to drill in the adjacent acreage tracts. If off location power lines or other facilities are needed, a separate application will be filed by the company or third party.

Mitigation Measures: The mitigation measures include the Pecos District Conditions of Approval.

2.2 Alternative B - No Action

The BLM NEPA Handbook (H-1790-1) states that for Environmental Assessments (EAs) on externally initiated proposed actions, the No Action Alternative generally means that the proposed activity will not take place. This option is provided in 43 CFR 3162.3-1 (h) (2). This alternative would deny the approval of the proposed application, and the current land and resource uses would continue to occur in the proposed project area.

2.3 Alternatives Considered But Not Further Analyzed

Field investigation of all areas of proposed surface disturbance for Alternative A-Proposed Action were inspected to ensure that potential impacts to natural and cultural resources would be minimized through the implementation of mitigation measures. These measures are described for all resources potentially impacted in Section 4.0 of this EA. Therefore, no additional alternative other than those listed above have been considered for this project.

3.0 Affected Environment

This section is a discussion, by relevant resources, of the current condition of the affected environment.

Location: Approximately 11 miles northeast of Artesia, New Mexico.

3.1 Air Resources

Air Quality

Air quality is determined by atmospheric pollutants and chemistry, dispersion meteorology and terrain, and also includes applications of noise, smoke management, and visibility. The area of the proposed action is within the Pecos River airshed and is classified as a Class II Air Quality Area. A Class II area allows moderate amounts of air quality degradation. The primary causes of air pollution in the project area are from motorized equipment and dust storms caused by strong winds during the spring. Particulates from nearby oil and gas production, agricultural burning, recreational and industrial vehicular traffic and ambient dust can also affect air quality. Air quality in the area near the proposed action is generally considered good, and the proposed action is not located in any of the areas designated by the Environmental Protection Agency (EPA) as “non-attainment areas” for any listed pollutants regulated by the Clean Air Act.

Greenhouse gases (GHG), including carbon dioxide (CO₂) and methane (CH₄), are not regulated by the EPA under the Clean Air Act. The EPA’s Inventory of US Greenhouse Gas Emissions and Sinks 1990-2006, found that in 2006, total U.S. GHG emissions were over 6 billion metric tons and that total U.S. GHG emissions have increased by 14.1% from 1990 to 2006. The report also noted that GHG emissions fell by 1.5% from 2005 to 2006. This decrease was, in part, attributed to the increased use of natural gas and other alternatives to burning coal in electric power generation.

Climate

Ongoing scientific research has identified the potential impacts of anthropogenic (man-made) GHG-emissions, changes in biological carbon sequestration, and other changes due to land management activities on the global climate. Through complex interactions on a regional and global scale, these changes cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although natural GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused carbon dioxide equivalent (CO₂(e)) concentrations to increase dramatically, and are likely to contribute to overall global climatic changes. The Intergovernmental Panel on Climate Change recently concluded that “warming of the climate system is unequivocal” and “most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations (Intergovernmental Panel on Climate Change (IPCC) 2007).

Global mean surface temperatures have increased nearly 1.33°F from 1906-2005. Models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Northern latitudes (above 24° N) have exhibited temperature increases of nearly 2.1°F since 1900, with nearly a 1.8°F increase since 1970 alone. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change.

In 2001, the IPCC indicated that by the year 2100, global average surface temperatures would increase between 2.5°F and 10.4°F above 1990 levels, (IPCC Third Assessment Report: Climate Change 2001) depending on the assumptions made in the predictive model. The National Academy of Sciences has confirmed these findings, but also has indicated there are uncertainties regarding how climate change may affect different regions. More recently, the Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures are more likely than increases in daily maximum temperatures. Increases in temperatures would increase water vapor retention in the atmosphere, and reduce soil moisture, increasing generalized drought conditions, while at the same time enhancing heavy storm events. Although large-scale spatial shifts in precipitation distribution may occur, these changes are more uncertain and difficult to predict.

Several activities contribute to the phenomena of climate change, including emissions of GHGs (especially carbon dioxide and methane) from fossil fuel development, large wildland fires and activities using combustion engines; changes to the natural carbon cycle; and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over different temporal scales. For example, recent emissions of carbon dioxide can influence climate for 100 years.

3.2 Range

The proposed action is within the Turkey Track range allotment (#65075). This allotment is a yearlong cow-calf deferred rotation operation. Range improvement projects such as windmills, water delivery systems (pipelines, storage tanks, and water troughs), earthen reservoirs, fences, and brush control projects are located within the allotment, but not within the project area. In general, an average rating of the range land within this area is six acres/AUM (Animal Unit Months). In order to support one cow, for one year, about 72 acres is needed. This equals about nine cows per section.

3.3 Soil

The area of the proposed project is mapped as GC: Gypsum land-Cottonwood complex, 0 to 3 percent slopes. These are gypsum soils and are described below:

Gypsum

These soils have a loamy surface layer, with gypsiferous materials starting at a depth of 1 to 10 inches. They are found on gently undulating uplands, with steep, broken gypsum outcrops occurring in places. Permeability varies from very low to moderate, water-holding capacity is very low to low, and runoff rapid to very rapid. Soil fertility and the rooting zone are limited by the underlying gypsiferous material. These soils are subject to severe erosion once the vegetative cover is lost. Reestablishing native plant cover could take 3-5 years due to unpredictable rainfall and high temperatures.

These areas have good populations of squamulose lichens, a few crustose and gelatinous lichens, and cyanobacterial, which is present throughout the top 2 mm of the soil. These soil crusts are important in binding loose soil particles together to stabilize the soil

surface and reduce erosion. They also function in the nutrient cycle by fixing atmospheric nitrogen, contributing to soil organic matter, and maintaining soil moisture. In addition, they can act as a living mulch which discourages the establishment of annual/invasive weeds. Structurally they form an uneven, rough carpet that reduces rain drop impact and slows surface runoff. Below the surface, lichen and moss rhizines, fungal hyphae, and cyanobacterial filaments all act to bind the soil surface particles just below and at the surface. Horizontally, they occur in nutrient-poor areas between plant clumps. Because they lack a waxy epidermis, they tend to leak nutrients into the surrounding soil. Vascular plants such as grasses and forbs can then utilize these nutrients.

3.4 Vegetation

Gypsum

The potential plant community of this category consists of grammas, gyp dropseed, and alkali sacaton. The shrub component is made up of four-wing saltbush, mormon tea, spiny althorn, javelin bush, and sumac. Forbs include gyp weed, scarlet guara, globemallow and croton. Shrubs and forbs are a minor component of the plant community.

3.5 Visual Resource Management (VRM)

The Visual Resource Management (VRM) program identifies visual values, establishes objectives in the RMP for managing those values, and provides a means to evaluate proposed projects to ensure that visual management objectives are met.

This project occurs within a Visual Resource Management Class IV zone. The objective of VRM Class IV is to provide for management activities which require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic landscape elements of color, form, line and texture.

3.6 Wildlife Habitat

This project occurs in a transition zone from Chihuahuan Desert habitat type to the west and to a sand shinnery habitat type to the east and is primarily dominated by mesquite scrublands intermixed with various grasses. This mesquite scrubland community extends across the southern Great Plains, occupying portions of north and west Texas, western Oklahoma, and southeast New Mexico. Portions of Eddy and Lea counties consist of mesquite scrublands to a lesser degree. The characteristic feature of the mesquite scrubland community is co-dominance by various species of grasses and cacti.

Various bird, mammal, reptile and invertebrate species inhabit this ecosystem in southeast New Mexico. Herbivorous mammals include mule deer, pronghorn, and numerous rodent species. Carnivores include coyote, bobcat, badger, striped skunk, and

swift fox. Two upland game bird species, scaled quail and mourning dove, are prevalent throughout southeast New Mexico. Many species of songbirds nest commonly, with a much larger number that use the habitat during migration or for non-nesting activities. Common avian predators include northern harrier, Swainson's hawk, red-tailed hawk, kestrel, burrowing owl, and Chihuahuan raven. Numerous snake and lizard species also inhabit this ecosystem.

3.7 Cultural Resources

The project falls within the Southeastern New Mexico Archaeological Region. This region contains the following cultural/temporal periods: Paleoindian (ca. 12,000 – 8,000 B.C.), Archaic (ca. 8,000 B.C. – A.D. 950), Ceramic (ca. A.D. 600 – 1540), Protohistoric and Spanish Colonial (ca. A.D. 1400 – 821), and Mexican and American Historical (ca. A.D. 1822 to early 20th century). Sites representing any or all of these periods are known to occur within the region. A more complete discussion can be found in *Living on the Land: 11,000 Years of Human Adaptation in Southeastern New Mexico; An Overview of Cultural Resources in the Roswell District*, Bureau of Land Management published in 1989 by the U.S. Department of Interior, Bureau of Land Management.

Native American Religious Concerns

The BLM conducts Native American consultation regarding Traditional Cultural Places (TCP) and Sacred Sites during land-use planning and its associated environmental impact review. In addition, during the oil & gas lease sale process, Native American consultation is conducted to identify TCPs and sacred sites whose management, preservation, or use would be incompatible with oil and gas or other land-use authorizations. With regard to Traditional Cultural Properties, the BLM has very little knowledge of tribal sacred or traditional use sites, and these sites may not be apparent to archaeologists performing surveys in advance of drilling. However, to date no TCPs or sacred sites have been identified in the vicinity of the current project area.

3.8 Noxious Weeds

There are four plant species within the CFO that are identified in the New Mexico Noxious Weed List Noxious Weed Management Act of 1998. These species are African rue, Malta starthistle, Russian olive, and salt cedar. African rue and Malta starthistle populations have been identified throughout the Carlsbad Field Office and mainly occur along the shoulders of highway, state and county roads, lease roads and well pads (especially abandoned well pads). The CFO has an active noxious weed monitoring and treatment program, and partners with county, state and federal agencies and industry to treat infested areas with chemical and monitor the counties for new infestations.

3.9 Cave/Karst

The project is located in gypsum karst terrain, a landform that is characterized by underground drainage through solutionally enlarged conduits. Gypsum karst terrain may contain sinkholes, sinking streams, caves, and springs. Sinkholes leading to underground drainages and voids are common. These karst features, as well as occasional fissures and discontinuities in the bedrock, provide the primary sources for rapid recharge of the groundwater aquifers of the region.

The BLM categorizes all areas within the Carlsbad Field Office as having either low, medium, high or critical cave potential based on geology, occurrence of known caves, density of karst features, and potential impacts to fresh water aquifers. This project occurs within a high karst zone. A high karst zone is defined as an area occurring in known soluble rock types and containing a high frequency of significant caves and karst features such as sinkholes, bedrock fractures that provide rapid recharge of karst aquifers, and springs that provide riparian habitat.

Sinkholes and cave entrances collect water and can accumulate rich organic materials and soils. This, in conjunction with the stable microclimate near cave entrances, support a greater diversity and density of plant life which provides habitat for a greater diversity and density of wildlife such as raptors, rodents, mammals, and reptiles.

The interior of the caves support a large variety of troglobitic, or cave environment-dependent species. The troglobitic species have adapted specifically to the cave environment due to constant temperatures, constant high humidity, and total darkness.

4.0 Environmental Impacts or Consequences

This section is a discussion, by relevant resources, of the potential impacts of the proposed action. The discussion includes direct, indirect, cumulative and residual impacts after mitigation actions have been applied.

No Action Alternative

Projects requiring approval from the BLM such as Applications for Permit to Drill can be denied when the BLM determines that adverse effects to resources (direct or indirect) cannot be mitigated to reach a Finding of No Significant Impact (FONSI). Under the No Action Alternative, the proposed project would not be constructed and there would be no new impacts to natural or cultural resources from oil and gas production. The No Action Alternative would result in the continuation of the current land and resource uses in the project area and is used as the baseline for comparison of alternatives.

4.1 Air Resources

Alternative A – Proposed Action

Air Quality

The winds that frequent the southeastern part of New Mexico generally disperse odors and emissions, however, air quality would be impacted temporarily from exhaust emissions, chemical odors, dust caused by vehicles traveling to and from the project area and from motorized equipment used during construction, drilling, and production of the well. Potential impacts of development could include releases of GHG and volatile organic compounds during drilling, testing, and production activities. Impacts to air quality will diminish upon completion of the construction and drilling phases of the proposed action.

The EPA has the primary responsibility for regulating air quality, including seven nationally regulated ambient air pollutants. The EPA has delegated regulation of air quality to some states of which New Mexico is one. The New Mexico Air Quality Bureau's (NMAQB) mission is to protect the inhabitants and natural beauty of New Mexico by preventing the deterioration of air quality. The NMAQB is responsible for: ensuring air quality standards are met and maintained; issuing air quality Construction and Operating Permits; enforcing air quality regulations and permit conditions. Any emission source must comply with the NMAQB regulations.

Impacts to air quality on lands managed by BLM in southeastern New Mexico are reduced by the following standard practices which include: utilizing existing disturbance; minimizing surface disturbance; reclaiming and quickly establishing vegetation on areas not necessary for production; periodic watering of access roads during dry periods; removal and reuse of caliche for building other projects. Moreover, BLM monitors well sites throughout the life of the well which includes: construction monitoring, drilling inspections, post-drilling environmental inspections, interim reclamation inspections and monitoring, production inspections and final reclamation inspection and monitoring.

Climate

Climate change analyses are comprised of several factors, including GHGs, land use management practices, and the albedo effect. The tools necessary to quantify incremental climatic impacts of specific activities associated with those factors are presently unavailable. As a consequence, impact assessment of effects of specific anthropogenic activities cannot be performed. Additionally, specific levels of significance have not yet been established. Qualitative and/or quantitative evaluation of potential contributing factors within the project area are included where appropriate and practicable. When further information on the impacts to climate change in southeastern New Mexico is known, such information will be incorporated into the BLM's NEPA documents as appropriate.

Environmental and economic climate change impacts from commodity consumption are not effects of the proposed planning decisions and thus are not required to be analyzed under the NEPA. They are not direct effects, as defined by the Council on Environmental Quality (CEQ), because they do not occur at the same time and place as the action. Neither are they indirect effects because the proposed plan actions and resulting greenhouse gas emissions production are not a proximate cause of the emissions or other factors resulting from consumption. The BLM does not determine the destination of the resources produced from Federal lands. The effects from consumption are not only speculative, but beyond the scope of agency authority or control. Therefore, this document does not include analysis of the consumption of resources produced as a result of planning decisions.

Mitigation Measures: None

4.2 Range Alternative A – Proposed Action

The loss of 2.37 acres of vegetation will not affect the Animal Unit Months (AUMs) which are authorized for livestock use in this area. There are occasional livestock injuries or deaths due to accidents such as collisions with vehicles, falling into mud pits or other excavations and ingesting plastic or other materials present at the work site. If further development occurs, the resulting loss of vegetation could reduce the AUMs authorized for livestock use in this area. A lessee's fence is located approximately 140 feet west of the center hole.

Impacts to the ranching operation are reduced by the following standard practices such as utilizing existing surface disturbance, minimizing the well pad and access road total surface disturbance, minimizing vehicular use, placing parking and staging areas on caliche surfaced areas, reclaiming the areas not necessary for production, and quickly establishing vegetation on the reclaimed areas.

Mitigation Measures: Rerouting of lessee's fence if necessary to accommodate well pad

4.3 Soil

Alternative A – Proposed Action

There is a potential for wind and water erosion due to the erosive nature of these soils once the cover is lost. There is always the potential for soil contamination due to spills or leaks. Soil contamination from spills or leaks can result in decreased soil fertility, less vegetative cover, and increased soil erosion.

Impacts to soil resources are reduced by the following standard practices which include: utilizing existing surface disturbance, minimizing the well pad and access road total surface disturbance, minimizing vehicular use, placing parking and staging areas on caliche surfaced areas, utilizing steel tanks rather than reserve pits, reclaiming the areas not necessary for production and quickly establishing vegetation on the reclaimed areas.

Mitigation Measures:

To further reduce impacts the following COAs will apply:

Interim reclamation will be conducted all disturbed areas not needed for active support of production operations, and if caliche is used as a surfacing material it will be removed at time of reclamation to mitigate impacts to soil resources.

Stockpile topsoil to enhance reclamation.

4.4 Vegetation

Alternative A – Proposed Action

2.37 acres of vegetation will be removed when the well pad is constructed. The flowline will be placed adjacent to an existing lease road within existing disturbance, no vegetation will be removed. This impact will last as long as the well is productive. However, interim reclamation, conducted within 6 months of the well being completed will reduce this area by about 1/3. When the well is plugged and abandoned, the rest of the pad will be reclaimed and potentially re-vegetate in 3-5 years, depending on timely rainfall.

Impacts to vegetation are reduced by the following standard practices which include: utilizing existing surface disturbance, minimizing the well pad and access road total surface disturbance, minimizing vehicular use, placing parking and staging areas on caliche surfaced areas, utilizing steel tanks rather than reserve pits, reclaiming the areas not necessary for production and quickly establishing vegetation on the reclaimed areas.

Mitigation Measures:

To further reduce impacts the following COAs will apply:

Interim reclamation will be conducted all disturbed areas not needed for active support of production operations, and if caliche is used as a surfacing material it will be removed at time of reclamation to mitigate impacts to soil resources.

4.5 Visual Resource Management (VRM)

Alternative A – Proposed Action

This project will cause some short term and long-term visual impacts to the natural landscape. Short term impacts occur during construction operations and prior to interim reclamation. These include the presence of construction equipment vehicle traffic. However, interim reclamation, conducted within 6 months after construction will reduce this area by about 1/3 by recontouring and revegetating.

Long term impacts are visible to the casual observer through the life of the well. These include the visual evidence of storage tanks, piping, pump jacks, pads and roads which cause visible contrast to form, line, color, and texture. Removal of vegetation due to road and drill pad construction exposes bare soil lighter in color and smoother in texture than the surrounding vegetation. The surfacing of these areas with caliche materials causes further contrasts. Those contrasts will be visible to visitors in the area.

After final abandonment and reclamation, the pad and associated infrastructure will be removed, reclaimed, recontoured and revegetated, thereby eliminating visual impacts.

Short and long term impacts are minimized by best management practices such as color selection, reducing cut and fill, screening facilities with natural features and vegetation, interim reclamation and contouring roads along natural changes in elevation.

Mitigation Measures:

To minimize the visual impacts the following COA will apply: Above-ground structures including meter housing that are not subject to safety requirements are painted a flat non-reflective paint color Shale Green, Munsell Soil Color No. 5Y 4/2”

4.6 Wildlife

Alternative A – Proposed Action

Impacts of the proposed action to wildlife in the localized area may include but are not limited to: possible mortality, habitat degradation and fragmentation, avoidance of habitat during construction and drilling activities and the potential loss of burrows and nests.

Standard mitigation measures and elements of the proposed action minimize these impacts to wildlife. These include: the NTL-RDO 93-1(modification of open-vent exhaust stacks to prevent perching and entry from birds and bats), nets on open top production tanks, interim reclamation, closed loop systems, exhaust mufflers, berming collection facilities, minimizing cut and fill, road placement, avoidance of: wildlife waters, stick nests, drainages and playas and dunal features.

These practices reduce mortality to wildlife and allow habitat to be available in the immediate surrounding area thus reducing stressors on wildlife populations at a localized level. Impacts to local wildlife populations are therefore expected to be minimal.

Mitigation Measures: None

4.7 Cultural Resources

Cultural resources on public lands, including archaeological sites and historic properties, are protected by federal law and regulations (Section 106 of the National Historic Preservation Act and the National Environmental Policy Act). Class III cultural surveys will be conducted of the area of effect for realty or oil and gas projects proposed on these lands prior to the approval of any ground disturbing activities to identify any resources eligible for listing on the National Register of Historic Places. Cultural resource inventories minimize impacts to cultural sites and artifacts by avoiding these resources prior to construction of the proposed project. If unanticipated or previously unknown cultural resources are discovered at any time during construction, all construction activities shall halt and the BLM authorized officer will be immediately notified. Work shall not resume until a Notice to Proceed is issued by the BLM.

A Class III cultural resource inventory (BLM 10-NM-523-187) was conducted of the area of effect, Historic properties were identified.

Mitigation Measures: none

4.8 Noxious Weeds

Alternative A – Proposed Action

Any surface disturbance can increase the possibility of establishment of new populations of invasive, non-native species. The construction of the proposed action may contribute to the establishment and spread of African rue and Malta starthistle. The main mechanism for seed dispersion would be by equipment and vehicles that were previously used and/or driven across noxious weed infested areas. Noxious weed seed could be carried to and from the project area by construction equipment and transport vehicles.

Mitigation Measures:

To further reduce impacts the following COAs will apply:

The operator shall be held responsible if noxious weeds become established within the areas of operations. Weed control shall be required on the disturbed land where noxious weeds exist, which includes the roads, pads, associated pipeline corridor, and adjacent

land affected by the establishment of weeds due to this action. The operator shall consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.

4.9 Cave/Karst

GENERAL IMPACT ANALYSIS

Cave and karst features provide direct conduits leading to groundwater. These conduits can quickly transport surface and subsurface contaminants directly into underground water systems and freshwater aquifers without filtration or biodegradation. In addition, contaminants spilled or leaked into or onto cave/karst zone surfaces and subsurfaces may lead directly to the disruption, displacement, or extermination of cave species and critical biological processes. In extreme or rare cases, a buildup of hydrocarbons in cave systems due to surface leaks or spills could potentially cause underground ignitions or asphyxiation of wildlife or humans within the cave.

In cave and karst terrains, rainfall and surface runoff is directly channeled into natural underground water systems and aquifers. Changes in geologic formation integrity, runoff quantity/quality, drainage course, rainfall percolation factors, vegetation, surface contour, and other surface factors can negatively impact cave ecosystems and aquifer recharge processes. Blasting, heavy vibrations, and focusing of surface drainages can lead to slow subsidence, sudden collapse of subsurface voids, and/or cave ecosystem damage.

A more complete discussion of the impacts of oil and gas drilling can be found in the *Dark Canyon Environmental Impact Statement of 1993*, published by the U.S. Department of the Interior, Bureau of Land Management.

GENERAL MITIGATION

To mitigate or lessen the probability of impacts associated with the drilling and production of oil and gas wells in karst areas, the guidelines listed in Appendix 3, Practices for Oil and Gas Drilling and Production in Cave and Karst Areas, as approved in the Carlsbad Resource Management Plan Amendment of 1997, page AP3-4 through AP 3-7 will be followed.

BLM maintains up to date locations and surveys of known cave and karst features. Projects will be located away from these features whenever possible. Drilling pads, roads, utilities, pipelines and flowlines will be routed around cave and karst features at an adequate distance to mitigate adverse impacts. Wellbore engineering plans will incorporate required cave and aquifer protection protocols.

Highly sensitive cave and karst areas with critical freshwater aquifer recharge concerns may have a number of special surface and subsurface planning and construction requirements based upon the risk of adverse impacts created by a specific location or process.

CONSTRUCTION IMPACT ANALYSIS

The construction of roads, pipelines, well pads and utilities can impact bedrock integrity and reroute, impede, focus, or erode natural surface drainage systems. Increased silting and sedimentation from construction can plug downstream sinkholes, caves, springs, and other components of aquifer recharge systems and result in adverse impacts to aquifer quality and cave environments. Any contaminants released into the environment during or after construction can impact aquifers and cave systems. A possibility exists for slow subsidence or sudden surface collapse during construction operations due to collapse of underlying cave passages and voids. This would cause associated safety hazards to the operator and the potential for increased environmental impact. Subsidence processes can be triggered by blasting, intense vibrations, rerouting of surface drainages, focusing of surface drainage, and general surface disturbance.

Blasting fractures in bedrock can serve as direct conduits for transfer of contaminants into cave and groundwater systems. Blasting also creates an expanded volume of rock rubble that cannot be reclaimed to natural contours, soil condition, or native vegetative condition. As such, surface and subsurface disruptions from blasting procedures can lead to permanent changes in vegetation, rainfall percolation, silting/erosion factors, aquifer recharge, and freshwater quality and can increase the risk of contaminant migration from drilling/production facilities built atop the blast area.

CONSTRUCTION MITIGATION

In order to mitigate the impacts from construction activities on cave and karst resources, the following Conditions of Approval will apply to this APD:

- In the event that any underground voids are encountered during construction activities, construction activities will be halted and the BLM will be notified immediately.
- No Blasting to prevent geologic structure instabilities.
- Pad Berming to minimize effects of any spilled contaminants.

DRILLING IMPACT ANALYSIS

During drilling, previously unknown cave and karst features could be encountered. If a void is encountered while drilling and a loss of circulation occurs, lost drilling fluids can directly contaminate groundwater recharge areas, aquifers, and groundwater quality. Drilling operations can also lead to sudden collapse of underground voids. Cementing operations may plug or alter groundwater flow, potentially reducing the water quantity at springs and water wells. Inadequate subsurface cementing, casing, and cave/aquifer protection measures can lead to the migration of oil, gas, drilling fluids, and produced saltwater into cave systems and freshwater aquifers.

DRILLING MITIGATION

Federal regulations and standard Conditions of Approval applied to all APDs require that adequate measures are taken to prevent contamination to the environment. Due to the extreme sensitivity of the cave and karst resources in this project area, the following additional Conditions of Approval will be added to this APD.

To prevent cave and karst resource contamination the following will be required.

Closed Mud System Using Steel Tanks with All Fluids and Cuttings Hauled Off.

- Rotary drilling with fresh water where cave or karst features are expected to prevent contamination of freshwater aquifers.
- Directional Drilling allowed after at least 100 feet below the cave occurrence zone to prevent additional impacts resulting from directional drilling.
- Lost Circulation zones logged and reported in the drilling report so BLM can assess the situation and work with the operator on corrective actions.
- Additional drilling, casing, and cementing procedures to protect cave zones and fresh water aquifers. See Drilling COAs.

PRODUCTION IMPACT ANALYSIS

Production facilities such as tank batteries, pump-jacks, compressors, transfer stations, and pipage may fail and allow contaminants to enter caves and freshwater systems. Downhole casing and cementing failures can allow migration of fluids and/or gas between formations and aquifers. Facilities may also be subject to slow subsidence or sudden collapse of the underlying bedrock.

PRODUCTION MITIGATION

In order to mitigate the impacts from production activities and due to the nature of karst terrain, the following Conditions of Approval will apply to this APD:

- Tank battery liners and berms to minimize the impact resulting from leaks.
- Leak detection system to provide an early alert to operators when a leak has occurred.
- Automatic shut off, check valves, or similar systems will be installed for pipelines and tanks to minimize the effects of line failures used in production or drilling.

RESIDUAL AND CUMULATIVE IMPACT ANALYSIS

Any industrial activities that take place upon or within karst terrains or freshwater aquifer zones have the potential to create both short-term and long-term negative impacts to freshwater aquifers and cave systems. While a number of mitigation measures can be implemented to mitigate many impacts, it is still possible for impacts to occur from containment failures, well blowouts, accidents, spills, and structural collapses. It is therefore necessary to implement long-term monitoring studies to determine if current mitigations measures are sufficient enough to prevent long-term or cumulative impacts.

RESIDUAL AND CUMULATIVE MITIGATION

- Annual pressure monitoring will be performed by the operator. If the test results indicate a casing failure has occurred, remedial action will be undertaken to correct the problem to the BLM's approval.

PLUGGING AND ABANDONMENT IMPACT ANALYSIS

Failure of a plugged and abandoned well can lead to migration of contaminants to karst resources and fresh water aquifers. While this action does not specifically approve plugging and abandonment procedures, the operator should be made aware that additional or special Conditions of Approval may apply at that time.

PLUGGING AND ABANDONMENT MITIGATION

Abandonment Cementing: Upon well abandonment in high cave karst areas additional plugging conditions of approval may be required. The BLM will assess the situation and work with the operator to ensure proper plugging of the wellbore.

5.0 Cumulative Impact Analysis

Cumulative impacts are the combined effect of past projects, specific planned projects, and other reasonably foreseeable future actions within the project study area to which oil and gas exploration and development may add incremental impacts. This includes all actions, not just oil and gas actions, that may occur in the area including foreseeable non-federal actions.

The combination of all land use practices across a landscape has the potential to change the visual character, disrupt natural water flow and infiltration, disturb cultural sites, cause minor increases in greenhouse gas emissions, fragment wildlife habitat and contaminate groundwater. However, the likelihood of these impacts occurring is minimized through standard mitigation measures, special Conditions of Approval and ongoing monitoring studies.

All resources are expected to sustain some level of cumulative impacts over time, however these impacts fluctuate with the gradual abandonment and reclamation of wells. As new wells are being drilled, there are others being abandoned and reclaimed. As the oil field plays out, the cumulative impacts will lessen as more areas are reclaimed and less are developed.

6.0 Consultations and Coordination

Prepared by: John Fast, Natural Resource Specialist BLM-CFO

Date: 02/03/09

The following individuals have been consulted regarding the proposed action:

Bruce Boeke, Archaeologist, BLM-CFO

Ty Allen, Wildlife Biologist, BLM-CFO

James Smith, Planning & Environmental Coordinator, BLM-CFO

Aaron Stockton, Natural Resource Specialist, BLM-CFO

7.0 References

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**DECISION RECORD (DR)
AND
FINDING OF NO SIGNIFICANT IMPACT (FONSI)
BLM Office: Carlsbad Field Office**

**DOI-BLM-NM-P020-2010-0346-EA
Lease #: NMNM 120349
Murchison Oil & Gas, INC.
Carbon Valley 26 Fed Com #1H**

Purpose and Need for Action

Murchinson Oil & Gas, INC has applied for a permit to drill a horizontal oil well and construct the associated access road. The location for the proposed well is as follows:

**Carbon Valley 26 Fed Com #1H:
Surface Location: 1980' FSL & 250' FEL, Section 26, T. 16 S., R. 27 E.
Bottom Location: 1980' FSL & 330' FWL, Section 26, T. 16 S., R. 27 E.**

Recommendation and Rationale:

Our analysis has shown with proper mitigation as described below the proposed action would have minimal environmental impacts. The proposed action is consistent with the Carlsbad Resource Area Management Plan and Amendments. Therefore, it is recommended that this application be approved.

Mitigation Measures:

The mitigation measures include the Pecos District Conditions of Approval.

Prepared by:

/s/ John Fast
John Fast, Natural Resource Specialist

3/5/2010
Date

Finding of No Significant Impact/Decision Record:

I have reviewed this environmental assessment including the explanation and resolution of any potentially significant environmental impacts. I have determined that the proposed action with the mitigation measures described above will not have any significant impacts on the human environment, no significant impacts to minority or low-income populations or communities have been identified for the proposed action and that an EIS is not required. I have determined that the proposed project is in conformance with the approved land use plan. It is my decision to implement the project with the mitigation measures as described above.

/s/ Don Peterson
for James Stovall, Field Manager
Carlsbad Field Office, BLM

3/10/2010
Date