

Appendix A

Protection Measures and Conditions 3-D Seismic Survey

**Protective Measures and Conditions for Lexam Explorations (USA)
To Conduct 3-D Seismic Survey
USFWS, Baca National Wildlife Refuge
Winter 2006-2007**

The USFWS management and operational procedures for the seismic survey which are designed to eliminate avoidable impacts to natural and cultural resources and physical infrastructure on the Baca National Wildlife Refuge (Refuge), and to control or reduce unavoidable adverse impacts. Those management and operational procedures are list below:

- 1) The Refuge Manager and environmental monitors will retain the right to "stop work" in any situation that imperils a Threatened or Endangered species or its habitat, that causes significant harm to Refuge resources, that threatens cultural or historic resources, or that endangers public safety. Any sightings of cultural features or artifacts or sightings of threatened or endangered species by employees or contractors of Lexam will be immediately reported to the Environmental Monitor or the Refuge Manager.
- 2) Lexam will, to the greatest extent practicable, conduct all exploration in such a manner as to minimize damage, erosion, pollution or contamination to the lands, waters, facilities, vegetation and other resources of the refuge.
- 3) As far as is practicable, all operations must be conducted without interference with the operation of the Refuge or disturbance to the wildlife thereon.
- 4) The physical occupancy of the area must be kept to the minimum space compatible with the conduct of efficient mineral operations.
- 5) Upon the cessation of operations, the area shall be restored as nearly as possible to its condition prior to the commencement of seismic operations.
- 6) Third-party environmental monitor(s) may be hired at Lexam's expense to ensure compliance with Refuge regulations and protective measures. Lexam will pay reasonable total cost of this requirement, as mutually agreed with the Refuge Manager prior to the hiring of the environmental monitors. The environmental monitor(s) will be hired with prior approval of the Refuge Manager, and will report directly to the Refuge Manager. The environmental monitors will be provided a radio and a cell phone for communications with crews.
- 7) Lexam is responsible for any damage caused by it's employees or contractors hired by Lexam involved in the operations, and for restoring impacted areas as closely as possible to original conditions prior to the end of operations. Lexam will be responsible for restoration of and/or mitigation for all damages to Refuge habitats, and for repairing any damages to Refuge facilities and infrastructure including roads, parking areas, levees, fences and water control structures.

8) The USFWS will enforce all applicable Federal statutes and regulations, including all Refuge specific regulations.

9) Monitoring Program: One or more environmental monitors should be on duty at all times. Additional monitors will be on duty when determined necessary by the Refuge Manager. Daily operations logs shall be kept by the environmental monitors and the operations project manager. These logs should document all daily activities as well as any damages to habitats or infrastructure. Daily updated logs will be made available to the Refuge Manager (or assignee) and Lexam (or assignee) each morning and a final composite log will be given to the Refuge Manager and Lexam upon completion of the program.

10) The shot line and receiver line pattern will be designed and operations conducted so as to minimize mechanized equipment traffic along the line and lessen the overall time required to conduct recording operations.

11) The seismic program will be initiated in the southwest portion of the Refuge and will progress from southwest to northeast.

12) Training Program. Training of all seismic program personnel will be conducted prior to commencing seismic activities through orientation meetings. Training will include review of the provisions and protection measures and review of Refuge-specific and general regulations applicable to national wildlife refuges. Training will be repeated periodically throughout the program prior to each phase of the operations and/or as new personnel begin work on the Refuge.

13) In the event of adverse weather conditions, the Refuge Manager may halt all seismic operations. Should work be delayed for this reason the Refuge Manager is authorized to extend the period of operation up to an additional thirty (30) days.

14) Measures to Protect Cultural Resources

- A file search to be performed by an archaeologist to identify any known cultural sites. The archaeologist will also identify and map high probability areas within the area of the seismic survey, and mapped buffer zones around all known sites and high probability areas.
- All cultural resources identified in the file search and all high probability areas will be mapped and/or flagged in the field by the archaeologist prior to beginning seismic operations, and such sites will be avoided by seismic field crews during all phases of the seismic survey. No seismic survey activities will occur in buffer zones of 100' radius around identified sites and high probability areas.
- The seismic survey will only use the low-impact seismic survey methodology specified in the "Seismic Methodology and Sensitive Area Avoidance Plan."

- Staging areas for the seismic survey will be off Refuge property.
- Any discovery of cultural artifacts or features during the course of the seismic survey will be immediately reported to the USFWS and the SHPO. The Refuge Manager and the environmental monitor(s) will have "stop work" authority for any activity that may threaten a cultural artifact or feature.

15) Measures to Protect Migratory Birds, Other Wildlife, and Habitats

- The timeframe for conducting the seismic survey will be January 01, 2007 to February 28, 2007, to reduce or altogether eliminate disturbance impacts to migrating/breeding migratory birds including waterfowl, shorebirds and wading birds. T-C understands that an earlier completion date is preferable, and will strive to complete the survey at the earliest possible date.
- Shifting of the seismic source or receiver lines and subsequent operations will be required to avoid active unanticipated wildlife concentrations or other sensitive wildlife features.
- Killing or harassing all wildlife on the Refuge is prohibited. Spotlighting of wildlife by crews will be prohibited.
- Potential vegetation damage and soil compaction/rutting along source and receiver lines will be reduced by: 1) restricting the number of vehicle passes along the lines to the absolute minimum required. Polaris will limit receiver line checks to the absolute minimum possible. Wherever possible, laying and servicing receiver equipment will be accomplished by walking. Natural and man-made travel lanes, (roads and trails) will be utilized whenever possible; 2) using four-wheelers where necessary in uplands and drier transitional sites; 3) minimizing turning by tracked vehicles (no locking tracks); 4) prohibiting all "cross-country travel" by mechanized vehicles.
- Damage to levees, ditches, and other waterway banks and shorelines will be minimized to the extent possible by: 1) conducting recording activities all on one side of a waterway in a portion of the project area before proceeding to the opposite side, thereby minimizing crossings; and 2) avoiding lateral travel along banks and shorelines.
- Polaris will pressure wash and chemically decontaminate with approved herbicides all vehicles and receiving equipment prior to deployment on the Refuge to avoid introducing any foreign plants or animals. Vehicles and receiving equipment will be inspected by the environmental monitor(s) prior to entering the Refuge.
- All work will be conducted during daylight hours unless approved or requested by refuge manager.

- Staging areas, and vehicle travel lanes will be approved by the Refuge Manager following a coordinated field review with Polaris.
- Sensitive habitats including Riparian and wet areas will be identified and avoided by shifting source and receiver lines and subsequent operations.
- All vegetation damage and soil compaction/rutting will be restored by Polaris as nearly as possible to its condition prior to commencement of seismic operation, or will be mitigated for as specified by the Refuge manager.

16) Other Measures

- Polaris will establish and identify to the USFWS a designated point of contact who will be available at all times for communication and coordination with the USFWS.
- All water control structures, wells and water gauges will be avoided except as authorized by the Refuge Manager.
- The USFWS and Polaris will cooperatively develop a Contingency Plan to cover the potential occurrence of project-related or other incidences of wildfire during the seismic survey. Survey crews will carry basic fire suppression equipment (shovels, fire extinguishers, etc.). Crews will report any occurrence of wildfire to Refuge management.
- Possession of firearms is prohibited by Refuge regulation. Possession of firearms is also prohibited by Polaris policy and is enforceable by dismissal from employment.
- In the event that any roads, trails, parking areas, levees, and other infrastructure are impacted by the seismic survey, these resources will be immediately repaired at Polaris' expense. Polaris will be required to maintain all Refuge facilities used during the seismic survey, and repair any damages caused by Polaris' use of these facilities.
- All damaged fences (barbed and electric) breached by the seismic survey will be repaired at Lexam's expense in a timely manner, and in a manner agreed upon by the Refuge Manager.
- Field oil or fluid changes will be permitted on the Refuge in selected staging (administrative) areas determined by the Refuge Manager. Any spilled oil will require immediate cleanup. Therefore, oil absorbent pads will be required on site at all times as a precautionary measure.
- Polaris will provide the Refuge Manager with proof of environmental liability insurance or post a bond prior to the initiation of seismic surveys.

- Strict adherence to Polaris Drug and Alcohol Policy will be enforced for all employees, contractors, and subcontractors. Violation of this policy will be grounds for immediate dismissal.
- All cans, bottles, paper, and other trash generated by the seismic crew will be removed from the Refuge daily. Trash receptacles provided by Polaris for its employees/contractors must be emptied and trash removed from the Refuge on a daily basis.
- All equipment and debris incidental to the survey, such as flagging, wires, poles, etc., will be removed following the cessation of activities on each line.
- Polaris will advise the Refuge Manager at least 72 hours in advance of the initial survey activities and shall coordinate all activities during the seismic survey on the Refuge with the Refuge Manager.
- The Refuge Manager will be provided detailed maps showing the exact locations of all seismic survey lines and shot holes promptly after survey completion.
- All applicable Federal and State regulations, including all Refuge-specific regulations shall be in force and adhered to by all seismic personnel at all times, except where explicitly exempted by the Refuge Manager. Seismic personnel shall comply with all, applicable ordinances, laws, decrees, statutes, rules and regulations of all federal and state entities.
- The USFWS can request add or modify the protective measures during the seismic survey should additional or modified stipulations be needed to protect Refuge resources or public safety.

Appendix B

USFWS Manual, Land Use Series, 612 FW 2, Oil and Gas



612 FW 2, Oil and Gas

FWM#: 107 (new)
Date: Oil and Gas
Series: Natural and Cultural Resources Management
Part 612: Minerals Management
Originating Office: Division of Realty

2.1 Purpose. This chapter provides standard policy guidance and background information on management of oil and gas activities on Service lands.

2.2 Scope. This chapter provides the basic information regarding the statutes, regulations, and procedures relating to all oil and gas activities conducted on Service lands.

2.3 Policy. The policy of the Service is governed by authorities for leasing oil and gas on Federal lands as found in the Mineral Leasing Act for Acquired Lands of August 7, 1947, as amended; for public domain lands, the Mineral Leasing Act of February 25, 1920, as amended; and in Alaska, Section 1008 of the Alaska National Interest Lands Conservation Act (16 U.S.C. 3148). Leasing is at the discretion of the Secretary of the Interior who has delegated the Bureau of Land Management authority to administer the laws, but has by regulation restricted oil and gas leasing on lands of the National Wildlife Refuge System to those involving drainage (43 CFR 3101.5-1 and 3100.2).

In conformance with the policy set forth in 50 CFR 27 (National Wildlife Refuge System), 50 CFR 60.3 (Patuxent Wildlife Research Center), and 50 CFR 70.4 (National Fish Hatcheries), the Service usually recommends against leasing when the Bureau of Land Management asks for comments.

In the case of non-federally owned oil and gas rights, it is the policy of the Service to protect project resources to the maximum extent possible without infringing upon the rights of sub-surface owners.

2.4 Objectives. The objectives of oil and gas management on Service lands are to:

- A. Protect wildlife populations, habitats, and other resources.
- B. Provide for the exercise of non-federal oil and gas rights while protecting Service resources to the maximum extent possible.

2.5 Authorities.

A. National Wildlife Refuge System Administration Act of 1966. This Act established the standard of "compatibility" which requires that uses of National Wildlife Refuge System (NWRS) lands must be determined to be compatible with the purposes for which individual units were established. (See 16 U.S.C. 668dd-668ee, as amended).

B. Alaska National Interest Lands Conservation Act of 1980 (ANILCA). This act includes

provisions for resource assessments and oil and gas leasing on Federal lands in Alaska. (See 16 U.S.C. 3101 et seq.).

(1) **Section 304** sets forth the requirement for completion of Comprehensive Conservation Plans (CCP) to determine compatibility for oil and gas activities.

(2) **Section 1002** authorizes an inventory and assessment of the fish and wildlife resources of the coastal plain of the Arctic National Wildlife Refuge. It authorizes an analysis of the impacts of oil and gas exploration, development, and production, and exploratory activity within the coastal plain in a manner that avoids significant adverse impacts on fish and wildlife and other resources. In addition, this section provides that all public lands within the coastal plain are withdrawn from all forms of entry or appropriation under the mining laws, and from operation of the mineral leasing laws, of the United States.

(3) **Section 1003** prohibits the leasing of oil and gas within the boundaries of the Arctic National Wildlife Refuge until authorized by a further act of Congress.

(4) **Section 1008** authorizes oil and gas leasing on Federal lands in Alaska. Oil and gas activities (including leasing) may be prohibited when so designated by the law or by the Secretary of the Interior. The Secretary may, after having considered the national interest, determine that exploration, development, or production of oil and gas would be incompatible with the purpose for which the unit was established.

(5) **Section 1310** provides for mission purposes of the Department of Defense and other agencies with prior withdrawals on existing or new refuges in Alaska. Except for the mission of the Department of Defense, ANILCA mandated refuge withdrawals primary for all Alaska refuges. No leasing can be allowed unless the Service determines that such leasing would be compatible with the purposes for which the areas were established (43 CFR 3101.5-1 and .5-3).

C. Mineral Leasing Acts.

(1) The Mineral Leasing Act of 1920 (30 U.S.C. 181 et seq.) authorizes the leasing of oil and gas on Service lands withdrawn from the public domain. This Act provides for the disposition of all money received from leasing activity to be paid into the Treasury. Revenues derived from leases outside of Alaska are distributed as follows: 50 percent, State of origin; 40 percent, Reclamation Fund; and 10 percent deposited in the General Fund.

(2) The Mineral Leasing Act for Acquired Lands of 1947 (30 U.S.C. 351 et seq.) authorizes the leasing of oil and gas on Service lands which were acquired by the United States. All funds derived from a leasing activity on acquired lands are paid into the Treasury to be distributed under the provisions of the Refuge Revenue Sharing Act (16 U.S.C. 715s.)

(3) Almost all Service lands are subject to one or both of these mineral leasing laws.

D. Other Laws Relating to Oil and Gas Activity on NWRS Lands.

(1) **National Environmental Policy Act of 1969.** (42 U.S.C. 4321 et seq.) Refer to 550 FW, National Environmental Policy Act.

(2) **Archaeological Resources Protection Act of 1979.** (16 U.S.C. 470aa-470ee). Refer to 614 FW, Cultural Resources Management.

(3) **Migratory Bird Conservation Act of 1929.** (16 U.S.C. 715 et seq). Section 715e provides statutory

authority for regulation of reserved mineral rights on refuge lands (it subordinates oil and gas interests to such rules and regulations as may be prescribed by the Secretary from time to time.)

(4) **Endangered Species Act of 1973.** (16 U.S.C. 1531 et seq.) as amended.

(5) **Wilderness Act of 1964.** (16 U.S.C. 1131 et seq.).

E. Regulations.

(1) **Oil and Gas Leasing on NWRS Lands** (43 CFR 3101.5.) This regulation established guidelines covering oil and gas leasing on NWRS lands.

(2) **Mineral Operations on NWRS Lands** (50 CFR 29.32.) This regulation sets forth general rules governing the exercise of reserved and excepted mineral rights on NWRS lands.

(3) **Geological and Geophysical Exploration of the Coastal Plain of the Arctic National Wildlife Refuge, Alaska** (50 CFR Part 37.) This regulation establishes guidelines governing geological and geophysical exploration for oil and gas within the coastal plain of the Arctic National Wildlife Refuge.

2.6 Definitions.

A. Abandonment. To cease production of oil and gas from a well when it becomes unprofitable, including but not limited to plugging.

B. Development. The construction of all necessary facilities for collection, treatment, storage, and transportation of oil and gas.

C. Drainage. A process in which petroleum resources in a geologic formation in land controlled by, in this case the Service, are depleted by the extraction of petroleum from the same formation by an operation located on adjacent land of another owner.

D. Excepted Rights. Oil and gas rights outstanding in third parties when the United States (Service) acquires title to the lands.

The owner of excepted (outstanding) oil and gas rights has the right to sell, lease, explore for, and remove those minerals subject to the terms of the instrument by which that interest was acquired or reserved and to the State laws governing protection of the surface and the rights of the surface owner. The project leader is responsible for obtaining proof of legal right to enter for oil and gas operations, (deed, lease agreement, title evidence, etc.). Close cooperation with the operator is necessary to minimize disturbance and damage to the project area. Conditions found during inspections should be documented. (See 612 FW 2.9(B).)

E. Exploration. Geological exploration or geophysical exploration or both, and all related activities and logistics associated with either or both.

F. Production. Operation, maintenance, and termination of yielding oil and gas wells and related support facilities.

G. Reserved Rights. A clause in a conveyance, such as a deed, where the seller or grantor retains oil and gas rights on the property sold to the United States on behalf of the Service.

The owner of oil and gas rights reserved, when selling land to the United States, has the right to sell, lease, explore for, and remove those minerals in accordance with the conditions in the deed to the United

States and with pertinent State laws. Close cooperation with the operator is necessary to minimize disturbance and damage to the project area. Conditions found during inspections should be documented. (See 612 FW 2.9(B).)

2.7 Responsibilities.

A. The Director provides national policy guidance on procedures governing all uses of Service lands, including oil and gas activity.

B. Regional Directors.

(1) Review determinations of project leaders in appeals filed in accordance with 50 CFR 25.45 (refuge permits).

(2) Ensure that project leaders adhere to law and policy when making decisions concerning oil and gas activities.

C. Project Leaders.

(1) Administer all oil and gas activities.

(2) Comply with all applicable laws, policies, and guidance when administering oil and gas activities.

(3) Protect Service lands against all unnecessary damage resulting from oil and gas activities.

(4) Where reserved or excepted mineral rights exist, the project leader is responsible for ensuring that his/her actions do not result in an illegal taking of private property.

2.8 Regulations and Policies Relating to Oil and Gas Activities on NWRS Lands.

A. NWRS Lands Outside of Alaska.

(1) Public Domain and Acquired Lands Within a Withdrawal Boundary. Federally-owned oil and gas rights on NWRS lands embraced in the withdrawal of public domain and acquired lands of the United States are not available for leasing (43 CFR 3101.5-1) except where drainage occurs (43 CFR 3100.2). In a decision by the Interior Board of Land Appeals (57 IBLA 319) in 1981, it was determined that the prohibition against oil and gas leasing on "refuge lands" did not include lands acquired from other sources. (On January 31, 1984, Congress was informed that the Department had no plans to pursue leasing of non-Alaska refuge lands.) Some forms of exploration may be permitted on these lands subject to Regional direction. If so permitted, the applicant seeking exploration privileges must justify the need. Reserved or excepted rights may exist within the embrace of this type of withdrawal on acquired sections. When this situation occurs, the persons holding those privileges have the full right to develop their minerals subject to provisions for maximum protection of wildlife and other resources.

(2) Acquired Lands. Acquired lands are open to oil and gas leasing under the Mineral Leasing Act for Acquired Lands of 1947, but units of the National Wildlife Refuge System are closed under Departmental policy. Exploration of federally-owned minerals on these lands is also subject to Regional direction and justification. Reserved and excepted rights on acquired lands are subject to the same provisions as public domain.

(3) Coordination Lands. Coordination lands, which are withdrawn or acquired lands made available to States by cooperative agreement, may be made available for oil and gas leasing under Departmental regulations. Representatives of the Bureau of Land Management (BLM) and the Service, in cooperation

with State game commissions, determine by agreement which coordination lands are not closed to oil and gas leasing (43 CFR 3101.5-2). Regardless of whether an agreement is reached on leasing, some forms of exploration may be permitted. Exploration may occur in accordance with Regional mandates, justification of need by the applicant, and consultation with the applicable State game commission. The exercise of reserved or excepted rights on coordination lands is the same as described in public domain and acquired lands.

B. NWRS Lands in Alaska. Refuges in Alaska, other than the Arctic National Wildlife Refuge, may be open to oil and gas leasing if such use is found to be compatible with the purpose for which they were established. The determination of compatibility is fulfilled through the development of refuge comprehensive conservation plans. Exploration of NWRS lands in Alaska is also permitted when compatible. Reserved and excepted rights occurring on refuge lands are administered in the same manner as those described in NWRS lands outside of Alaska.

C. Drainage. If drainage of NWRS lands is suspected, the project leader should consult with the Bureau of Land Management (BLM) to determine whether drainage is actually occurring. If drainage from oil and gas wells drilled on adjacent lands is confirmed, those affected NWRS lands may be leased under exceptions for drainage described in Departmental regulations and policies (43 CFR 3001.2). In such situations, leases should stipulate "no surface occupancy" (directional drilling) where possible. Alternatively, an authorized officer and the BLM may execute agreements with the mineral right owners of adjacent lands providing compensation for losses incurred in drainage.

2.9 Procedural Requirements for Permitting Oil and Gas Activities.

A. Plan of Operations. Operational plans detailing oil and gas activities will be required for federally-owned rights and requested on reserved and excepted rights. The proposed plan of operations shall include, as appropriate, the following:

- (1) Names, addresses, and phone numbers of owner(s) and operator.
- (2) Proof of mineral rights in the form of a copy of the lease, deed, designation of operator, or assignment of rights.
- (3) Map(s) showing the location of mineral rights.
- (4) Maps showing the location of proposed activity and facilities.
- (5) Estimated timetable for completion and periods of activity.
- (6) Description of potential hazards to persons and/or environment.
- (7) Methods for disposal of all waste including drilling mud.
- (8) Provisions for rehabilitation.
- (9) Any additional information required by the project leader for evaluation of the operation.

The proposed plan of operations is submitted to the project leader for review. Within 30 days of the receipt of the plan, the project leader will notify the operator of approval or rejection. If rejected, he/she will describe the reason for the rejection and recommend any corrective action if applicable.

B. Managing Private Rights. The mineral holder has a responsibility to show reasonable regard for the surface estate as required by State law. Project leaders should adhere to the following guidelines in

managing private mineral activities on Service lands:

(1) On Service lands where mineral activity is occurring or anticipated, the deed should be examined to determine whether the Service's right to require a Special Use Permit was recognized. If recognized, a permit will be required. Such other rules and regulations as may be specifically set out in a given deed will also be strictly enforced. A permit will not be mandatory in other instances. A deed restriction recognized in 16 U.S.C. 715e that subordinates oil and gas interests as may be prescribed by the Secretary from time to time may require a legal interpretation before a permit can be issued. Unusual deed language or other questions should be referred to Regional Realty staff and the Solicitor for review.

(2) Where a deed does not recognize permitting authority, the project leader should seek to clarify the Service's power as a holder of the surface estate under State law. State statutes or case law may give powers beyond the usual common law rights of landowners. Moreover, when an intended use would severely impair or destroy the surface interest, and is a use the Service would not have foreseen at the time of purchase, it may be outside the mineral owner's rights under the deed.

(3) Absent a permitting requirement in the deed, the project leader should pursue voluntary permitting arrangements with the mineral interest owner to specify the reasonable limits of his/her intended operations. The mineral interest owner's inducement for entering into such an agreement is a degree of protection from later being found to have acted unreasonably and to possibly be subjected to civil or criminal liabilities.

(4) If neither mandatory nor voluntary permitting is possible, the mineral owner should be given written notice of all reasonable alternatives which would minimize impacts of the activity. This will enable the project leader to establish, if necessary, that these less-damaging alternatives were disregarded without due consideration of the Service's interests as surface owner should damage occur.

(5) When the owner of the mineral interest exceeds the boundaries of what is reasonably necessary to recover his/her minerals, or fails to take reasonable precautions to minimize the surface damage, the Service may take legal action for damages, secure an injunction, and where appropriate, seek criminal penalties.

(6) The Service's authorities regarding taking of migratory birds or endangered species apply to mineral operators on Service lands. Civil or criminal sanctions should be sought when appropriate.

(7) The key factors in successfully balancing the development of private mineral interests and the protection of wildlife and other resources on Service lands are early and frequent communication and cooperation between the Service and the mineral rights owner, and a commitment to reasonableness on the part of both parties.

(8) Current Service policy does not allow the reservation of minerals other than oil and gas. Great care is to be taken to expressly state in the deed what restrictions will be placed on oil and gas reservations. The provisions should be designed to allow the Service the greatest flexibility possible in dealing with future unforeseen conditions.

C. Performance Bond. A performance bond or certificate of insurance will be required for exploration, development, and production activities. If an operator possesses an existing State or national bond of sufficient coverage, a new bond may not be required. The project leader will determine the potential costs involved should it become necessary for the Service to pay for restoration of damaged areas. These costs will be fully covered by the performance bond or certificate of insurance. Documentation of the existence of the required bond or certificate and its coverage of the Service must be submitted to the project leader prior to issuance of a Special Use Permit.

D. Cost Recovery. The Service has no legal authority to charge an owner for the right to develop outstanding or reserved oil and gas rights. However, charges can be assessed if other than reasonable surface damage occurs. Charges assessed for Special Use Permits should reflect administrative costs incurred in processing where federally owned oil and gas are involved (drainage). Additional charges may be assessed to cover costs incurred in monitoring these activities.

2.10 Designing Permit/Lease Stipulations and Background Information. The diverse nature of Service projects does not allow for the complete standardization of stipulations and conditions to be imposed on oil and gas operations. Consequently, oil and gas activities must be managed on an individual unit basis, with protective stipulations developed in a site-specific manner. Generally, stipulations attached to the lease or Special Use Permit should include protection of air quality, soils, water, wildlife, wildlife habitat, and other Service resources.

A. Leasing. Where leasing is permitted on Service lands, it will be coordinated with the BLM. Coordination with the BLM, which is responsible for issuing leases, allows the Service to provide input on necessary stipulations to be included in the lease agreement.

B. Access. Regulations pertaining to access to Service lands are covered in 50 CFR Part 26. A Special Use Permit may be issued to persons requiring access to their oil and gas rights. Access should be restricted to a specified area in accordance with the provisions of the lease.

C. Exploration.

(1) Geological and Geophysical Surveys.

(a) Geological exploration is often utilized where the bedrock geology of an area is well exposed. When this condition occurs, it is often possible to predict oil and gas potential. This type of exploration is usually performed with little surface damage since heavy equipment is not required. Geophysical exploration may be used in conjunction with geological exploration. Three subsurface characteristics are usually measured by geophysical methods: gravitational field, magnetic field, and seismic characteristics.

(b) Gravitational surveys detect variations in gravity caused by differences in the densities of various types of subsurface rock. This is usually done with small, portable instruments called gravimeters. This type of activity normally causes very little surface disturbance.

(c) Magnetic surveys may be used alone or as a supplement to gravitational surveys. Magnetic surveys reveal upwarped geological structures (likely to yield oil and gas) because such structures show strong magnetic responses. This type of activity normally causes little surface disturbance.

(d) Seismic surveys are the most commonly used geophysical methods and are reported to give the most reliable results. Seismic surveys gather subsurface geological information through the generation and receipt of impulses from an artificially generated shock wave.

(e) Seismic methods are usually referred to by the method which is utilized to generate the shock wave. The thumper method involves dropping a steel slab weighing about 2.73 metric tons (three tons) to the ground several times along a predetermined line. The vibroseis method involves vehicles equipped with vibrator pads and recording devices. The pads are lowered to the ground and the vibrators triggered electronically from the recorder truck. The dinoseis method can be used with a variety of vehicles, however. Its shock wave producing device consists of a bell shaped chamber mounted underneath a vehicle. The seismic energy is imparted into the ground through the spark ignition of a propane and oxygen mixture confined in the chamber.

(f) Explosives have been the most widely used way to generate seismic shock waves. Explosives are used in two different methods: subsurface and surface. In the subsurface method, 2.27 - 22.68 kilograms (5-50 pounds) of explosive charge are detonated at the bottom of a 7.62 - 60.96 meters (25-200 foot) drill hole. Drilling of holes may be accomplished by drill rigs mounted on trucks or portable drills depending on access and topography. Up to 1.82 meter (6 foot) craters may result from this method. The surface explosive method involves the placing of explosives directly on the ground.

(g) Vehicular traffic associated with seismic surveys is potentially the most environmentally damaging aspect of seismic activities. Temporary disturbance to wildlife may be accompanied by habitat loss through changes in water, soil, and vegetative characteristics from heavy equipment damage. Use of ground vehicles may result in long term vegetation change and scenic impacts, where trees are clear cut along a straight compass line. This may be mitigated by requiring helicopter transport of the device producing the seismic wave or drilling equipment (when subsurface explosives are used).

(2) Exploratory Drilling.

(a) When geological and geophysical surveys are favorable for oil and gas, exploratory drilling may be justified. There are basically two types of exploratory drilling: core drilling and wildcat tests. Core drilling involves drilling relatively shallow holes to supplement seismic data. The holes are usually 34.48 to several hundred meters (100 to several thousand feet) deep. Wildcat tests involve drilling in unproven territory to provide information about whether the area actually contains oil and gas. Core drilling apparatus is readily helicopter transportable.

(b) Typical drilling facilities consist of access road(s), drill pad, drill rig, mud pumps, mud pit, generators, pipe rack, and tool house. Other requirements include 4,730 to 14,191 liters (5,000 to 15,000 gallons) of water a day for mixing drilling mud, cleaning equipment, cooling engines, et cetera. Mud pits should always be lined to prevent fluid loss, or portable containers should be utilized instead. Drill muds are used to lubricate the drill bit and remove cuttings. Muds are mixed on-site to match downhole physical properties. They may contain heavy metals and other hazardous materials. Cuttings may contain minerals which become contaminants when oxidized on the surface.

(c) Most exploratory wells are drilled relatively straight and vertical. However, in a situation where the drill site cannot be situated directly over the subsurface drill target, directional drilling may be employed. There may be serious physical, economic, and technical constraints on the use of directional drilling. Directional drilling may, in certain instances, present the project leader with a viable alternative method for reconciling oil and gas activities with resource values. When federally owned oil and gas rights are the issue, the project leader may determine that directional drilling is the only method which protects Service resources adequately. In the case of reserved or excepted rights, it may be more difficult to stipulate that directional drilling would be required. In this case, the project leader may have to demonstrate that there is no alternative if Service resources are to be adequately protected. Where surface values would be destroyed by construction of access roads to exploratory sites, exploratory wells can be drilled by helicopter transportable rigs. In Alaska, temporary winter ice roads can provide access for the drill rig.

D. Development.

(1) If an exploratory well becomes a discovery well; i.e., a well that yields commercial quantities of oil and gas, additional wells may be drilled to confirm the discovery, to establish the extent of the field, and to efficiently chart the reservoir. Spacing of wells drilled under Federal lease is usually a minimum of 16.19 hectares (40 acres) for oil and between 64.78 and 259.11 hectares (160 and 640 acres) for natural gas. Spacing of wells drilled in accordance with reserved or excepted rights would vary by State.

(2) The project leader may decide to designate a temporary road system before a permanent system is

decided upon. Permanent road systems may be determined after productive wells are identified and potential production ascertained. In addition to roads, other facilities required in development may include flowlines, storage tanks, separators, treaters, and injection wells.

(3) Occasionally, developers of adjacent mineral rights may enter into agreement to "unitize" the field, which may involve private as well as Service lands. "Unitizing" involves the development and operation of a field as a unit, disregarding separate ownerships. Costs and benefits would be allocated according to agreed terms.

(4) Usually, 10.26 to 15.38 centimeters (4-to-6-inch) diameter pipelines are used to transport the petroleum between the well, treating and separating facilities, and central collection points. These lines may be on the surface, buried, or elevated. Pipelines are usually buried because of flow problems in winter and mechanical damage that may occur on the surface. Two methods are used separately or in conjunction to transport oil out of a lease or unitized area: tanker trucks and pipelines. Oil may be transported by truck from small fields but pipelines are the most common method of transporting oil and gas. Oil and gas must be transported separately because of their different physical characteristics.

E. Production.

(1) Production begins just after the discovery well is completed and is usually concurrent with development operations. Temporary facilities may be used at first, but as development proceeds and reservoir limits are determined, permanent facilities are installed.

(2) Many wells require artificial lift to bring oil to the surface. Two methods of artificial lift are generally used: gas lift and pumping. Gas lift involves forcing high pressure gas down the drill hole. Fluid that is standing in the hole is displaced by mixing with gas and rises to the surface. Pumping is the main method of artificial lift with various types of pumps utilized. Pumps are usually powered by electric motors or internal combustion engines on the surface. Electric motors make less noise and require less maintenance but electric power is often not available. One commonly used type of artificial lift device is a rod pump which uses an electric motor (or internal combustion engine) to run a surface device ("pumping jack") that imparts an up-and-down motion to a string of steel rods (sucker rods) which in turn is connected to and operates the bottomhole pump.

(3) Most gas wells produce by normal flow and do not require pumping. Surface use at a flowing gas well is usually limited to a fenced area 6.1 meters (20 feet) square containing a gas well "Christmas tree". On site facilities include those described under development.

F. Abandonment and Rehabilitation.

(1) The life spans of oil and gas fields vary with such factors as reserves; reservoir characteristics; nature of petroleum; subsurface geology; and political, economic, and environmental constraints. Dry wells and those that formerly produced are often plugged with cement, with the casing sometimes filled with heavy mud. After plugging, all related above-ground support facilities must be removed from the site. Removal of subsurface facilities, such as pipelines, is subject to State laws and project leader discretion.

(2) Restoration stipulations will be incorporated into any permits issued, supplemented by detailed information on rehabilitation procedures in the operational plan. Depending on the site, drilling mud may be injected into the well and buried or hauled away in accordance with State law. All hazardous substances will be removed from the site and disposed of in an approved hazardous material dumping site. The permittee shall, unless otherwise directed by the project leader, restore access roads and sites to original surface contours and revegetate with appropriate native flora.

2.11 Ensuring Compliance with Permit Conditions. To ensure that operations are carried out in a

reasonable manner, resulting in no unnecessary adverse effects, the project leader shall initiate a written record of activities from initial contact through completion of the oil and gas activity. This file will generally contain records of conversations, correspondence, photos, evaluations, and test results (if required). This record serves an integral function in documenting violations should they occur.

2.12 Coordination and Review. Oil and gas activities may require consultation with other agencies or offices by regulation or as a source of information.

A. Service Offices (Regional Director, Realty, Ecological Services, Law Enforcement). The Regional Director is usually consulted on controversial issues or appeals. Realty is a source of information when the location or ownership of mineral rights is in question. Ecological Services must be consulted when section 404 permits, for dredged or fill material (33 U.S.C. 1344), are required due to wetland alterations. Ecological Services field offices may provide expert advice on oil and gas management plans, project design, and special use permit stipulations. Law Enforcement may be needed when there is a violation of a permit.

B. Other Department Offices (Bureau of Land Management (BLM), U.S. Geological Survey (USGS), Solicitor). Legal questions may be answered or clarified by the Solicitor's office. The BLM is responsible for the issuance of leases on federally owned oil and gas rights. The BLM and USGS may be helpful in designing stipulations or determining drainage.

C. Other Agencies (Corps of Engineers, State agencies). The Corps of Engineers issues 404 permits protecting wetlands. A variety of State agencies may be helpful in the management of oil and gas activities on Service lands, particularly conservation and minerals management sections.

2.13 Preparation of an Oil and Gas Management Plan. An oil and gas management plan is recommended on Service lands where oil and gas activity is projected or active. The format of such a plan should be in accordance with Regional guidelines. At a minimum, the plan should include the following:

A. Current project maps (operational and topographic) and aerial photos.

B. Mineral ownership information by tract.

C. Names and telephone numbers of Federal, State, and local agencies or personnel overseeing oil and gas activities.

D. Descriptions of project purposes and objectives.

E. Descriptions of project populations, habitat and programs including identification of sensitive species and areas.

F. A list of applicable regulations and policies (Federal, State, and project).

G. Excerpts from deeds regarding mineral rights status.

H. Descriptions of past, present, and proposed oil and gas activities on the unit.

I. A list of suggested standard permit stipulations.

J. Potential impacts and protective and corrective measures.

2.14 Selected References and Sources of Information. The following list of references represents a small selection of source data which may be helpful in managing oil and gas activities on Service lands. The references may be especially useful in designing stipulations to protect resources.

(A) A Primer of Oil Well Service and Workbook, p.106; Petroleum Extension Service, University of Texas, Austin, TX; 1979.

(B) Controlled Directional Drilling, p.49; Petroleum Extension Service, University of Texas; Austin, TX; 1984.

(C) Drilling, a Source Book on Oil and Gas Well Drilling from Exploration to Completion; J. A. Short/Pennwell Publishing Company; Tulsa, OK; 1983.

(D) Drilling Mud, p.71; Petroleum Extension Service, University of Texas; Austin, TX; 1984.

(E) Facts About Oil, p.44; American Petroleum Institute; Washington, DC; 1984.

(F) Geophysics in Petroleum Exploration, p.24; American Petroleum Institute; Washington, DC.

(G) Introduction to Oil and Gas Production, p.81; American Petroleum Institute; Washington, DC; 1983.

(H) Managing Oil and Gas Activities in Coastal Environments, p.541; W.F. Longley, R. Jackson and B. Snyder/U.S. Fish and Wildlife Service, Office of Biological Services, Washington, DC; 1981. Also see FWS/OBS - 78/54 Managing Oil and Gas Activities in Coastal Environments, p.66.

(I) Natural Resources Protection and Petroleum Development in Alaska, p.305; U.S. Fish and Wildlife Service, Biological Services Program, Washington, DC; FWS/OBS - 80/22; 1984. Also see FWS/OBS - 80/23 Handbook for Management of Oil and Gas Activities on lands in Alaska, p.64.

(J) Oil and Gas Guide, Northern Region, Training Guide; US Department of Agriculture; US Forest Service, R-1; 1979.

(K) Oil and Gas Use Characterization, Impacts, Guidelines, p.148; US Department of Commerce; Louisiana State University; Baton Rouge, LA; See Grant Publication No. LSU-J-76-006; 1976.

(L) Pipeline Construction, p.123; M. Hosmanck/Petroleum Extension Service, University of Texas; Austin, TX; 1984.

(M) Seismic Exploration Fundamentals, p.85; J.A. Coffeen/PennWell Publishing Company; Tulsa, OK; 1978.

Appendix C

Terms and Conditions

LEXAM EXPLORATIONS (U.S.A.) INC.

CONDITIONS AND PROTECTIVE MEASURES RELATING TO LEXAM EXPLORATION (BACA WELL #5 AND BACA WELL #6 OR BACA WELL #7) ON THE BACA NATIONAL WILDLIFE REFUGE

United States Fish and Wildlife (“USFWS”) Terms and Conditions

To minimize and mitigate the potential impacts of its exploration program on the surface and subsurface resources of the Baca National Wildlife Refuge, Lexam Explorations (U.S.A.) Inc. (“Lexam” or the “Operator”) shall implement the following measures. These measures shall be equally applicable to Lexam’s employees, representatives, consultants, contractors and subcontractors.

- 1) All vehicles and equipment from outside the Refuge will be decontaminated per USFWS procedures to prevent the introduction of noxious weeds to the Refuge. Decontamination will include removal of skid plates for inspection and cleaning if necessary.
- 2) All ground-disturbing activities associated with drilling operations and setup will require on-site cultural resource monitoring which will be provided by Lexam. In addition, once timing of road and pad construction activities is determined, USFWS biologists will survey affected areas to document current wildlife activity and sensitivities to be addressed and/or avoided.
- 3) Lexam will provide trained environmental monitors, approved by USFWS, who will continue to serve as liaisons between the Refuge Manager, construction contractor, and drill rig personnel and ensure that all operations are conducted in a manner that minimizes surface impacts.
- 4) Impacts to sensitive habitat, wildlife, plants, other sensitive natural or historical resource features will be avoided to the extent possible while constructing the access road and well pads.
- 5) All construction of roads and pads will occur in a way that best facilitates their subsequent complete removal and reclamation once Lexam activities have ceased at these sites. This includes separating and stockpiling topsoil layers on-site to be replaced during reclamation. All disturbed areas will be reclaimed per the requirements imposed by the Colorado Oil and Gas Conservation Commission (“COGCC”) and with USFWS input. Only endemic plants and seed mixtures are to be used in reclamation.
- 6) A baseline water quality study of the near-surface unconfined aquifer, deeper aquifers, and surface water in proximity to the planned well locations will be conducted prior to drilling. In addition, at least three monitoring wells will be installed near each well pad to monitor potential spills or releases.
- 7) Casings will be set with COGCC-approved cement to 3,000 feet below the surface which will fully protect the aquifers from contamination through communication in the borehole.
- 8) A closed loop mud and drill cuttings system will be used to minimize impacts to surrounding habitats. In addition, drill cuttings will be isolated in an above-ground tank during drilling. Cuttings will be removed from the Refuge and disposed of off-site in accordance with state regulations.

- 9) Drilling operations will be modified, as necessary, to reduce conflicts with regular Refuge management activities.
- 10) A gate guard will be provided by Lexam, and approved by the USFWS, to document traffic entering and exiting the Refuge and to eliminate potential illegal entry onto the Refuge.
- 11) Arrangements for additional USFWS law enforcement personnel will be made in the event it is deemed necessary to effectively enforce state, federal, refuge, and wildlife laws and regulations during drilling activities.
- 12) Construction and drilling activities will be conducted from August 1 through April 30 in order to avoid conflicts with wildlife and limit ground disturbance activities to periods of low precipitation to minimize impacts to soil.
- 13) Well sites will be located as far from sensitive wet meadow wetlands as practicable.
- 14) Drill pads will be fenced if necessary to prevent large ungulates from gaining access to the sites.
- 15) To protect special status species such as the Rio Grande Sucker and Rio Grande Chub, USFWS and Lexam will:
 - Establish a 0.25-mile buffer zone of no activity around potential and identified habitat.
 - Limit vehicle crossings to existing or pre-approved crossings.
 - Sample waterways for particulate matter, creating a baseline and regular monitoring during period of activity.
 - Assess stability and suitability of road water crossings prior to road construction and drilling activities and perform upgrades, if needed. Conduct periodic monitoring of crossings during activities and documentation of any deficiencies that may occur that may be indicative of potential structural failure.
 - Provide dust suppression in the vicinity of waterway crossings.
- 16) Pre- and post-drilling aerial photographs will be taken of the proposed drilling and road construction area. The photographs will be color and will provide complete coverage of the drilling and road construction area. The pre-survey documentation shall be submitted within 10 days of initiation of the drilling, the post-survey documentation shall be submitted within 110 days of completion along with a digitized version of the pre-survey photographs. These photographs will become the property of the Refuge.
- 17) The Operator shall provide detailed maps or plats to the Refuge Manager or his authorized representative of the proposed project layout, showing routes, staging areas, construction areas, and work locations.
- 18) All materials brought into the Refuge to build up the location pad will be authorized by the Refuge Manager or his authorized representative. To minimize the spread of invasive species, no top soils will be brought in from off the Refuge.
- 19) Summaries of all the results generated from the water quality sampling, cultural resource work and any other sampling or monitoring, including the results of Lexam's exploratory drilling, will be provided to the Refuge Manager upon completion and summation.
- 20) The Operator's drilling activities will be restricted to the period of August 1 through April 30. Any field operations conducted during the Refuge's migratory bird closure period (May 1 through July 31) must be coordinated and authorized by the Refuge Manager or his authorized representative. USFWS will consider allowing Lexam to

continue work in early May if allowing access is necessary to complete activities and such activities would not impact the Refuge and resources greater than what is anticipated in the EA. Rig up and rig down operations can only be conducted during daylight hours. Drilling operations will be conducted 24 hours per day.

- 21) The Operator shall designate an onsite representative for field operations who shall be present during all phases of the Operator's operation and be the sole representative of the Operator and subcontractors regarding all communications and decisions of the Refuge Manager or his authorized representative. The Operator shall keep the Refuge Manager or his authorized representative informed if there is any change of designated representative for field operations.
- 22) Refuge officials will conduct an on site meeting before rig-up with representatives of the Operator, drilling contractor, subcontractors, suppliers and service companies. The purpose of the meeting is to go over regulations and such conditions that apply to work crew conduct on the refuge.
- 23) Prior to rig-up, an Emergency Preparedness Plan covering exploratory drilling, well control, materials hauling, spill response, and fire evacuation, will be provided to the Refuge Manager and discussed in a pre-operation meeting to be held with local governments. The plan shall contain a telephone list naming key contacts for emergency operations and activation.
- 24) The Operator will upgrade and maintain all access routes, roads and bridges designated for its use across the Refuge in accordance with acceptable specifications and standards. The Operator shall have road maintenance equipment and operator(s) readily available to perform road repairs and maintenance as needed, or as directed by the Refuge Manager or his authorized representative.
- 25) Dust levels on regularly traveled access routes must be kept to a minimum. The Operator shall have a water truck and operator(s) readily available to perform dust abatement as needed, or as directed by the Refuge Manager or his authorized representative. Only water will be allowed for dust suppression efforts. Dust control measures shall be implemented throughout the traveled areas of the project area in addition to the dust abatement requirement in measure #15.
- 26) The drill site and immediate access roads shall be constructed of refuge approved material for all drilling locations. Drill pads may not exceed 90,000 square feet in area. All existing drainage patterns within roads to be constructed shall be maintained uninterrupted by the use of culverts, bridges or other applicable techniques as specified and authorized by the Refuge Manager or his authorized representative.
- 27) The soils at the location site will be tested using approved standards to determine levels of heavy metals, chemical pollutant, and other contaminants, prior to rig-up operations. Duplicate tests will be conducted before completion or at abandonment. If the exit test reveals levels above the background established by pre-drilling test, cleanup will be required. The most practical method of clean up is soil removal. Any quantity of soil removed will be replaced to the original contours.
- 28) Upon completion of drilling operations, the Refuge Manager or his authorized representative must be advised within 120 days whether the well is to be retained or plugged. If the well site is to be abandoned, the well is to be plugged according to state law, all above ground structures removed and the site and road restored as directed by the Refuge Manager or his authorized representative. Any damage to existing surface vegetation, water channels, or other physical features shall be restored to original site conditions. All costs shall be born by the Operator.

- 29) Pits, ponds and/or open tanks are prohibited. Portable tanks must be used in circulating operations for the temporary storage of all drilling fluids, cuttings, mud, and contaminants. All drilling fluids, cuttings, mud, contaminants, portable tanks, and other equipment must be transported off Refuge to a state approved facility upon cessation of drilling activity. It is highly recommended that an auger tank be used for transferring drill cuttings and sand to a vehicle for off Refuge transport.
- 30) All toxic construction and equipment supplies and refuse (oil, grease, gasoline, diesel, paint, and other petrochemical derivatives) shall be centrally stored. Wastes shall be disposed off refuge immediately following completion of drilling operations. In the event of an accidental spill or discharge of oil, brine, or any other petrochemical substance, the Operator shall immediately notify the Refuge Manager or his authorized representative. The Operator shall remove contaminated soils for proper disposal off Refuge, and replace such soils with the same type soils or of a type specified and approved by the Refuge Manager or his authorized representative. A site reclamation plan may be required by the Refuge Manager or his authorized representative.
- 31) Catch pans or other liner systems approved by the Refuge Manager are required for equipment and locations such as mud pumps, bulk mud additive tanks, fuel tanks, mixing shed, generators, accumulator and lines, and under the entire rig floor. The catch pans will cover the entire surface area under the equipment. The rig floor catch pan will be tied to allow for wash down and mud drainage from drill pipe. The catch pans will be kept free and clean from accumulated debris and spill materials.
- 32) The Operator will be responsible for providing all water needed for drilling operations. No waste water will be discharged onto Refuge lands, ditches, or water bodies. The Operator will provide a containerized or temporary septic system for domestic sewage disposal during drilling operations, which shall be removed upon completion of drilling. Use of portable toilets at drill site or the installation of a septic system, or similar treatment system or tanks will be required for any trailer or quarters on site. No surface discharge of septic system or portable toilet water is permitted. Septic tanks must be inspected weekly during operations and pumped as necessary. Upon completion of operations, the septic tanks must be pumped out and all material hauled away.
- 33) All disposable type materials and trash brought onto the Refuge or generated at the drill site shall be removed from the Refuge on a biweekly basis and upon completion of the drilling activities. The drill site and operational area shall be kept free of debris and trash at all times. Trash shall be contained securely at the drill site in such a manner (fully enclosed trash cages) as to prevent trash from being spread by wind or wildlife. No trash may be disposed of or buried on the Refuge.
- 34) General Refuge access conditions :
- Access is to allow Lexam and/or its contractors access to portions of the Refuge for the purpose of carrying out drilling of oil and gas exploration wells Baca #5 and Baca #6 or Baca #5 and Baca #7 (either #6 or #7 would be drilled, but not both).
 - The Refuge Manager is the coordinating official having immediate jurisdiction and administrative responsibility for oil and gas operations on the Baca National Wildlife Refuge (Refuge) lands and property, all entry upon the Refuge must be coordinated with the Refuge Manager or his authorized representative The Refuge Manager must be advised at least 48 hours in advance of initial activity.
 - The failure of the United States to require strict performance of the terms, conditions, covenants, agreements, or stipulations of this permit for access to conduct exploration activities on national wildlife refuge lands, shall not constitute a waiver or relinquishment of the right of the United States to strictly enforce

thereafter such terms, conditions, covenants, agreements, or stipulations which shall, at all times, continue in full force and effect.

- Lexam and/or its contractors shall save, hold harmless, defend, and indemnify the United States, its agents and employees for loss, damages, or judgments and expenses on account of bodily injury, death or property damage, or claims for bodily injury, death or property damage of any nature whatsoever, and by whomever made, arising out of the Operator, his employees, subcontractors or agents with respect to the exploration of any and all mineral rights within the lands administered by the Refuge.
- All applicable federal and state regulations apply and will be in force. Operator shall be responsible for the actions of all exploration and support personnel. Violations of applicable laws or regulations will subject the operator and/or his employees to prosecution under state and/or federal laws. Individuals utilizing the Refuge under the Operator's authorization are subject to inspections of vehicles and their contents by federal and state law enforcement officers.
- Proof of general liability insurance in the amount of \$1,000,000 must be furnished to repair/mitigate any damages. This does not limit the liability for damages to this amount.
- Operators will act in a manner that is respectful of Refuge habitats, wildlife, and property. Gates are to be locked or unlocked as they are found.
- All vehicle access will be restricted to developed roads and two-tracks. All terrain vehicle use and deviations to vehicle use must be pre-approved by the Refuge Manager in writing prior to any action taken.
- Vehicle speed limits will be set at the discretion of Refuge Manager and limits will be strictly adhered to.
- No pets will be allowed on the Refuge.
- Possession of firearms, alcoholic beverages or drugs is strictly prohibited on the Refuge.
- Fires are strictly prohibited in any areas of the Refuge.
- Operators are not to be considered agents of the USFWS and are not to represent the USFWS in any matters.
- Operators will perform all work in accordance with the highest standards of the industry and to the satisfaction of the USFWS.
- Operators will perform all work in accordance with all applicable laws and regulations and will obtain all necessary permits or licenses when required to do so.
- All personnel and activities shall be restricted to the immediate drilling area and the direct access road to the drill site.
- Feeding wildlife species is prohibited. Molesting or destroying the home or dens of wildlife is prohibited. If dens are found during the normal course of operations, distinctive flagging will be used to alert all personnel of the den location. Adverse impacts on fish, wildlife and the environment shall be kept to an absolute minimum. All road kills will be reported to the Refuge Manager or his authorized representative.

- Littering is prohibited. All cans, bottles, lunch papers, and operations trash must be removed. Cigarette butts are considered litter. All vehicles will be equipped with a container to carry out trash.
 - All necessary permits, contacts and clearances must be completed or obtained by Lexam prior to the start of the activity.
 - No overnight quarters will be permitted on the refuge unless authorized by Refuge Manager.
- 35) Implement the recommendations contained in the report entitled "Existing Conditions Report for a Portion of the Lexam Road, Saguache County, Colorado," prepared by Russell Surveyors and Associates, Inc., March 30, 2008, with input from the USFWS.
- 36) Implement the recommendations that were the basis for the air quality report analysis set forth in the "Lexam Baca Drilling Project Visibility Impact Evaluation," Air Sciences Inc., April 30, 2008: (a) power generators will be Tier 2 engines; (b) diesel fuel used in generators and all other non-road engines will be ultra-low-sulfur (less than 0.05 percent sulfur); and (c) disturbed areas will be watered to control the fugitive dust
- 37) Upon CDOW recommendation, Lexam has agreed, that in the event of a severe winter, to assisting the CDOW with managing for the needs of any wintering big game temporarily displaced by Lexam's activities within the designated areas, especially if the temporary displacement results in the potential for a decline in overall physiological health of the animals or in increased game damage claims by private landowners. This assistance could occur as a Lexam funded baiting program, feeding program or other form of distribution management as determined appropriate by CDOW within the severe winter range area.

If Lexam discontinues or fails to perform any of the preceding terms and conditions, and the Refuge Manager believes such failure will lead to unreasonable damages to Refuge resources, the USFWS may assess penalties pursuant to 50 C.F.R. Part 28 and may require Lexam to cease exploration activities until the risk of damage to Refuge resources has been removed or mitigated in the sole discretion of the USFWS.

Colorado Oil and Gas Conservation Commission ("COGCC") Terms and Conditions

The following are the terms and conditions are imposed by the COGCC in Permit No. 2006A069 (Baca Well #5), Permit No. 2006A070 (Baca Well #6) and that certain Sundry Notice changing the location of Well #6, dated April 30, 2008, and Permit No. 20075486 (Baca #7). Terms and conditions Nos. 19 and 20 were added to the Baca #7 permit and apply to Baca #5 and #6 as well. Certain of the COGCC terms and conditions are duplicative of terms and conditions imposed by the USFWS and described above.

1. Notify David Shelton - COGCC Engineering Supervisor (303-894-2100 x 108) or David Dillon - COGCC Engineering Manager (303-894-2100 x 104) 48 hours prior to moving onto the location with drilling equipment. Advise Mr. Shelton or Mr. Dillon at least 24 hours prior to running any casing string to provide COGCC Field Inspectors sufficient notification time to witness cementing operations and pressure testing of blowout preventers. If the well is a dry hole, notify Mr. Shelton or Mr. Dillon 24 hours prior to plugging and abandoning this well.
2. Any changes to the approved drilling plan and procedures must be approved in writing by the COGCC.

3. Immediately notify the COGCC of any major problems encountered during the drilling, cementing, or completion process.
4. Conductor casing and surface casing will be cemented to surface.
5. Surface casing depth will be set at a depth of 3000 feet. This depth was determined by COGCC staff based upon review of available relevant data, including data from the deep water well located approximately one mile from the drill sites, and after consultation with the Division of Water Resources staff.
6. Prior to commencing operations, an inventory of all chemicals and products that will be used or stored on site must be provided to the COGCC, the surface owner, and local emergency response personnel prior to bringing those substances on to the Baca National Wildlife Refuge. If additional chemicals or products are required, then information about these substances must be provided to the COGCC, the surface owner, and the local emergency response personnel prior to bringing them on to the Baca National Wildlife Refuge.
7. Prior to commencing operations, a meeting with the local emergency response personnel will be held to establish an adequate safety and response plan for drilling, completion, and production activities.
8. A closed loop mud and cutting system will be used and cuttings will be placed in an above ground and lined enclosure, unless landowner approval to use an alternative mud and cutting system is obtained in writing.
9. The drill cuttings will not be left at or buried on the drill site or elsewhere on the Baca National Wildlife Refuge, unless landowner approval is obtained in writing. Cuttings will be disposed in accordance with COGCC Rule 907.
10. Formation temperatures will be recorded and the data provided to the COGCC and the surface owner.
11. If pumping tests are conducted on discrete zones below deepest neighboring water well (2,180 feet below surface), then water samples will be collected for basic water quality tests, including TDS, dissolved metals, common anions, pH and alkalinity. The analytical results will be provided to the COGCC and the surface owner.
12. If production casing is run, then all hydrocarbon and water bearing formations must be covered with cement and a cement bond log must be run to verify coverage. Cementing requirements will be determined by COGCC staff from open-hole logs and other well information obtained during the drilling of the well.
13. If the well is plugged as a dry hole, then the COGCC must be contacted for plugging instructions, which will be based on log and geologic data, and the actual wellbore configuration. Cement plugs will be set to confine all fluids to the reservoirs in which they originally occurred. The plugging procedure will assure that all aquifers are properly isolated and protected.

14. A guard, provided by Lexam, shall be stationed at the property gate on County Road T during all drilling and completion activities. The guard will limit access to the property to Lexam employees, Lexam contractors, and other authorized personnel.
15. Baseline water quality data will be acquired from both near surface (unconfined aquifer) and deeper aquifers in proximity to proposed wells prior to the spud of the wells and again within six months after the wells are completed and/or plugged. Sampling and analysis procedures must be approved by the COGCC staff prior to conducting this work. Data will be provided to the COGCC and the surface owner. Data will be used to assess any possible long-term effects on ground water quality.
16. A minimum of one up-gradient and two down-gradient monitoring wells will be installed around each drill pad. The wells will be completed in the shallow unconfined aquifer. The locations and elevations of the wells will be surveyed and depth to water will be measured. Water samples will be collected for chemical analysis before the wells are spud and at predetermined intervals thereafter, which will be agreed to by the United States Fish and Wildlife Service (USFWS) and Lexam. If spills or releases of drilling related chemicals at sites occur, then the sampling frequency may be increased to a frequency agreed to by the USFWS, Baca Grande Water and Sanitation District, and Lexam.
17. Equipment and vehicles brought onto the Baca National Wildlife Refuge from outside the San Luis Valley must be cleaned and decontaminated to minimize introduction of non-native species and noxious weeds.
18. Lexam will insure that all drilling and completion operations will be supervised by a WellCAP IADC certified supervisor. All blow prevention equipment shall be rated for 5000 psi and will be installed and tested in accordance with U.S. Bureau of Land Management Onshore Order #1.
19. Approval of the APD is limited to drilling and completion operations and permission shall be obtained from the Director of the Oil and Gas Conservation Commission prior to commencing production from the Baca Wells #5, #6, or #7.
20. Any conditions related to protection of public health, safety, welfare and the environment that are developed as a result of the federal Environmental Assessment process and that are under the jurisdiction of the Oil and Gas Conservation Commission shall be applied to the drilling and completion operations of the Baca Wells #5, #6, or #7.

Saguache County Agreement Terms and Conditions

The following terms and conditions are summarized from that certain "Agreement between Saguache County and Lexam Explorations (U.S.A.) Inc. Related to Drilling and Exploration Activities," dated April 17, 2007.

1. The County will provide certain signage, at specified locations, as may be agreed to by Lexam and the County and that Lexam will pay the County Road and Bridge Department the sum of a minimum of \$100.00 for that signage.

2. Lexam, to comply with the County road weight limitations, will weigh each truck that it owns, contracts for, or controls and uses for its activities within the County, and that will use any road in the County road system.
3. Lexam or its contractors will provide a copy of the weight ticket for each vehicle used or participating in its activities within the County, for each trip that the subject vehicle makes on the County road system, to the County's Road and Bridge Department.
4. Lexam agrees to pay to the County the sum of \$4.29 for each ton of weight that the vehicles subject to this Agreement exceed the County road weight limit of 54,000 pounds.
5. Lexam agrees to purchase a County Road Access Permit for accessing Saguache County Roads, from the Saguache County Road & Bridge Department, at the same cost charged by the County to other, similar users of County roads.
6. All sums payable under the Agreement will be paid to the County on a monthly basis.
7. In order to minimize the cost and effort involved in disposing of cuttings from the drill sites and to minimize the impact that the drilling activities may have on Saguache County, Lexam agrees that it will voluntarily test the "cuttings" which arise from the drilling of any exploration well or other exploration activities within the County of Saguache. Such testing shall be limited to those cuttings that visually exhibit substances other than dirt and rocks and for which Lexam proposes to permanently dispose in the County. These tests will be in addition to, or concurrent with, any other testing which may be required by Federal or State authority. The purpose of this testing is to determine if the cuttings can be safely used as wellsite cover and/or road base materials, as well as to assist in determining if any special precautions are required for the permanent disposal of the cuttings. The testing will include:
 - Total petroleum hydrocarbons (TPH),
 - Sodium Adsorption Ratio (SAR),
 - Heavy metal concentrations,
 - pH level, and
 - Conductivity.

Lexam agrees that it will provide a report of the above tests and all other tests performed on the cuttings and fluids produced results from the drilling operation, as required by Federal or State agencies, to the County Land Use Department. Said testing will conform to the generally acceptable testing standards for the industry.

Appendix D

Agreement Between Saguache County and Lexam Explorations (U.S.A.)

AGREEMENT BETWEEN SAGUACHE COUNTY AND LEXAM
EXPLORATIONS (U.S.A.) INC. RELATING TO DRILLING AND
EXPLORATION ACTIVITIES IN SAGUACHE COUNTY, COLORADO

This Agreement is entered into this 17 day of April, 2007, by and between the County of Saguache, Colorado, a governmental entity ("County"), and Lexam Explorations (U.S.A.) Inc. ("Lexam").

WHEREAS, the County has the legal authority to adopt regulations establishing weight limitations and usage restrictions for roads which belong to the County; and

WHEREAS, the County had adopted a series of Resolutions in 1990 establishing weight limitations on County roads and certain usage restrictions. These Resolutions also established a permitting system and an excessive weight impact fee. The County and Lexam had entered into an agreement relating to those impact fees and certain activities then being conducted by Lexam in Saguache County; and

WHEREAS, those Resolutions, permit requirements and weight limitations have remained in effect since 1990; and

WHEREAS, Lexam is conducting certain activities with the County which have and will result in certain services being provided by the County which are not normally supplied to private entities and certain of Lexam activities will place an undue burden on the County roads; and

WHEREAS, the County adopted Resolution No. 2007 G-2 to update the weight limitations for the County road system and update the impact fees for use of the system to reflect current costs associated with undue impact by special activities and usage. The Resolution also provides that the County and entities whose activities will have an undue impact on the County roads may enter into an Agreement to address that impact; and

WHEREAS, the County and Lexam desire to enter into an Agreement to address the impact that Lexam's activities will and may have on the County roads and services, as well as other matters affecting the County created by Lexam's activities.

THEREFORE, in consideration for the mutual promises and covenants contained herein, and for such other good consideration, the sufficiency of which is hereby acknowledged, the parties agree as follows:

1. That the County will provide certain signage, at specified locations, as may be agreed to by Lexam and the County and that Lexam will pay the County Road and Bridge Department the sum of a minimum of \$100.00 for that signage.
2. That Lexam, to comply with the County road weight limitations, will weigh each truck that it owns, contracts for, or controls and uses for its activities within the County, and that will use any road in the County road system.
3. Lexam or its contractors will provide a copy of the weight ticket for each vehicle used or participating in its activities within the County, for each trip that the subject vehicle makes on the County road system, to the County's Road and Bridge Department.
4. Lexam agrees to pay to the County the sum of \$4.29 for each ton of weight that the vehicles Subject to this Agreement exceed the County road weight limit of 54,000 pounds.
5. That Lexam agrees to purchase a County Road Access Permit for accessing Saguache County Roads, from the Saguache County Road & Bridge Department, at the same cost charged by the County to other, similar users of County roads.
6. Said sum will be paid to the County on a monthly basis.
7. In order to minimize the cost and effort involved in disposing of cuttings from the drill sites and to minimize the impact that the drilling activities may have on Saguache County, Lexam further agrees that it will voluntarily test the "cuttings" which arise from the drilling of any exploration well or other exploration activities within the County of Saguache. Such testing shall be limited to those cuttings that visually exhibit substances other than dirt and rocks and for which Lexam proposes to permanently dispose in the County. These tests will be in addition to, or concurrent with, any other testing which may be required by Federal or State authority. The purpose of this testing is to determine if the cuttings can be safely used as well site cover and/or road base materials, as well as to assist in determining if any special precautions are required for the permanent disposal of the cuttings. The testing will include:
 - .. Total petroleum hydrocarbons (TPH),
 - Sodium Adsorption Ratio (SAR),
 - Heavy metal concentrations,
 - pH level, and
 - Conductivity.

Lexam agrees that it will provide a report of the above tests and all other tests performed on the cuttings and fluids produced results from the drilling operation, as required by Federal or State agencies, to the County Land Use Department. Said testing will conform to the generally acceptable testing standards for the industry.

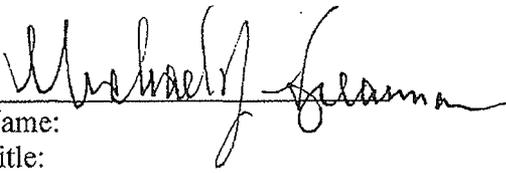
8. The County will discuss, following the receipt of the above tests, the possibility of potential uses for the cuttings from the drilling activities with Lexam.

9. The parties may modify the terms of this Agreement in a writing signed by authorized agents of both parties.

The undersigned, by executing this Agreement, hereby affirm that they have the authority to enter into this Agreement and to be bound by the terms contained herein.

SAGUACHE COUNTY:

LEXAM EXPLORATIONS
(U.S.A.) INC.:


Name:
Title:


Name: Stefan M. Spears
Title: VP Strategic Dev.

Appendix E

Baseline Surface Water and Groundwater Sampling Analytical Results

Baseline Chemistry for Surface Water

Sample Name	COTTONWOOD CREEK INTAKE		DEADMAN CREEK		SOUTH CRESTONE CREEK		SPANISH CREEK - EAST		SPANISH CREEK - WEST		WILLOW CREEK - EAST		WILLOW CREEK - BACA 5		WILLOW CREEK - WEST	
Location Type	Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water		Surface Water	
Aquifer	n/a		n/a		n/a		n/a		n/a		n/a		n/a		n/a	
Treatment	unfiltered	filtered	unfiltered	filtered	unfiltered	filtered	unfiltered	filtered	unfiltered	filtered	unfiltered	filtered	unfiltered	filtered	unfiltered	filtered
Profile I (Major ions, metals, general)																
pH (std. units)	6.7		6.56		7.28		7.62		7.82		7.5		8.23		8.3	
pH - Field (s.u.)	7.86		8.02		7.89		7.53		(d)		7.97		8.54		(d)	
Conductivity - Field	49.9		47.7		55.8		178.9		(d)		86.7		353		(d)	
Temperature - Field	(e)		12.9		10.4		16.3		(d)		14.9		(e)		(d)	
Alkalinity (mg/L as CaCO3)	32.3		15.9		25.8		94		145		44.8		155		132	
Bicarbonate (mg/L as CaCO3)	32.3		15.9		25.8		94		145		44.8		155		131	
Carbonate (mg/L as CaCO3)	<1		<1		<1		<1		<1		<1		<1		1.4	
Chloride	0.41		0.51		0.95		1		2.9		0.46		2.02		1.66	
Fluoride	0.12		0.4		0.1		0.22		0.31		0.15		0.38		0.3	
Sulfate	4.67		3.13		1.62		3.71		5.17		2.23		4.8		3.18	
Total Dissolved Solids	39		50		46		129		214		70		212		168	
Aluminum (mg/L)	<0.08	<0.08	0.87	<0.08	0.17	<0.08	<0.08	<0.08	<0.08	<0.08	0.55	<0.08	0.1	<0.08	<0.08	<0.08
Antimony (mg/L)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Arsenic (mg/L)	<0.025	<0.025	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Barium (mg/L)	0.0073	0.0069	0.016	0.0068	0.023	0.0197	0.0412	0.0399	0.0503	0.0499	0.0372	0.0239	0.0459	0.0448	0.0357	0.036
Beryllium (mg/L)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron (mg/L)	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Cadmium (mg/L)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium (mg/L)	12	11.8	6.9	6.34	8.42	8.13	19.2	18.4	28.5	28	12.4	11.6	25.3	25	23.5	23.6
Chromium (mg/L)	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006	<0.006
Copper (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron (mg/L)	<0.06	<0.06	1.06	<0.06	0.23	<0.06	<0.06	<0.06	0.13	0.08	1.03	0.08	0.2	<0.06	<0.06	<0.06
Lead (mg/L)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Magnesium (mg/L)	1.43	1.4	0.98	0.76	0.89	0.84	5.83	5.59	7.84	7.73	2.12	1.75	9.83	9.61	7.67	7.69
Manganese (mg/L)	0.004	<0.004	0.0223	<0.004	0.0113	<0.004	<0.004	<0.004	0.0211	0.0116	0.0509	0.014	0.007	0.0068	<0.004	<0.004
Mercury (mg/L)	<0.0002	<0.0002	0.00021	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Potassium (mg/L)	<0.5	<0.5	0.77	0.59	<0.5	<0.5	2.31	2.24	6.08	6.04	1.49	1.49	4.34	4.25	4.15	4.12
Selenium (mg/L)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Silver (mg/L)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Sodium (mg/L)	1.64	1.61	1.1	1.06	0.98	0.96	10.7	10	17.9	17.4	1.98	1.91	24.2	23.6	16.1	15.9
Thallium (mg/L)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hydrocarbons																
Diesel (mg/L)	<0.1		<0.1		<0.1		<0.1		<0.1		<0.1		<0.1		<0.1	
Gasoline (mg/L)	<0.1		<0.1		<0.1		<0.1		<0.1		<0.1		<0.1		<0.25	
Ethane (mg/L)	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	
Methane (mg/L)	<0.001		<0.001		<0.001		0.0307		0.0349		0.00472		0.00621		0.00112	
VOCs																
1,1,1,2-Tetrachloroethane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,1,1-Trichloroethane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,1,2-Trichloroethane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,1,2-Trichloroethane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,1-Dichloroethane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,1-Dichloroethane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,1-dichloropropene (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,2,3-Trichlorobenzene (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,2,3-Trichloropropane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,2,4-Trichlorobenzene (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,2,4-Trimethylbenzene (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,2-Dibromo-3-chloropropane(DBCP) (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,2-Dibromoethane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,2-Dichlorobenzene (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,2-Dichloroethane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,2-Dichloropropane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,3,5-Trimethylbenzene (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,3-Dichlorobenzene (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,3-Dichloropropane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
1,4-Dichlorobenzene (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
2,2-Dichloropropane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
2-Chlorotoluene (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
2-hexanone (µg/L)	<2.5		<2.5		<2.5		<2.5		<2.5		<2.5		<2.5		<2.5	
4-Chlorotoluene (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
Acetone (µg/L)	<2.5		<2.5		<2.5		<2.5		<2.5		<2.5		<2.5		<2.5	
Acrylonitrile (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
Benzene (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
Bromobenzene (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
Bromochloromethane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	
Bromodichloromethane (µg/L)	<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5		<0.5	

bis(2-Chloroethoxy)methane (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
bis(2-Chloroethyl)ether (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
bis(2-chloroisopropyl)ether (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
bis(2-Ethylhexyl)phthalate (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.33	<0.5	0.583	<0.5
Butylbenzylphthalate (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbazole (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz[a,h]anthracene (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzofuran (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diethylphthalate (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethylphthalate (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-n-butylphthalate (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-n-octylphthalate (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobutadiene (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorocyclopentadiene (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachloroethane (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno[1,2,3-cd]pyrene (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Isophorone (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrobenzene (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrosodimethylamine (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
n-Nitroso-di-n-propylamine (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
n-Nitrosodiphenylamine (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenol (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyridine (µg/L)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Organic compound or gas above detection limit
Analyzed as part of December 2006 sampling event

(d) Field parameters not measured
(e) Due to lag time, measured temperature not reflective of in situ water temperature

Appendix F

Comments and Responses Summary

**Comments and Responses on the Draft Environmental Assessment of
Planned Gas and Oil Exploration,
Baca National Wildlife Refuge,
Saguache County, Colorado**

Introduction

This document, Appendix F, is a companion document to the Finding of No Significant Impact (FONSI) and includes the following components:

- Copies of written comments from federal, state, and local government agencies, with responses to those comments
- A summary of comments from individuals, and responses to individual comments
- A summary of form letters received

The Draft Environmental Assessment (EA) was released to the public for review and comment on January 18, 2008. A 45-day comment period for the document closed on March 2, 2008. In addition, the U.S. Fish and Wildlife USFWS (USFWS) held a public open house in Crestone, Colorado on February 12, 2008. The USFWS received over 2,000 comments from 415 individuals (primarily letters and emails), 7 letters from federal, state, or local government agencies, and about 47,500 form letters.

This Appendix addresses the substantive comments. As defined by NEPA compliance guidelines, comments are considered substantive if they:

- Question, with reasonable basis, the accuracy of the information in the document
- Question, with reasonable basis, the adequacy of the environmental analysis
- Present reasonable alternatives other than those presented in the Draft EA
- Cause changes or revisions in the proposal

Comments and responses are divided into two sections. The first section includes copies of the comments made by federal, state, and local government agencies. The second part of the response to comments includes a summary of the comments made by the general public or other entities.

In compliance with the spirit of the Privacy Act of 1974, it is the policy of the USFWS, Region 6 not to publish names, addresses, or other personal information of individuals (agencies, business, and organization are excluded). Rather than print every letter from individuals and redact (black out) all personal information, and because many of the comments are similar in nature, the USFWS has summarized the general nature of the comments received and tracked the number of individuals that expressed each general comment.

The USFWS responded to each of the individual comments that are substantive. Where appropriate, the text of the FONSI has been revised to address comments.

Responses to Government Agency Comments

The USFWS received formal comments from the following federal, state, and local government agencies:

1. U.S. Environmental Protection Agency
2. National Park Service
3. Hopi Tribe
4. Colorado Division of Wildlife
5. Colorado Historical Society
6. Saguache County
7. Town of Crestone

Letters from these agencies are shown in **Appendix G**. Beside each reproduced letter is the USFWS's response, numbered to correspond to specific comments in the letter.

Responses to Individual Comments

This section includes general responses to individual comments, listed by the comment number in the following table. As shown in the table, the USFWS tracked the number of individuals who expressed each type of comment, and responded to those that are substantive. Responses to substantive comments begin on page F-9 of this appendix.

While the USFWS acknowledged comments expressing particular sentiments or opinions, those comments are not considered substantive and are not included in the responses.

How to find Responses to Individual Comments

- Comments are organized by topic in the following table. Each comment has a corresponding number.
- Comment code numbers identified with bold text and a "*" are considered to be substantive. Only substantive comments have responses.
- Look up the comment code for the substantive comment of interest, beginning on page F-9, to find the comment and the USFWS's response.

Individual Comments by Issue

All of the comment codes used, and the number of individual comments that contained each code, are detailed in the following table. Substantive comments are indicated with **bold** text and an "*" and are responded to in the following pages. The number of comments received does not include form letters, which are addressed below under *Petitions and Form Letters*.

Comment Code	Comment/Issue Description	Number of Comments	Percentage
Purpose and Need			
1001	General comment about the purpose and need for the Proposed Action	3	<1%
1002*	Specific substantive comment about the purpose and need (specific text)	6	2%
1005*	Comment that this analysis is premature since a CCP has not been completed	58	15%
1006	Comment about the stated purpose and need relative to NEPA definitions	6	2%
1007	Comment about the description of Lexam's proposed project	5	1%
1008	Comment calling for additional details in the proposed project description	8	2%
1009	Additional proposed mitigation measures (specific text)	7	2%
Statutes, Regulations, and Other Plans			
1101	Comment about conformance with existing policies or management plans	3	<1%
1102*	Comment that the Proposed Action is not consistent with the purposes of a NWR	27	7%
1103*	Comment about the authority and responsibilities of the USFWS	51	13%
1105	Comment suggesting that the USFWS should deny Lexam access	16	4%
1106	Comment that the mineral rights should be retired	4	1%
1107*	Comment questioning why the proposed project is allowed when public access is restricted	12	3%
1108	Comment about COGCC regulations and authority	6	2%
1109*	Comment about Lexam's mineral interest/property rights	2	<1%

Comment Code	Comment/Issue Description	Number of Comments	Percentage
Alternatives			
2001	General comment about alternatives	3	<1%
2002*	Specific substantive comment about alternatives	5	1%
Proposed Action			
2011	Comment in support of the Proposed Action	0	0%
2012	Comment opposed to the Proposed Action	44	12%
2013	Comment in support of the Proposed Action, with modifications	1	<1%
2014*	Comment calling for strict environmental protections and mitigation measures	5	1%
No Action Alternative			
2021	Comment in support of the No Action Alternative	1	<1%
2022	Comment opposed to the No Action Alternative	1	<1%
2023	Comment in support of the No Action Alternative, with modifications	1	<1%
No Mineral Exploration Alternative			
2031	Comment in support of the No Mineral Exploration Alternative	2	<1%
2032	Comment opposed to the No Mineral Exploration Alternative	0	0%
2033	Comment in support of the No Mineral Exploration Alternative, with modifications	1	<1%
2034	Comment supporting purchase and withdrawal of mineral interests	11	3%
2035	Comment that the document should describe the process involved in acquiring mineral rights	2	<1%
Alternatives Considered but Eliminated from Further Analysis			
2042*	Comment opposing the rationale for eliminating alternatives from further analysis	6	2%
Affected Environment and Environmental Consequences			
3002*	Comment that baseline resource data has not been adequately collected	24	6%
3003	General concern about resource impacts due to the proposed project	21	6%
3005*	Comment about the analysis and potential impacts of fracturing/cracking techniques	14	4%
3006	General comment about the resource values in the area	39	10%
3007	General concern about the human health impacts of the proposed project	16	4%
Geology, Mineral Resources, and Soils			
3101*	Specific substantive comment about geology, mineral resources, or soil impacts	1	<1%
3103*	Comment questioning analysis of effects on mineral resources	2	<1%
3104*	Comment questioning analysis of effects on soils	3	<1%
3105*	Comment about potential impacts to fault lines	6	2%
3106	Concern about soil contamination due to the proposed project	4	1%
Air Quality			
3202*	Comment questioning analysis of effects on air quality	7	2%
3203	Concern about the impacts of the Proposed Action on air quality	22	6%
3204*	Concern about cumulative effects on air quality	5	1%

Comment Code	Comment/Issue Description	Number of Comments	Percentage
3205*	Comment about the effects on air quality at GSDNP regarding Class I/Class II airsheds	15	4%
3207*	Comment about the effects of ozone resulting from the proposed project	3	<1%
3208*	Comment about the effects of air pollution on nearby solar facility	7	2%
Water Resources			
3301*	Specific substantive comment about water resources	5	1%
3302*	Comment questioning analysis of effects on water resources	12	3%
3303*	Concern about the impacts of the Proposed Action on surface water quality	7	2%
3304*	Concern about the impacts of the Proposed Action on groundwater quality	64	17%
3305*	Concern about the impacts of the Proposed Action on groundwater levels/quantity	4	1%
3306	Comment about the local and regional importance of the groundwater aquifer	33	9%
3307*	Concern about cumulative effects on water resources	11	3%
3308	Comment about the effects on surface water quality in the Rio Grande watershed	5	1%
3309*	Concern about the impacts on domestic wells in nearby communities	4	1%
3310	Comment about the effects on Rio Grande Compact water deliveries	3	<1%
Vegetation and Habitats			
3401*	Specific substantive comment about vegetation and habitats	2	<1%
3402*	Comment questioning analysis of effects on vegetation and habitats	2	<1%
3403	Concern about the impacts of the Proposed Action on vegetation and habitats	5	1%
3404*	Comment questioning the potential for restoration of vegetation	3	<1%
3405*	Comment about impacts to wetlands and/or riparian habitat	11	3%
3406*	Concern about the introduction or expansion of non-native species due to the proposed project	2	<1%
Wildlife and Fisheries			
3501*	Specific substantive comment about wildlife and fisheries	5	1%
3502*	Comment questioning analysis of effects on wildlife	7	2%
3503	Concern about the impacts of the Proposed Action on wildlife	24	6%
3504*	Comment about the rare or imperiled species that exist on the refuge	23	6%
3505*	Comment about sensitive habitat for elk, mule deer, or antelope	7	2%
3506*	Comment that rare or imperiled species on the refuge have not been adequately documented	9	2%
Cultural Resources			
3602*	Comment questioning analysis of effects on cultural resources	10	3%
3603	Concern about the impacts of the Proposed Action on cultural resources	5	1%
3604	Comment noting that Native American artifacts have been found nearby	11	3%

Comment Code	Comment/Issue Description	Number of Comments	Percentage
3605	Comment about that status of area as a sacred site	14	4%
3606	Comment noting the proposed inclusion of the refuge in a National Heritage Area	4	1%
Native American Traditional Values			
3702*	Comment questioning analysis of effects on Native American traditional values	2	<1%
Recreation			
3801*	Specific substantive comment about recreation	1	<1%
3802*	Comment questioning analysis of effects on recreation	1	<1%
Socioeconomic Resources			
3851*	Specific substantive comment about socioeconomic resources	8	2%
3852*	Comment questioning analysis of effects on socioeconomic resources	27	7%
3853	Concern about the impacts of the Proposed Action on socioeconomic resources	16	4%
3854*	Concern about the impacts of the Proposed Action on "sense of place" or "uniqueness" values	53	14%
3855*	Comment about the existence of and impacts to nearby spiritual centers	68	18%
3856*	Comment about impacts to nearby Colorado College facilities	28	7%
3857*	Comment about the impacts to tourism and the local economy	19	5%
3858	Comment about the impacts to agriculture	4	1%
3859*	Concern about the emergency response/law enforcement capability of local governments	10	3%
3860*	Comment about impacts to/analysis of traffic and safety on County Road T	43	11%
3861	Concern about cumulative effects on community services if gas production occurs	3	<1%
Aesthetics			
3901	General comment about impacts to the aesthetic setting of the area	29	8%
3903*	Comment questioning analysis of effects on visual resources	25	7%
3904*	Comment about the effects of light pollution	26	7%
3905*	Comment questioning analysis of effects of noise	35	9%
3907	Concern about the impacts of the Proposed Action on noise	9	2%
3908	Concern about the cumulative effects on aesthetic resources	1	<1%
3909*	Comment about impacts to views from Great Sand Dunes National Park	1	<1%
NEPA Process			
4001	General comment about planning/NEPA process	13	3%
4002*	Specific substantive comment about the planning/NEPA process	6	2%
4003*	Comment that the NEPA process has not been adequately followed	35	9%
4004	General comment that more studies/analysis should be completed	20	5%
4005*	Comment that discounting impacts as "temporary" is a violation of NEPA	11	3%
4010*	Comment that the cumulative effects analysis is inadequate	7	2%

Comment Code	Comment/Issue Description	Number of Comments	Percentage
4011*	Comment that no RFFAs are identified and no cumulative effects are analyzed	8	2%
4012*	Comment that the EA does not address the cumulative effects of gas production	30	8%
4020*	Comment that an EIS should be completed	199	53%
4022	Comment that an EIS should be required because of significant impacts	2	<1%
4023*	Comment that an EIS should be required due to the level of controversy	6	2%
4024*	Comment questioning the determination of/support for "no significant impacts"	46	12%
4025	Comment that a full EIS should analyze the impacts of both exploration and production	2	<1%
4026	Comment suggesting the need for a revised draft EA with additional analysis	1	<1%
4030	Comment that the USFWS appears to have already made its decision	2	<1%
4031	Comment questioning the objectivity of ENSR as a contractor to Lexam	14	4%
4033*	Comment about precedent for/requirement of additional NEPA analysis for future production wells	19	5%
Public Involvement Process			
4101	Comment on the format of public scoping meetings	1	<1%
4103*	Comment that scoping comments/issues were not addressed in the Draft EA	29	8%
4104*	Comment that the public involvement process has been inadequate	6	2%
4106	Comment that the Draft EA was not available on the USFWS's website during part of the comment period	1	<1%
4107	Request that the comment period be extended	1	<1%
Draft EA			
4201	Comment about Draft EA document	9	2%
4202*	Comment that the scope of the Draft EA is too narrow	38	10%
4203*	Comment that the analysis in the Draft EA is inadequate	63	17%
4204	Comment that the Draft EA "does not address impacts at all"	8	2%
4205*	Specific comment about the analysis in the Draft EA	5	1%
4208	Comment that anticipated permitting requirements are not adequately defined	3	<1%
4209*	Suggested additions to the Draft EA document/analysis	7	2%
Other			
5001	General comment about environmental impacts	27	7%
5002	Comment noting that the project proponent is a foreign (Canadian) company	13	3%
5004	No comment	1	<1%
5005*	Comment about the USFWS's capacity to monitor or oversee the proposed project	5	1%
5006	Comment questioning Lexam's experience/capability	14	4%
5007	Comment about accidents/spills inherent in the oil and gas industry	16	4%
5008	Comment about the impacts from oil and gas drilling in other areas	24	6%

Comment Code	Comment/Issue Description	Number of Comments	Percentage
5009	Comment about environmental permitting requirements	2	<1%
5010*	Concern about adequate insurance/bonding to account for accidents	2	<1%

Summary of Form Letters

The USFWS received mass correspondence (form letters) from three different groups commenting on the Draft Environmental Assessment:

1. Baca Grande Homeowners
2. Humanity in Unity
3. Natural Resources Defense Council

The amount of mass correspondence received from each source and the comments contained in each are described below. Comments that were added to the form letter text were recorded as individual comments. Substantive comments contained in this correspondence (indicated with **bold** text and an “**”) are described and responded to below under *Responses to Individual Comments*.

Baca Grande Homeowners

The USFWS received 26 copies of a form letter with the following comments:

- 1104 – Comment that the USFWS should fulfill its resource protection/ stewardship responsibilities
- **4020*** – Comment that an EIS should be completed
- **4024*** – Comment questioning the determination of/support for “no significant impacts”
- **4033*** – Comment that the “agency/NEPA approval of exploration” would set a precedent for future production wells
- **4103*** – Comment that scoping comments/issues were not addressed in the Draft EA
- **4202*** – Comment that the scope of the Draft EA is too narrow
- **4206*** – Comment that the Draft EA does not adequately document/support “no significant impacts”

Humanity in Unity

The USFWS received 76 copies of a form letter with the following comments:

- 1104 – Comment that the USFWS should fulfill its resource protection/ stewardship responsibilities
- **4020*** – Comment that an EIS should be completed
- **4033*** – Comment that the “agency/NEPA approval” of exploration would set a precedent for future production wells
- **4202*** – Comment that the scope of the Draft EA is too narrow
- 4204 – Comment that the Draft EA “does not address impacts at all”
- **4206*** – Comment that the Draft EA does not adequately document/support “no significant impacts”

Natural Resource Defense Council

The USFWS received 47,048 copies of a form letter with the following comments:

- **1005*** – Comment that the analysis is premature since a CCP has not been completed
- **1107*** – Comment questioning why the proposed project is allowed when public access to the refuge is restricted
- **2014*** – Comment calling for strict environmental protections and mitigation measures
- 2034 – Comment supporting purchase and withdrawal of mineral interests
- 3306 – Comment about the local and regional importance of the groundwater aquifer
- **3405*** – Comment about impacts to wetlands and/or riparian habitat

- **3504*** – Comment about the rare or imperiled species that exist on the refuge
- **3505*** – Comment about sensitive habitat for elk, mule deer, or antelope
- 3604 – Comment noting that Native American artifacts have been found nearby
- 3606 – Comment noting the proposed inclusion of the refuge in a National Heritage Area
- **4020*** – Comment that an EIS should be completed

Most Common Concerns or Issues

The 10 most common concerns or issues expressed in the individual comments (not including form letters) were:

1. Comment that an EIS should be completed (4020)
2. Comment about the existence of and impacts to nearby spiritual centers (3855)
3. Concern about the impacts of the Proposed Action on groundwater quality (3304)
4. Comment that the analysis in the Draft EA is inadequate (4203)
5. Concern about the impacts of the Proposed Action on "sense of place" or "uniqueness" values (3854)
6. Comment that this analysis is premature since a CCP has not been completed (1005)
7. Comment about the authority and responsibilities of the USFWS (1003)
8. Comment questioning the determination of/support for "no significant impacts" (4024)
9. Comment opposed to the Proposed Action (2012)
10. Comment about impacts to/analysis of traffic and safety on County Road T (3860)

Responses to Individual Comments

1000 – Purpose and Need

Comment 1002: Specific comment about the purpose and need.

1002a: While the FWS recognizes the vested property rights of the mineral estate owner, Lexam, the EA misstates the FWS's authority as a servient, surface estate owner.

Response 1002a: As stated in the Draft EA, Lexam's sub-surface mineral rights are excepted rights that were owned by a third party at the time the USFWS acquired title to the lands. USFWS policy provides for the exercise of non-federally owned mineral rights "while protecting USFWS resources to the maximum extent possible." These policies are supported by Colorado law and COGCC policies.

1002b: ...to state that the drilling is to be conducted in a "reasonable manner" undermines not only the definition of an EA, but takes the multiple and significant risks and reduces them to a vague, ambiguous condition of "reasonable."

Response 1002b: The USFWS has determined that the resource protection provisions documented in the Final EA and FONSI will allow Lexam their legal right to access and explore their sub-surface mineral rights in a "reasonable" manner that protects refuge resources and minimizes impacts to the human environment to the maximum extent possible.

1002c: ...any comprehensive assessment of the "exploration of the mineral estates" to ensure it is conducted in a "reasonable manner" must necessarily include a full assessment of the drilling company.

Response 1002c: See response to comment 1002b. It is not within the USFWS's jurisdiction or authority to question the internal capacity or capabilities of the sub-surface property owner. Instead, the USFWS has advanced environmental protection measures that would apply to any company seeking access across refuge lands for the purposes of mineral exploration.

1002d: Concern about monitoring requirements and duration of monitoring after project is completed.

Response 1002d: See response to comment 5005.

1002e: The minimum "Project Area" should be the entire extent of Lexam's mineral ownership underlying federal lands in the area (i.e., The Baca Ranch), plus the San Luis Valley (SLV) zone of influence dictated by all necessary off-site activities.

Response 1002e: The "project area" identified in the Draft EA includes all of the proposed facilities and a ½ mile buffer. Resources whose impacts extend beyond the project area (e.g., air quality, visual resources) are analyzed at the appropriate scale to encompass the effects of the proposed federal action (Note that the *federal action* is the formulation of standards and measures to ensure that refuge resources are not unreasonably impacted).

1002f: the FWS should acknowledge that NEPA does not provide a mechanism by which a surface estate owner, even the United States, may proscribe what surface uses are "reasonable" before surface occupancy would be "permitted."

Response 1002f: See response to comment 1002b. It is not within the USFWS's authority to "permit" (i.e., allow or disallow) access for excepted rights on the refuge. Instead, the USFWS has included reasonable environmental protection measures that would apply to any company seeking access across refuge lands for the purposes of mineral exploration.

Comment 1005: Comment that this analysis is premature since a CCP has not been completed.

Response 1005: As noted in the Draft EA, the USFWS has not yet initiated baseline data collection for a Comprehensive Conservation Plan (CCP) process for Baca NWR. The CCP process, once started, is expected to take several years. Since Lexam has a legal right to explore their sub-surface mineral interests on the refuge, the USFWS determined that such a delay would be an unreasonable constraint on Lexam's right to explore and develop its mineral estate. Instead, the USFWS has outlined measures to protect refuge resources and management during the exploration process.

Comment 1009: Additional proposed mitigation measures.

1009a: Rather than "strive" to obtain muffling equipment; require that they do.

Response 1009a: Background noise levels reported by the NPS, USEPA, and ENSR for rural areas such as this study area typically range from 35 to 45 dBA. In 1993/1994, the NPS reported that, in the study area, noise levels were less than 40 dBA 90 percent of the time. Noise attenuation calculations predict at 2000 feet from the project is 3.1 dBA above this, an increase that is not perceptible as reported by most noise authorities. At 4000 feet distance from the drilling rig, the project noise level would be expected to be 37 dBA, and definitely imperceptible above background. At 2 miles (the distance to the Great Sand Dunes National Park), the noise levels from the proposed activities would be below background levels (see Appendix G, response to Comment 2-5). Based on the foregoing, noise muffling equipment would be more than adequate, even unnecessary, to attenuate noise levels.

1009b: Lexam should be required to erect sound absorbing barricades around the drill site to reduce noise pollution and commit to using directional lighting at night to reduce light pollution.

Response 1009b: With regard to noise, see response to Comment 1009a. In Section 4.11.1.2, the Final EA states that Lexam "will ensure, to the extent possible for safety, that lights on the drilling rig and location are directed to work areas."

1009c: ...one possible mitigation is building a structure of fine mesh around the rig, encompassing all four sides with a solid top that would allow ventilation but diminish the negative impact of the lights at night.

Response 1009c: See response to comment 1009a.

1009d: The EA does not mention an obvious mitigation that would be effective: prohibiting drilling at night.

Response 1009d: Oil and gas drilling operations typically are conducted on a 24-hour basis. Drilling only in daylight hours would be time consuming and costly and be considered an unreasonable request by Lexam as a result of the financial and time costs.

1009e: ...the Service should require Lexam to post a substantial bond, beyond that required by State regulations, as additional financial assurance that the refuge will be restored to its original condition upon completion of drilling operations.

Response 1009e: See responses to comments 2014 and 5010.

Comment 1107: Comment questioning why the proposed project is allowed when public access to the refuge is restricted

Response 1005: The refuge is currently closed to general public access until a Comprehensive Conservation Plan is developed to identify compatible public use programs and their management needs. See also response to comment 1005.

2000 – Alternatives

Comment 2002: Specific comment about alternatives.

2002a: ...at least two additional alternatives should be developed and discussed in detail and analyzed for expected impacts. On reasonable approach would be to develop one alternative constituting some logical abbreviation of the proposed action (e.g., drill only a single exploration well, drill sequentially... Another alternative might provide a more extensive or intensive exploration scheme (bigger area, more wells).

Response 2002a: The concept of allowing only one well was considered but eliminated from further analysis because Lexam found that two wells (and the cost of drilling two wells) are necessary to fully characterize subsurface conditions. A more extensive drilling program was not considered because it is not necessary or economical to pursue such a program at this exploration stage. Any additional exploration or drilling activity would be the subject of a separate NEPA analysis.

2002b: While there are no funds available for a federal buyout of the mineral rights...we do not feel that should preclude a more thorough consideration of such a possibility.

Response 2002b: The concept of federal acquisition (through purchase, donation, trade, or other means) was considered in the Draft EA as the No Mineral Exploration Alternative. The federal acquisition of Lexam's sub-surface mineral rights would be subject to numerous variables and approvals (potentially including a Congressional appropriation). Currently, there are no proposed budget proposals by the President, nor are there any proposed legislation in Congress related to a "federal; buyout" of the mineral estate at issue in this comment. Considering these factors, the USFWS determined that it was not necessary or appropriate to speculate on how the mineral rights could be acquired. Instead, the Draft EA analyzes the no mineral exploration scenario as a comparison to other alternatives.

2002c: The "No Mineral Exploration Alternative," as described in the DEA, is actually the "No Action Alternative" as required by CEQ regulations.

Response 2002c: The *federal action* that provides the legal basis for this NEPA analysis is the formulation of standards and measures to ensure that refuge resources are not unreasonably impacted. The No Mineral Exploration Alternative would require a separate federal action – the acquisition of Lexam's mineral rights. Therefore, the "no drilling" alternative is not the No Action alternative because it would require a federal action to be implemented. The No Action Alternative (meaning no *federal* action) would still allow Lexam to move forward with exploratory drilling on the refuge without any standards or measures to protect refuge resources.

2002d: ...the "No Federal Involvement Alternative" is not possible, and therefore is impractical as a "reasonable alternative."

Response 2002d: See response to comment 2002c. Rather than debate the extent of the USFWS's jurisdiction to impose protective standards and measures on access to excepted mineral rights on the refuge, the USFWS has developed and Lexam has agreed to the protective standards and measures that are described in the Final EA and FONSI. Since the Federal Action is the imposition of reasonable protective standards and measures on exploration of excepted mineral rights, the "No Action" or "No Federal Involvement Alternative" would logically be not imposing any protective standards and measures.

Comment 2014: Comment calling for strict environmental protections and mitigation measures.

Response 2014: The USFWS has proposed, and Lexam has agreed to, over 36 measures to minimize potential impacts to refuge and community resources. These measures are in addition to the COGCC permit approval requirements (see Appendix C, Terms and Conditions). The USFWS has determined that

these measures are sufficient to allow Lexam reasonable access to its mineral estate without unreasonably degrading or significantly impacting the refuge and the surrounding human environment.

Comment 2042: Comment opposing the rationale for eliminating alternatives from further analysis. (Comments made regarding elimination of alternatives that include denying Lexam access and suspending access until a CCP is completed).

Response 2042: The USFWS eliminated alternatives that were not legally or economically practical. The USFWS determined that denying Lexam access or suspending access until a CCP is completed are not legally possible because they would unreasonably infringe on the rights of sub-surface property owners to access their mineral rights in a timely manner and could lead to a constitutional takings claim by Lexam against the United States. Since these alternatives are not consistent with USFWS policies and Federal and Colorado law, they were eliminated from further analysis.

3000 – Affected Environment and Environmental Consequences

Comment 3002: Comment that baseline resource data has not been adequately collected.

Response 3002: The USFWS has not yet initiated baseline resource data collection for a forthcoming CCP process (see response to comment 1105) that will encompass the entire Baca NWR. However, as part of the NEPA analysis for the Draft EA and FONSI, the specific areas that will be affected by the proposed mineral exploration (about 14 acres) was evaluated and analyzed. Resources in the project area are summarized in the Draft EA. This level of baseline resource analysis is typical and appropriate for many development projects on both public and private lands, and is sufficient to evaluate the natural resource impacts of the Proposed Action.

3100 – Geology, Mineral Resources, and Soils

Comment 3101: Specific substantive comment about geology, mineral resources, or soil impacts.

3101a: The draft EA must also address topsoil handling procedures and mitigation measures that will be used when the soils are wet.

Response 3101a: Under measure #3, the USFWS would monitor moisture conditions during construction operations and if necessary halt operations to reduce impacts from excessive moisture (severe rutting).

3200 – Air Quality

Comment 3202: Comment questioning analysis of effects on air quality.

Response 3202: The USFWS revised the “Affected Environment” and “Environmental Consequences” sections of the EA for air quality. These sections now include more data and analysis about existing condition, project activity leading to air quality emissions, air quality transport, and the nearby Great Sand Dunes National Park and Preserve mandatory Class I area. Please refer to Sections 3.3 and 4.3 for more information.

Comment 3206: Comment about the analysis regarding Class I/II airsheds.

Response 3206: See response to comment 3202.

Comment 3207: Comment about the effects of ozone resulting from the proposed project.

Response 3207: Ozone as a pollutant occurs from a complex interaction of nitrogen oxides and volatile organic compounds. Formation of ozone is enhanced by heat in the atmosphere (summer conditions) and abundant vegetation. Given that the emissions of ozone forming compounds would be small and that drilling activities would be largely conducted in cooler periods of the year (fall and winter), ozone is not expected to pose a concern.

Comment 3208: Comment about the effects of air pollution on nearby solar facility.

Response 3208: The location of the solar facility is to the south and west of the exploration activity. The 2001-2006 wind frequency plots indicate that winds blow in that general direction for less than 10 percent of the time. Given that flow in that direction is limited in time and project emissions are generally small, no significant impact to vertical opacity is anticipated.

3300 – Water Resources

Comment 3301: Specific substantive comment about water resources.

3301a: Baseline data for the entire watershed must first be established through adequate hydrological studies.

Response 3301a: The USFWS has determined that such extensive baseline studies are not necessary to evaluate the potential impacts of the proposed action (the formulation of standards and measures to ensure that refuge resources are not unreasonably impacted).

3301b: ...require that horizontal directional drilling be used for the installation of the facilities under watercourses.

Response 3301b: The project proposal does not include new facilities that would cross watercourses. All roads, drill pads and activities requiring new construction are located out of wetland habitats. If culvert replacement is required for existing road crossings, the Corps of Engineers will be consulted and necessary permits acquired and followed.

3301c: ...require that a qualified monitor be on site to measure the NTU's of the water and that erosion and sediment controls be implemented during and after construction.

Response 3301c: The USFWS has required that baseline water quality study be conducted prior to drilling, in addition to ongoing groundwater monitoring. Also, trained environmental monitors are required to ensure that all operations are conducted in a manner that minimizes surface impacts.

Comment 3302: Comment questioning analysis of effects on water resources.

Response 3302: See response to comment 3304.

Comment 3303: Concern about the impacts of the Proposed Action on surface water quality.

Response 3303: The Proposed Action is not anticipated to adversely affect surface water quality. As part of its environmental protection standards and measures, the USFWS has required the installation of at least three monitoring wells near each well pad to monitor potential spills or releases.

Comment 3304: Concern about the impacts of the Proposed Action on ground water quality.

Response 3304: The USFWS recognizes the long history of concern about groundwater resources beneath the Baca NWR, as well as the importance of that resource to the region. Because of these concerns, the Colorado Oil and Gas Conservation Commission, at the request of the USFWS, stipulated that well casings be set with concrete to a depth of 3,000 feet as a condition for permit approval. This casing depth is consistent with the recommendation of the engineer for the Rio Grande Water Conservation District that 3,000 feet is an adequate depth to protect the “active” portion of the aquifer with good water quality. The recommendation was based upon published reports. Other required measures to protect surface and groundwater from potential contamination are outlined in the Final EA and the FONSI.

Comment 3305: Concern about the impacts of the Proposed Action on groundwater levels/quantity.

Response 3305: As stated in the Final EA, Lexam may obtain contract rights to approximately 15 acre-feet of water for use in the planned project. The water would be withdrawn from a well owned by the USFWS and pursuant to an agreement with a nearby private water user to allow replacement of all depletions. The Colorado Division of Water Resources has regulatory authority over any substitute water supply plan that would be filed by Lexam to implement the arrangement described above. Withdrawal of the 15 acre-feet of water from a well owned by the USFWS would result in no impact to water supply on the Refuge, since Lexam would be required to offset the depletion of water it uses. Based on the foregoing, the proposed exploration program is not expected to affect the quantity or reliability of groundwater in the area.

3400 – Vegetation and Habitats

Comment 3401: Specific substantive comment about vegetation and habitats.

3401a: Specific reclamation plans must be addressed for abandonment of wells and mitigative measures.

Response 3401a: The Draft EA and FONSI outline COGCC requirements and additional USFWS-imposed measures regarding the abandonment and plugging of wells, and overall site reclamation.

3401b: EA must require revegetation with native grasses and plants. The use of the term “similar” vegetation is wrong.

Response 3401b: Protective measure #5 requires that only endemic plants and seed mixtures are to be used in reclamation.

Comment 3404: Comment questioning the potential for restoration of vegetation.

Response 3404: The Final EA acknowledges that it may require up to 15 to 20 years for vegetation communities to return to predisturbance levels. The USFWS has required, and Lexam has agreed, that existing surface vegetation and other surface features will be restored to original site conditions after drilling operations are completed.

Comment 3405: Comment about impacts to wetlands and/or riparian habitat.

Response 3405: The proposed drilling sites were selected, with the input of USFWS staff, to specifically avoid and minimize impacts to wet meadows and other wetland habitats. Additional measures to minimize impacts are described in the Final EA. This project proposal has no anticipated impacts on wetlands other than the potential replacement of existing culverts/bridges under an existing access road. The Corps of Engineers will be consulted for permitting requirements prior to replacement of culverts/bridges.

Comment 3406: Concern about the introduction or expansion of non-native species due to the proposed project.

Response 3406: The USFWS has included, and Lexam has agreed to several protective measures to minimize the potential for introduction of non-native species in the project areas. These include decontamination of vehicles, stockpiling of native topsoil, and on-site environmental monitors. Recognizing that it is impossible to eliminate the risk of non-native species on the refuge (with or without the proposed project), the USFWS has determined that the proposed measures will minimize the risk of infestations resulting from the proposed project.

3500 – Wildlife and Fisheries

Comment 3501: Specific substantive comment about wildlife and fisheries.

3501a: Omitted from the Draft EA was the Brazilian free-tailed bat and Wilson's phalarope, listed as extremely rare in Colorado, but described in the nearby similar Baca lands.

Response 3501a: The analysis of special status species is focused on species that are protected by the federal ESA or are listed as state endangered, threatened, or species of concern. This approach is consistent with USFWS policy and guidance. Neither the Brazilian free-tailed bat nor the Wilson's phalarope are listed as special status species. (The Brazilian free-tailed bat is tracked by the Colorado Natural Heritage Program as an "element of concern" – a status that has no regulatory significance).

3501b: ...the specific bird species that migrate through this area need to be mentioned, along with the time of year of migration. This would provide data for assessing of the effect of the tower and ground activities on bird migration.

Response 3501b: The Draft EA included a discussion of two special status species (greater sandhill crane and long-billed curlew) that are known to migrate through the area. Other migratory birds are generally described in the *Migratory Birds* discussion. This analytical approach is commonly accepted, is consistent with USFWS guidance and policies, and is sufficient to effectively analyze the effects of the Proposed Action.

Comment 3502: Comment questioning analysis of effects on wildlife.

Response 3502: The USFWS believes that the level of analysis of impacts to wildlife, based on habitat for general species and known occurrences of rare or imperiled species, is sufficient to support its decision. The Draft EA described the anticipated effects of the proposed project on several types of wildlife species, including big game, small game, non-game species, migratory birds, fisheries, and special status species.

Comment 3504: Comment about the special status species that exist on the refuge. (Generally suggesting that the analysis is inadequate and/or additional species have not been considered).

Response 3504: The analysis of special status species was based on those species that are listed under the federal Endangered Species Act, or are designated as state endangered, threatened, or species of concern by the Colorado Division of Wildlife. As part of the proposed project, the USFWS included additional protective measures to minimize impacts to special status species, including preconstruction surveys of affected areas. The USFWS believes that the measures to minimize impacts to special status species, as well as the analysis of those species, is sufficient to support the USFWS's decision and to ensure that no special status species would be adversely affected by the proposed project.

Comment 3505: Comment about sensitive habitat for elk, mule deer, or antelope.

Response 3505: The USFWS has determined that the protective measures that the USFWS has established for the proposed activities, including seasonal restrictions and preconstruction surveys, will minimize adverse impacts to big game species. For example, the seasonal restrictions will eliminate impacts to these species during the spring production (birthing) period. While there will be some habitat and noise disturbance to these species (as outlined in the Draft EA) the USFWS has determined that those impacts will have a minor impact on the long term use and productivity of the refuge for elk, mule deer, and antelope.

Comment 3506: Concern that rare or imperiled species on the refuge have not been adequately documented.

Response 3506: See response to comment 3504.

3600 – Cultural Resources

Comment 3602: Comment questioning analysis of effects on cultural resources. (Includes comments about impacts to artifacts or archaeological research in the area, and the consideration of spirituality as a cultural resource, and whether the proposed project is considered an “undertaking” subject to NHPA requirements).

Response 3602: Comments regarding the analysis of the spiritual resources or values of the Crestone area are addressed under Socioeconomic Resources (Comments 3851-3860). The cultural resources analysis was conducted in a manner that is consistent with USFWS policies as well as applicable state and federal laws and guidance. This analysis included both Class I (file search) and Class III (intensive field surveys) of the project area. The USFWS has determined that this analysis, combined with the required on-site archaeological monitoring during drilling operations, adequately documents and protects documented and undocumented cultural resources on the refuge.

The USFWS has conducted extensive cultural surveys in the Refuge and consulted with federal and state historic preservation officials and Indian tribes with possible cultural connections to the Baca NWR, and has determined that the reasonable time, place, and manner restrictions will not have adverse impact on cultural resources.

However, all surface disturbance will be subject to prior cultural resource surveys and damage to cultural resources will be avoided or mitigated in coordination with the USFWS archaeologist and the State Historic Preservation Officer.

3700 – Native American Traditional Values

Comment 3702: Comment questioning analysis of effects on Native American traditional values.

Response 3702: As outlined in the Draft EA, the USFWS contacted 16 Native American tribes to inform them about the process and solicit their comments about the potential impacts of the proposed project. The Hopi Tribe provided a letter commenting on the Draft EA (see **Appendix G**). The USFWS has determined that the rigorous monitoring of ground disturbing activities that will be required will minimize the chance of disturbing cultural resources.

3800 – Recreation

Comment 3801: Specific substantive comment about recreation.

3801a: Many people come to hike the Sangres, hunt, fish, and just experience the pristine mountain landscape. The EA states that there are no recreational opportunities in the project area, which is an irrelevant and disingenuous avoidance of the clear and obvious fact that there are recreational opportunities that would be impacted by the project... degrading the quality of the experience of these vast public lands, were again neither acknowledged nor addressed.

Response 3801a: Public access and recreational use is currently prohibited on the refuge and within the immediate project area. Degradation of recreational experiences due to visual impacts were analyzed and addressed in the EA. The preferred alternative can be summed up as follows: The USFWS is proposing standards for ensuring that the planned exploration of the mineral estate underlying the Refuge by Lexam does not unreasonably degrade or impact the Refuge's surface estate and associated resources. As such, the analysis of the effects of Lexam's planned exploratory drilling upon various socioeconomic resources does not fall within the purview of this analysis. The preferred alternative does not affect socioeconomic resources, spiritual centers, tourists, etc.

3850 – Socioeconomic Resources

Comment 3851: Specific substantive comment about socioeconomic resources.

3851a: It (Draft EA) speaks about our population as if the "town of Crestone (population 73 in 2000)" is the sum total of people who live here and the only notable activity concerns the three USFS trailheads. There are over a thousand residents and many visitors staying at the spiritual centers for extended periods in addition to (other visitors).

Response 3851a: See response to comment 3801a.

3851b: At this point, it is fair to say that tens of millions of dollars have been invested into the "spiritual infrastructure" of this place: temples, chapels, meditation halls, lodges, retreat cabins, etc.

Response 3851b: See response to comment 3801a.

3851c: There is little recognition of the hazard due to wildfire that the proposed drilling activities could have on the adjoining lands.

Response 3851c: See response to comment 3801a.

3851d: Who is going to pay for the upkeep of (County Road T and Colorado Highway 17)?

Response 3851d: See Appendix D of the Final EA for the agreement between Saguache County and Lexam concerning county road use.

3851e: Section 3.10.7 states that there are approximately 56 fire fighters in three departments - many of these fire fighters are the same individuals, and any of them may be away from the area in any given period of time.

Response 3851e: See response to comment 3859.

3851f: ...the Draft EA's picture makes our community completely invisible by sweepingly eliminating all human factors in the immediate vicinity of the refuge, even though the refuge is next to the town of Crestone and in view of the Baca.

Response 3851f: See response to comment 3801a.

3851g: ...the EA also states that Crestone is not low income nor inhabited by minorities (who historically have lower incomes than Caucasians). The truth is quite a bit different. Saguache county median family income is \$23,638, which means 22.7% of the population lives below poverty.

Response 3851g: Minority population or income status is not the sole criteria for consideration of environmental justice according to EO 12898. Determination is based primarily on whether such groups are at a disproportionate risk of environmental and human health effects. It is of the opinion of the USFWS that residents of Saguache County, and more specifically Crestone, are not at disproportionate risk of environmental or human health effects with respect to the preferred alternative.

Comment 3852: Comment questioning analysis of effects on socioeconomic resources.

Response 3852: See response to comment 3801a.

Comment 3854: Concern about the impacts of the Proposed Action on "sense of place" or "uniqueness" values.

Response 3854: See response to comment 3801a.

Comment 3855: Comment about the existence of and impacts to nearby spiritual centers.

Response 3855: See response to comment 3801a.

Comment 3856: Comment about impacts to nearby Colorado College facilities.

Response 3856: See response to comment 3801a.

Comment 3857: Comment about the impacts to tourism and the local economy.

Response 3857: See response to comment 3801a.

Comment 3859: Concern about the emergency response/law enforcement capability of local governments.

Response 3859: Section 4.10.1.3 of the Draft EA states that deficiencies in local emergency services will be identified and discussed with the refuge manager and local governments prior to commencement of the drilling program. The proposed drilling program will include an Emergency Preparedness Plan that will be provided to the Refuge Manager, local governments, and the COGCC. The Emergency Preparedness Plan would include plans and contingencies for fires, accidents, spills, and other emergencies.

Comment 3860: Concern about impacts to traffic and safety on County Road T.

Response 3860: Section 4.10.1.2 acknowledges the likelihood of negative impact to local traffic. It should be implied that increased trucking also will increase road wear correspondingly. Vehicles associated with the project would be subject to all state, federal, and local regulations concerning traffic safety.

3900 – Aesthetics

Comment 3903: Comment questioning analysis of effects on visual resources.

Response 3903: In Section 4.11.1.2 the Final EA states that Lexam “will ensure, to the extent possible for safety, that lights on the drilling rig and location are directed to work areas.”

Comment 3904: Comment about the effects of light pollution.

Response 3904: See response to comment 3903.

Comment 3905: Comment questioning analysis of effects of noise.

Response 3905: See response to comment 1009a.

Comment 3909: Comment about impacts to views from Great Sand Dunes National Park.

Response 3909: As stated in Section 4.11.1.1 of the Final EA, the drilling rig would not be practically viewable for most park visitors at a distance from the park visitor center of 18 miles.

4000 – NEPA Process

Comment 4002: Specific substantive comment about the planning/NEPA process

4002a: There needs to be a meaningful display of the many decisions to be made as well as adequate descriptions of the likely environmental and other impacts (econ or social) resulting from the decisions. FWS also missed an important opportunity in this NEPA process...to involve other federal agencies as “cooperating agencies” when they are likely to be impacted by future Lexam proposals and actions.

Response 4002a: See response to comment 4203. While the use of cooperating agencies is unusual for an EA, the USFWS has consulted with several other federal agencies (including the National Park Service and Environmental Protection Agency) that have an interest in the project.

4002b: Lexam clearly has the intention to drill in order to take wells to production. If test drilling is successful, it is reasonably foreseeable that Lexam will try to fully exploit its mineral estate.

Response 4002b: While it is clear that Lexam hopes to discover commercially developable resources, the USFWS has determined that the likelihood of mineral production is speculative and is not a reasonably foreseeable future action. The USFWS has stated, and Lexam has agreed, that the USFWS’s regulation of any additional exploration or production wells and facilities would be subject to a separate and additional NEPA analysis.

Comment 4003: Comment that the NEPA process has not been adequately followed.

Response 4003: The USFWS has determined that the process and analysis has been consistent with USFWS policies and guidelines, and CEQ guidance on NEPA. It is important to note that the *federal action* that provides the legal basis for this NEPA analysis is the formulation of standards and measures to ensure that refuge resources are not unreasonably impacted. Based on some of the issues expressed in comments on the Draft EA, the FONSI includes additional analysis of the potential effects to some resources.

Comment 4005: Comment that discounting impacts as “temporary” is a violation of NEPA.

Response 4005: The USFWS has determined that the impacts of the proposed action do not rise to the level of significance based on any of the NEPA definitions of significance (based on context and intensity). While the short duration of the proposed project is expected to help reduce the intensity and duration of impacts, the analysis does not avoid otherwise significant impacts by terming the action temporary.

Comment 4010: Comment that the cumulative effects analysis is inadequate.

Response 4010: See response to comment 4002b.

Comment 4011: Comment that no RFFAs are identified and no cumulative effects are analyzed.

Response 4011: See response to comment 4002b.

Comment 4012: Comment that the EA does not address the cumulative effects of gas production.

Response 4012: See response to comment 4002b.

Comment 4020: Comment that an EIS should be completed.

Response 4020: The USFWS has determined that the impacts of the proposed action (the formulation of standards and measures to ensure that refuge resources are not unreasonably impacted) do not meet the definition of “significant” as outlined by NEPA and USFWS policies. Therefore, a full EIS analysis on the proposed action is not warranted or necessary. The USFWS maintains that, if necessary, an additional NEPA effort (EA or EIS) will be required if additional exploration or production activity follows the Proposed Action.

Comment 4023: Comment that an EIS should be required due to the level of controversy.

Response 4023: While CEQ guidelines list the level of controversy as one of the indicators for “significance” of impacts, Department of the Interior guidelines as well as case law affirm that opposition to a proposal does not constitute “controversial” effects. While the USFWS recognizes the opposition and concern about the proposed action at both the local and national levels, the USFWS has determined that this opposition to the proposed action does not constitute a significant impact that warrants an EIS. However, in recognition of the public’s concerns about these issues, the USFWS has taken the time to respond to public and agency comments (which is above and beyond NEPA requirements for an EA).

Comment 4024: Comment questioning the determination of/support for “no significant impacts”

Response 4024: See response to comment 4020.

Comment 4033: Comment about precedent for/requirement of additional NEPA analysis for future production wells.

Response 4033: As stated in the Draft EA and in the FONSI, this NEPA analysis is limited to the USFWS’s adoption of standards and measures to ensure that refuge resources are not unreasonably impacted by the proposed exploration wells. The USFWS has stated, and Lexam has agreed, that the USFWS’s regulation of any additional exploration or production wells and facilities would be subject to a separate and additional NEPA analysis.

Comment 4103: Comment that scoping comments/issues were not addressed in the Draft EA.

Response 4103: Comments received during the scoping process were considered by the USFWS. In some cases, the Preferred Alternative (environmental standards and measures) was adjusted to better address issues identified in scoping. Examples include the addition of protective measures #35 and #36. Many of the issues identified during the scoping process are outside the legal jurisdiction of the USFWS or the scope of the NEPA analysis. Issues identified during the scoping process are summarized in Section 1.7 of the Draft EA.

Comment 4103: Comment that the public involvement process has been inadequate.

Response 4103: The USFWS has provided multiple venues and opportunities for public involvement and comment. This public involvement process (including these responses to comments) is beyond what is required by USFWS policies and NEPA for an EA.

Comment 4202: Comment that the scope of the EA is too narrow.

Response 4202: See response to comment 4020. It is important to re-iterate that the *federal action* that provides the legal basis for this NEPA analysis is the formulation of standards and measures to ensure that refuge resources are not unreasonably impacted.

Comment 4203: Comment that the analysis in the Draft EA is inadequate.

Response 4203: The USFWS has determined that the level of analysis in the Draft EA is sufficient to support the determination of effects of the proposed action (the formulation of standards and measures to ensure that refuge resources are not unreasonably impacted). Based on issues and concerns raised during the public comment period, the USFWS has provided additional analysis and disclosure to support its findings for air quality and groundwater resources. This additional analysis is found in the Final EA.

Comment 4205: Specific comment about the analysis in the Draft EA.

4205a: Comment about BMPs not clearly outlined for sedimentation and water runoff

Response 4205: Specific BMPs are mentioned in section 1.6.1 of the EA. Appropriate BMPs that will be used depend on site conditions and the SWMP will describe the BMPs that will be used.

5000 – Other

Comment 5005: Comment about the USFWS's capacity to monitor or oversee the proposed project.

Response 5005: The USFWS's proposed action is to formulate standards and measures to ensure refuge resources are adequately protected. These standards and measures include the presence of trained environmental monitors on site. In addition, refuge staff is very familiar with the biological resources of the project area and will notice and report any unanticipated or irregular impacts to refuge resources.

Comment 5010: Concern about adequate insurance/bonding to account for accidents.

Response 5010: COGCC rules require that financial assurance bonds of \$25,000 be posted prior to drilling activities. In addition, the USFWS has required, as a condition of refuge access, proof of general liability insurance in the amount of \$1,000,000 to repair or mitigate damages. The USFWS has determined that these bonding/insurance requirements will be adequate.

Appendix G

Agency Comments and Responses Summary

Comment #	Letter #1	Response
<p>1-1</p>	 <p>UNITED STATES ENVIRONMENTAL PROTECTION AGENCY REGION 8 1595 Wynkoop Street DENVER, CO 80202-1129 Phone 800-227-8917 http://www.epa.gov/region08</p> <p>Ref: EPR-N FEB 29 2008</p> <p>Mr. Michael Blenden San Luis Valley NWR Complex U.S. Fish and Wildlife Service Region 6, National Wildlife Refuge System 9383 El Rancho Lane Alamosa, Colorado 81101</p> <p>Re: Baca National Wildlife Refuge Oil Explorations Draft Environmental Assessment</p> <p>Dear Mr. Blenden:</p> <p>The United States Environmental Protection Agency (EPA) has reviewed the Draft Environmental Assessment (DEA) for the Baca National Wildlife Refuge (Refuge) Oil Explorations Project prepared by the U.S. Fish and Wildlife Service (USFWS). In accordance with our responsibilities under the National Environmental Policy Act (NEPA), 42 U.S.C. §4371 <i>et seq.</i> and the Clean Air Act (CAA) §309, 42 U.S.C. §7609, EPA offers the following comments for your consideration.</p> <p>This proposed exploratory drilling project will occur inside the Baca National Wildlife Refuge, which is near the town of Crestone, within Saguache County, Colorado, and in close proximity to the Great Sand Dunes National Park. The Great Sand Dunes National Park is a federal Class I area under the Clean Air Act, requiring special protection of air quality and air quality related values, such as visibility. As noted in the DEA, the Baca Refuge was established to protect the region's hydrology as well as the ecological, cultural, and wildlife resources of the area. The USFWS' stated objective for the DEA is to ensure that initial exploration of the mineral estate under the Refuge by Lexam Exploration Inc. (Lexam) is conducted in a reasonable manner and to establish stipulations and recommendations that would protect the Refuge's surface estate and resources. Lexam has proposed to drill two exploratory wells approximately 14,000 feet deep from two separate well pads and construct access roads to each well pad in the Refuge. Lexam has identified three potential well pad sites, but will use only two of these sites for the exploratory phase of their project. The DEA estimated that up to 14.5 acres of land disturbance would occur in the construction of the well pads and access roads.</p>	<p>1-1 Thank you for your comments.</p>

Comment #	Letter #1 Page 2	Response
1-2	<p>NEPA requires agencies to study the potential environmental impacts of any major federal action. USFWS's involvement in Lexam's drilling proposal via the establishment of stipulations and recommendations to ensure protection of the area's resources renders this a major federal action covered under NEPA (40 C.F.R. §1508.18). Pursuant to NEPA, USFWS has prepared this DEA to ensure that initial exploration of the mineral estate is conducted in a reasonable manner and to determine whether the proposed action by Lexam will have a significant impact(s) on the surrounding environment as defined by NEPA, 40 CFR Part 1501.4(2)(c). The DEA does not consider and evaluate the potential impacts of production for these two exploratory wells. Should the wells go to production, additional NEPA analysis will be required to evaluate the potential significant environmental impacts associated with that activity.</p>	1-2 Thank you for your comments.
1-3	<p>Environmental assessments, such as this one, must provide sufficient evidence and analysis to address whether a project's impacts will be significant. If the agency finds that the action will significantly affect the quality of the human environment, it must prepare an Environmental Impact Statement (EIS). After our review of the DEA prepared for Lexam's proposal, EPA's position is that the DEA does not provide sufficient information to allow USFWS to determine whether this project will have significant impacts and whether preparation of an EIS is necessary. EPA has identified four major areas of concern that we believe warrant further explanation, studies and analysis to allow USFWS to make this determination. These areas include: air quality, water quality, groundwater, and socioeconomics.</p> <p><u>Air Quality</u></p>	1-3 Thank you for your comments.
1-4	<p>The DEA discusses air quality in very general terms. Because of this, EPA has found it difficult to understand or evaluate air impacts caused by the proposed exploratory drilling operation. It is our determination that there needs to be a more rigorous air analysis undertaken to understand the significance of the proposed action on the surrounding airshed. The critical need for this additional information is amplified due to the location of the proposed drilling pads and operations near sensitive air sheds. The proposed drilling operations are to be conducted approximately 12 miles from the Great Sand Dunes Class I area and 1.5 miles from a sensitive Class II area.</p>	1-4 The USFWS revised the "Affected Environment" and "Environmental Consequences" sections of the EA for air quality. These sections now include more data and analysis about existing condition, project activity leading to air quality emissions, air quality transport, and the nearby Great Sand Dunes National Park and Preserve mandatory Class I area. Please refer to Sections 3.3 and 4.3 for more information.
1-5	<p>The Clean Air Act (CAA) requires special protection of air quality and air quality related values (such as visibility) in many of the nation's wilderness areas and national parks. Specifically, section 160 of the CAA requires measures "to preserve, protect and enhance the air quality in national parks, national wilderness areas, national monuments and other areas of special national or regional natural, recreation, scenic, or historic value." (42 U.S.C §7470.) The CAA contains provisions aimed at "remedying... impairment of visibility in mandatory class I Federal areas." (42 U.S.C. §7491), as well as general provisions for a Prevention of Significant Deterioration (PSD) program designed to protect federal Class I areas from air quality degradation under Subpart I of Part C. Class I Areas include national parks and wilderness areas of a certain size and are allowed only very small increments of new pollution above already existing air pollution levels. Class II areas (the default designation) also are limited in their</p>	1-5 See response to comment 1-4.

Comment #	Letter #1 Page 3	Response
	<p>allowable increments of new pollution, though not as stringently as Class I. The PSD program places an affirmative responsibility on federal land managers to protect air quality in many of the most important national parks and wilderness areas in the nation from human-caused pollution. (42 U.S.C §7475(d)(2)(B).) The Wilderness Act, 16 U.S.C §1131 <i>et seq.</i>, further directs the federal land management agencies to protect the wilderness character of those areas designated as wilderness. In that Act, Congress recognized the importance of preserving designated areas in their natural condition and declared a policy to “secure for the American people of present and future generations the benefits of an enduring resource of wilderness.” (16 U.S.C §1131(a).)</p>	
1-6	<p>Despite the proximity of the proposed drilling operations to the federal Class I Great Sand Dunes National Park, the DEA fails to provide any analysis of potential impacts to visibility at the National Park. Depending on local meteorology, emissions from even a small number of drilling operations may impact visibility in the Class I area. To support a Finding of No Significant Impact, the NEPA document should include an analysis of potential impacts to visibility at the neighboring Class I and sensitive Class II area. Should the analysis indicate the potential for impacts to visibility, EPA recommends the NEPA analysis consider mitigation measures, such as low-emission drilling rigs (i.e. Tier II, Tier III).</p>	1-6 See response to comment 1-4.
1-7	<p>While the DEA provided the Colorado Department of Public Health and Environment (CDPHE) Emission Inventory for Saguache County and generally described the drilling operations, it did not offer specific details, such as emission rates, duration of drilling or completion operations, or type of drilling rig. Further, no discussion on the type and volume of support vehicular traffic was included. Similarly, the DEA contains minimal air quality and meteorological data for the area. Typically EPA prefers a summary of existing ambient air conditions from monitoring sites located nearby (see: http://www.epa.gov/air/data/index.html, http://www2.nature.nps.gov/air/monitoring/ads/adsreport.cfm, and http://vista.cira.colostate.edu/views/.) Such monitoring and drilling operation information forms the basis for completion of a project-specific emission inventory and the subsequent air analyses that are typically found in NEPA documents for oil and gas operations. For full disclosure, EPA recommends the NEPA analysis include a specific accounting of all air emissions for the project. In addition, EPA suggests the NEPA document include evaluation of the project’s potential impacts on relevant air quality standards, including (1) the National Ambient Air Quality Standard (NAAQS) and Colorado Ambient Air Quality Standards (AAQS), (2) Prevention of Significant Deterioration (PSD) increments including NO₂, PM₁₀, CO, and SO₂, and (3) nitrogen and sulfur deposition rates.</p>	1-7 See response to comment 1-4.
1-8	<p>In our further review of the DEA, we found no information regarding the cumulative effects to air quality. Without this information, it is not possible for the USFWS, EPA, the State and the public to determine whether the cumulative effects indicate that this project will have a significant impact. In addition, given that this project involves an exploratory drilling operation, an anticipated reasonable foreseeable development (RFD) plan is needed in the event natural gas or oil is found to be viable for production purposes. The DEA notes that oil and gas exploration is an iterative process, but then states that it is not possible to determine whether any future exploration will occur. While agencies are not required to evaluate effects that are highly speculative or indefinite, it is not unreasonable that following the initial exploration, additional</p>	1-8 While it is clear that Lexam hopes to discover commercially developable resources, the USFWS has determined that the likelihood of mineral production is speculative and is not a reasonably foreseeable future action. The USFWS has stated, and Lexam has agreed, that the USFWS’s regulation of any additional exploration or production wells and facilities would be subject to a separate and additional NEPA analysis.

Comment #	Letter #1 Page 4	Response
	<p>exploration wells would be necessary. Because of the omission of an RFD, EPA, other federal and state agencies, and the public cannot determine the full extent of the potential impacts to the surrounding areas from this project.</p>	
	<p><u>Surface Water (Wetlands)</u></p>	
1-9	<p>In EPA's review of the DEA, we found limited information on the impact of Lexam's proposed action on aquatic resources. This is particularly troublesome given that the proposed purpose of the Refuge is "to restore, enhance and maintain wetland, upland, riparian and other habitats for wildlife, plants and fish species." (DEA, page 1-1).</p>	1-9 See response to comments 1-10 and 1-11.
1-10	<p>The DEA has identified 1,585 acres of wetlands within the project area (Table 3-2). The DEA goes further in breaking down the project area's wetlands into wetland and vegetation types in Tables 3-3 and 3-4. When EPA reviewed the DEA's description of wetlands, we could find no information on the acreage of wetlands, wetland type or value of the wetlands impacted by the proposed alternatives. This information is essential in order to properly evaluate the project impacts to existing aquatic resources, meet NEPA requirements and federal wetland regulations and policy, and develop mitigation options. The NEPA document should contain sufficient information to support a USFWS decision on the significance of the aquatic impacts as well as the decision on whether a CWA Section 404 permit is necessary. Furthermore, the NEPA document should include how the federal land management agency will adhere to the guidance provided in the 1990 Corps of Engineers and EPA Memorandum of Agreement (MOA) concerning the determination of mitigation under the Clean Water Act Section 404(b)(1) Guidelines.</p>	1-10 All roads, drill pads and activities requiring new construction would be located out of wetland habitats. This has been clearly stated in the Final EA. The only anticipated 404 compliance issue may be associated with maintenance activities on the existing "Lexam" road. If culvert replacement is required, the Corps of Engineers will be consulted and necessary permits acquired and followed.
1-11	<p>In addition, we recommend that the USFWS consider the requirements of the Wetlands Protection Executive Order 11990 in the NEPA analysis. Executive Order 11990 directs federal agencies in certain circumstances to provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. EPA requests that the USFWS provide discussion on how Executive Order 11990 applies to the proposed action at the Refuge and how USFWS will comply with this Executive Order.</p>	1-11 This project proposal has no anticipated impacts on wetlands other than the potential replacement of existing culverts/bridges under an existing access road. The replacement would be at the request of the USFWS to avoid potential collapse under heavy loading. Collapse would result in altered wetland hydrology and potential fuel/chemical spills. If culvert replacement is required, the Corps of Engineers will be consulted and necessary permits acquired and followed.
	<p><u>Groundwater</u></p>	
1-12	<p>As groundwater is an especially important and vulnerable resource in the San Luis Valley, EPA recommends the USFWS provide additional information on potential impacts to resources in the area. The aquifers that underlie the valley store very large amounts of groundwater which is critical for maintaining groundwater dependant ecosystems, providing water for irrigation, and providing drinking water. Though the aquifers hold large quantities of groundwater in storage, there is little annual recharge. The Baca Wildlife Refuge is located near the mountain front where recharge to the aquifers occurs. The NEPA analysis should provide more detailed information, including data and maps, on the occurrence of groundwater in the valley fill sediments that underlie the proposed drill site. In addition, the NEPA analysis should present information on the total thickness, saturated thickness, recharge and discharge for the</p>	1-12 The USFWS recognizes the long history of concern about groundwater resources beneath the Baca NWR, as well as the importance of that resource to the region. Because of these concerns, the Colorado Oil and Gas Conservation Commission, at the request of the USFWS, stipulated that well casings be set with concrete to a depth of 3,000 feet as a condition for permit approval. This casing depth is consistent with the recommendation of the engineer for the Rio Grande Water Conservation District that 3,000 feet is an adequate depth to protect the "active" portion of the aquifer with good water quality. The recommendation was based upon published reports. Other required measures to protect surface and groundwater from potential contamination are outlined in the Final EA and the FONSI.

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	<p>aquifers that underlie the site. The DEA, and numerous reports on the hydrogeology of the San Luis Valley, indicate that the "deeper" aquifer extends to 4500 feet below the land surface - yet the plan only requires casing to be set to 3000 feet. EPA requests information regarding how the lower part of the aquifer will be protected.</p>	
1-13	<p>In addition, EPA recommends the NEPA analysis include information about permitted and actual use of groundwater in the vicinity of the Refuge. Information may be obtained from the Colorado State Engineer on the number and location of existing, permitted wells (domestic, irrigation, stock, and public supply.) Finally, EPA recommends more detail be provided on the proposed groundwater monitoring program that is included in the DEA such as: the party(ies) responsible for development and implementation of the monitoring program; sampling frequency; and monitoring data management.</p>	1-13 Section 1.6.2.4 of the Final EA describes the agreement whereby Lexam would acquire groundwater for its exploration activities, subject to the constraints that the Colorado Division of Water Resources would place on any such agreement. Water that Lexam would obtain from the agreement is presently an adjudicated right. Withdrawal of the 15 acre-feet of water from a well owned by the USFWS would result in no impact to water supply on the Refuge, since Lexam would be required to offset the depletion of water it uses, as described in Section 2.2.2.5 of the Final EA. If an agreement cannot be made to the satisfaction of the parties and the State, then Lexam, as stated in the Final EA, would purchase water from available off-site sources.
1-14	<p><u>Socioeconomic Resources</u></p> <p>The DEA has not fully evaluated the impacts that exploratory drilling and potential full field development will have on the communities surrounding the Refuge. As stated in the DEA, "Recreation and tourism also has a substantial role in regional economy." (DEA, page 3-39). It is EPA's understanding that the recreational attractions and economics to this portion of the San Luis Valley is supported by an environmental setting that is based on natural beauty, lack of industrialization and a spiritual attraction of the area. The DEA has not evaluated or analyzed fully how the proposed action from Lexam will impact this unique environment and its uses.</p>	1-14 The Final EA analyzes the effects of environmental protection measures suggested to the mineral owner concerning the time, place and manner of two exploratory wells (which is the federal action). For the most part, none of these measures or restrictions will impact socioeconomic values in the area.
1-15	<p>In conclusion, EPA does not believe the DEA provides sufficient information to allow USFWS to determine whether this project will have significant impacts and whether preparation of an EIS is necessary. To this end, EPA recommends the NEPA document be supplemented with additional analysis and study on potential impacts to air quality, water quality, and socioeconomics. If you have any questions or would like to discuss our comments, please contact Dick Clark of my staff at (303) 312-6748 or by email at clark.richard@epa.gov.</p>	1-15 Thank you for your comments.
	<p>Sincerely,</p>  <p>Larry Svoboda Director, NEPA Program Office of Ecosystems Protection and Remediation</p> <p>5</p>  <p>Printed on Recycled Paper</p>	

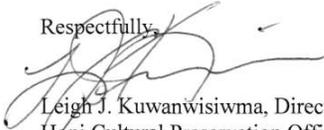
Comment #	Letter #2	Response
	<div style="text-align: center;">  <p>United States Department of the Interior NATIONAL PARK SERVICE</p> <p>Great Sand Dunes National Park and Preserve 11500 Highway 150 Mosca, Colorado 81146- 9798 Phone 719- 378- 6300 Fax 719- 378- 6310</p>  </div> <p>L3025 (1470)</p> <p>DEC- 08/0001</p> <p>March 3, 2008</p> <p>Memorandum</p> <p>To: Mike Blenden, Project Leader, San Luis Valley NWR Complex, Region 6, National Wildlife Refuge System, U.S. Fish and Wildlife Service, Alamosa, Colorado</p> <p>From: Superintendent, Great Sand Dunes National Park and Preserve </p> <p>Subject: Review of Environmental Assessment of Proposed Gas and Oil Exploration, Baca National Wildlife Refuge, Saguache County, Colorado</p> <p>2-1 The National Park Service (NPS) has reviewed the subject environmental assessment (EA). Lexam Exploration U.S.A. is proposing two exploration wells within the Baca National Wildlife Refuge. The proposal includes details for constructing access to and drilling the Baca #5, #6, and #7 wells as straight holes. Drilling will occur on Baca #5 and on either Baca #6 or Baca #7 with a total of two wells being drilled. The Baca #5 is approximately 3 miles from the northern boundary of Great Sand Dunes National Park and Preserve. The Baca #6 and #7 wells are both approximately 2 miles from the same corner of the park boundary. Our comments focus on evaluating the project's potential to affect Great Sand Dunes National Park and Preserve (park) and how that potential was addressed in the EA. We also include two recommendations: one to fully evaluate the alternative of directionally drilling the two wells from a single surface location inside the Refuge and a comment on the scope of the project.</p> <p>2-2</p> <p>2-3 1. The proposal would have potential impacts on visual quality, air quality, and natural soundscapes in the park. The EA specifically considers the park in the impact analysis for visual resources, but not for air quality or noise impacts.</p> <p>Visual Resources. The current EA includes a reasonable visual impact analysis of what park visitors may see from various vantage points near and in the park (Section 4.11.1.1). We did not identify any further needed mitigation based on the project's short- term nature.</p> <div style="text-align: center;">  </div>	<p>2-1 Thank you for your comments.</p> <p>2-2 Thank you for your comments.</p> <p>2-3 Thank you for your comments.</p>

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2-4	<p>Air Quality. The EA lacks a credible air quality impact analysis to evaluate the impacts to the park. The park contains both a Class I wilderness area and a Class II non-wilderness area. Results from a preliminary visible plume analysis performed by the NPS indicate potential impacts from the operation of a single 1500 horsepower diesel fueled drilling rig to both the Class I and Class II areas of the park. The EA should include air quality impact analyses that evaluate the visibility impacts and the concentrations of criteria air pollutants caused by the project in both the Class I and Class II areas of the park. The concentration analysis should be performed with an EPA air quality dispersion model. The air quality impact analysis should evaluate impacts from both the construction and operation phases of the project which include emissions from combustion sources as well as fugitive emissions. The analysis should also calculate impacts of acid deposition of total sulfur and total nitrogen at both the Class I and Class II areas of the park. Impacts to visibility should be performed with the EPA VISCREEN model for both the point sources and area sources to both the Class I and Class II areas of the park. Mitigation strategies should be evaluated to minimize impacts to air quality in the park. Mitigation measures include the watering of the dirt roads to reduce fugitive dust. The drilling rig should use ultra low sulfur diesel fuel. Due to the proximity of the project to the park, Lexam should obtain the lowest air pollutant emitting drilling rig that is commercially available. The NPS Air Resources Division staff is available to discuss these issues.</p>	2-4 See response to comment 1-4.
2-5	<p>Natural Soundscapes. At 2.0 miles distance, sound in the park from site construction and well drilling may not be perceivable to park visitors under most atmospheric conditions, but the analysis does not allow us to reach that conclusion. The noise metrics presented in the EA, Leq (24) and Ldn, were designed for use in urban areas when studying the impact of aircraft noise on humans during the night time hours. These are inappropriate metrics for use in a natural area, particularly an area adjacent to a unit of the National Park System. The "maximum permissible noise levels," as presented in table 3-8 have little bearing on the lands being analyzed in this EA. Human health standards are not applicable except at the actual job site and would only apply to rig workers. The appropriate sound metrics for this EA would be the L90 standard (level of ambient sound exceeded 90% of the time) or the use of "audibility standard." These metrics should be applied to determine the potential sound impacts in the park. Additional information on appropriate noise metrics and sampling techniques for natural areas can be obtained from the Natural Sounds Program in the Air Resources Division. Finally, we note the analysis is premised on use of a quieter diesel- electric rig, but its use is qualified by availability. This qualification diminishes the quality of the analysis.</p>	<p>2-5 The NPS comment stated that the maximum permissible noise levels presented in Table 3-8 are said to "have little bearing on the lands being analyzed in this EA." The noise levels presented are those allowed under Colorado Statute 25-12-103. The NPS did not provide an ambient sound level for the park that was consistent with the L90 metric or an "audibility standard" as suggested in the comment as more appropriate Discussions with the NPS indicated that they hope to generate a base line data set to characterize ambient sound levels in the northern section of Great Sand Dunes Notational Park.</p> <p>It is agreed that background noise levels reported by the NPS, USEPA, and ENSR for rural areas such as this study area typically range from 35 to 45 dBA. In 1993/1994 the NPS reported that, in the study area, noise levels were less than 40 dBA 90 percent of the time. Although not acquired adjacent to the exploration project, this is the best data currently available approximating background noise levels in this environment.</p> <p>Section 4.11.2.1 "Effects of Lexam's Planned Exploration Program" in the EA predicts noise levels from drilling activity and attenuation rates based upon data from similar drilling operations at the Pinedale Anticline in Wyoming. In the Pinedale, Wyoming situation the Bureau of Land Management leasing stipulations established a 75 dBA maximum limit for noise levels 30 feet away from the drill pad as a condition for approval based upon minimizing wildlife disturbance. It is assumed that the drilling equipment used on the Pinedale project will characterize noise generated by equipment ultimately used by Lexam on this project. Such an assumption has to be made since Lexam will be leasing drilling equipment for this project but the actual drilling equipment has not yet been identified. Consequently the specific drill rig to be employed cannot yet be identified. As the section describes, at Pinedale the highest average noise levels recorded 130 feet away from the drilling rig in various locations around the rig was found to be 66.8 dBA. Assuming a similar rig is used to drill the proposed wells, noise attenuation calculations predict that noise levels would be 43.1 dBA and 37 dBA at 2000 and 4000 horizontal feet from the drilling rig respectively. Although noise will be periodically audible it will likely be below background levels 2 miles (the distance to Great Sand Dunes National Park boundary) from the drilling rig.</p>
2-6	<p>2. Mitigation measures described in the EA include timing restrictions, use of liners, use of a diesel- electric rig (qualified by availability), and good surface casing/cementing practices. However, the EA does not evaluate using a single pad to drill the two wells. Such an option is a means for significantly reducing surface impacts by reducing the number of needed pads and road segments to drill wells.</p>	2-6 See response to comment 2-7.

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2-7	<p>The NPS offers the following comment for FWS consideration to further reduce impacts on the Refuge.</p> <p>Drilling Two Wells from Same Surface Location in the Refuge. Using only one drill site to drill two wells is an obvious strategy to reduce the footprint of operations, and should be fully evaluated as a reasonable alternative. It seems the most attractive alternative in terms of feasibility and cost- effectiveness would be a central location at the proposed Baca #6 site or a new location further west. The Baca #6 location provides opportunity for one straight hole and departures of 1 mile and 3800 feet to reach Baca #5 and #7 respectively. A location equidistant from the three wells would make required horizontal departures about 4500 feet. These are starting points for evaluating a single surface location that would substantially reduce overall impacts of the proposal. Though the Refuge would be the primary beneficiary of reduced impacts, indirect impacts to adjacent lands from construction activities (e.g., visual intrusion and fugitive dust) would also be less.</p>	<p>2-7</p> <p>Wellbore stability is a critical factor in drilling deviated wells. Rocks in the subsurface are subjected to vertical and horizontal stresses as well as pore pressure. When a drill bit penetrates the earth, the equilibrium of these stresses is upset. The cavity produced when drilling a hole may be deformed by these stresses (Garrouch and Ebrahim 2001). Often the deformation is inconsequential, but in some cases the deformation may result in collapse of the hole. Wellbore instability is enhanced in directionally drilled wells and wellbore stability incidents are responsible for 40 percent of non-productive time and 25 percent of drilling costs (Gallant et al. 2007). The greater instability of directionally drilled holes leads to greater probability of incidents that would include:</p> <ul style="list-style-type: none"> • Hole collapse and loss of hole; • Lost circulation; • Stuck drill pipe; • Blow outs; • Drill pipe failure; and • Excessive drag during tripping drill pipe or casing (Alaska Department of Natural Resources 2008).
2-8	<p>The EA evaluates and dismisses an alternative for directionally drilling the wells from outside the Refuge, which would entail perhaps a two- mile horizontal departure. Though we agree with the conclusion that the alternative is not feasible, we found the discussion to be technically weak. Though directional wells do present additional physical and economic risk, these risks are effectively managed by the oil and gas industry on a daily basis. Directional wells would still provide useful information for interpreting the existing seismic data, though perhaps not to the extent of the current proposal.</p> <p>To be useful, analysis of directional drilling alternatives needs to be rigorous and include discussion of geologic feasibility and whether directional drilling options could meet Lexam's project objectives.</p>	<p>The primary objective of the proposed activities is to explore for commercially producible hydrocarbons. Intimately related to that objective is the gathering of data. The data that would be gathered would primarily be focused on the stated objective, but other valuable information also would be obtained. That information would include the stability of subsurface strata when exposed to the drill bit and drilling fluids. There is a general consensus in the oil industry that drilling of vertical wells in wildcat areas is the first choice because it lessens the risk factors (but does not eliminate them) presented by drilling into unknown subsurface environments. Because of the unknown conditions that may be encountered at depth for this project, it is unreasonable to assume that directional drilling is either technically practical or feasible, just because these risks are seemingly effectively managed by the oil and gas industry on a daily basis</p> <p>With regard to Lexam's planned exploration activities, the wells are expected to be 7,000 feet deeper than the Baca #2, which was drilled to a true vertical depth of 6,908 feet. Although the seismic data can identify structures, faults, and possible strata, it cannot identify potential problem zones (high stress areas, lost circulation zones, over pressuring) at depths deeper than the nearest well control.</p>
2-9	<p>3. Scope of the Analysis. The scope of the analysis is limited to road and drill pad construction, and drilling operations. We agree that full- field development cannot reasonably be analyzed at this time, and further, that exploratory drilling cannot reasonably be expected to proceed to production. However, plugging and abandonment of the wells and reclamation of the operations areas is a reasonable outcome that should be included in the EA.</p>	<p>2-8</p> <p>See response to comment 2-7.</p>
2-10	<p>Flow Testing. The project scope does not include flow testing potential gas bearing zones. If such zones are encountered, there will likely be a strong desire on Lexam's part to conduct limited flow tests to further evaluate the zone(s) potential. Conducting such tests would likely include gas flaring and handling/disposal of produced liquids. Because this is a common occurrence, the NPS standard approach is to include such short- term testing of exploration wells in the project scope for exploration wells and in the NEPA analysis. Doing so avoids the need to supplement an existing NEPA document and provides full disclosure to the public. It also avoids time delays for operators due to the need for the federal agency to do additional</p>	<p>2-9</p> <p>In the event that commercially developable mineral resources are not discovered (or for other reasons), Lexam may choose to plug and abandon the exploration wells and reclaim the operations areas. This potential outcome is considered to be inherent in both the Preferred Alternative and No Federal Involvement Alternatives. For this reason, many of the environmental protection measures developed by the USFWS relate to site reclamation and well abandonment procedures.</p> <p>2-10</p> <p>Open-hole flow testing (drill stem tests) may be conducted if hydrocarbon shows are encountered that warrant testing. Lexam does not propose to conduct production testing or construct pipelines as part of the planned activities described in the Final EA. If such facilities are contemplated, they will be assessed in subsequent NEPA analysis. Open-hole DST's have been added to the scope of Lexam's planned activities as described in the Final EA.</p>

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	<p>compliance work. As a result, we recommend that short- term testing be included in the project's scope and that the USFWS analyze this activity as part of its NEPA compliance at this time.</p> <p>We appreciate the opportunity to review this EA.</p> <p>bcc: Linda Dansby Regional Minerals Coordinator Intermountain Region- Santa Fe National Park Service P.O. Box 728 Santa Fe, NM 87504- 0728</p> <p>Carol McCoy Chief, Planning, Evaluation and Permits Branch Geologic Resources Division National Park Service P.O. Box 25287 Denver, CO 80225- 0287</p> <p>John Bunyak Chief, Policy, Planning and Permit Review Branch Air Resources Division National Park Service P.O. Box 25287 Denver, CO 80225- 0287</p> <p>LDansby:IMDE- MOG:2/22/08 with input from JBunyak, J Vimont and JNotar:NRPC-ARD, and CMcCoy, KMoss, EKassman, LNorby and PO'Dell:NRPC- GRD:2/21/08</p>	

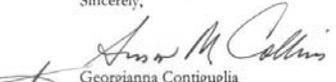
Comment #	Letter #3	Response
	<div data-bbox="216 154 661 381">  <p>THE HOPI TRIBE P.O. Bo 123 Kykotsmovi, AZ 86039 (928) 734-3000</p> </div> <div data-bbox="777 203 892 332"> <p>RECEIVED FEB 26 2008 SLV NWR COMPLEX</p> </div> <div data-bbox="934 154 1102 235"> <p>Benjamin H. Nuvams CHAIRMAN Todd Honyaoma, Sr VICE-CHAIRMAN</p> </div> <div data-bbox="609 406 756 430"> <p>February 6, 2008</p> </div> <div data-bbox="237 462 672 576"> <p>Mike Blenden, Project Leader San Luis Valley National Wildlife Refuge Complex U.S. Fish and Wildlife Service 9383 El Rancho Lane Alamosa, Colorado 81101</p> </div> <div data-bbox="237 625 399 649"> <p>Dear Mr. Blenden,</p> </div> <div data-bbox="157 673 1039 901"> <p>3-1 This letter is in response to your correspondence dated January 18, 2008, with an enclosed copy of a draft <i>Environmental Assessment of Proposed Gas and Oil in the Baca National Wildlife Refuge</i>. As you know from our letters on this proposal dated September 5 and October 24, 2007, the Hopi Tribe claims ancestral and cultural affiliation to prehistoric cultural groups in this area of Colorado, and the Hopi Cultural Preservation Office supports the identification and avoidance of prehistoric archaeological sites and Traditional Cultural Properties. The Hopi Tewa people of First Mesa in particular have traditional association with Great Sand Dunes. Therefore, we appreciate the U.S. Fish and Wildlife Service's continuing solicitation of our input and your efforts to address our concerns.</p> </div> <div data-bbox="157 917 1039 1144"> <p>3-2 The Hopi Cultural Preservation Office previously supported the Baca Land Exchange benefiting Great Sand Dunes National Park and the Baca National Wildlife Refuge. In our September 5th letter, we stated we are concerned about adverse natural and cultural effects from Lexam's fossil fuel prospecting in the San Luis Valley. In our October 24, 2007, letter, we reviewed the cultural resource inventory of Baca #5, Baca #5 Alternative, and Baca #6 well pads and access roads that states, "Given the sand deposits throughout the area and specifically at the well pad and access road locations, monitoring of all ground disturbance is recommended." We also reviewed the cultural resource inventory of Lexam's Baca 3-D seismic project that identifies 42 prehistoric sites generally described as prehistoric open camps.</p> </div> <div data-bbox="157 1161 1039 1315"> <p>3-3 We have stated that we believe that if the Fish and Wildlife Service consulted with the fish and wildlife in Baca National Wildlife Refuge, they would say no to the proposed drilling. Therefore, regarding Lexam's proposal we generally supported the scoping comments of the Crestone Baca Land Trust, San Luis Valley Ecosystems Council Natural Resources Defense Council, et.al. Specifically, we agreed that the Fish and Wildlife Service has not identified a purpose and need for the proposal, and that the Hopi Tribe was not consulted on the already</p> </div>	<div data-bbox="1102 698 1449 730"> <p>3-1 Thank you for your comments.</p> </div> <div data-bbox="1102 941 1449 974"> <p>3-2 Thank you for your comments.</p> </div> <div data-bbox="1102 1193 1984 1307"> <p>3-3 The purpose and need for the project is clearly documented on page 1-1 in the Final EA and in the FONSI. The need to minimize surface disturbance to reasonable levels is implied, if not stated, in this section. Note that the federal action that provides the legal basis for the NEPA analysis is the formulation of standards and measures to ensure that refuge resources are not unreasonably impacted.</p> </div> <div data-bbox="1207 1323 1984 1388"> <p>The previous seismic exploration was conducted after receiving a permit from the COGCC and with the USFWS's input on mutually agreed upon measures to mitigate impacts on the refuge. The seismic studies were not subject to NEPA analysis or subsequent tribal consultation.</p> </div>

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	<p>Mike Blendon February 6, 2008 Page 2</p> <p>conducted 25-square mile seismic study. We supported the request that a full scope of actions be developed for the Baca National Wildlife Refuge through an Environmental Impact Statement, rather than an Environmental Assessment.</p> <p>3-4 We have agreed that the Baca Wildlife Refuge is threatened by one of the nation's most poorly justified predilections; the exploitation and degradation of our most special public lands for relatively miniscule reserves of oil and gas. We have further agreed that the Fish and Wildlife Service seems reluctant to exercise the authority it has been vested with, indeed its mandate, to protect these resources to the maximum extent possible. And finally, we have stated that we believed that this proposal constitutes a conflict of use that is incompatible with the purpose of the Refuge.</p> <p>3-5 The Hopi Cultural Preservation Office has now reviewed the enclosed draft Environmental Assessment. We share the goal to achieve a federal minerals withdrawal that will permanently protect the Refuge from gas and oil development, and therefore we support the No Mineral Exploration Alternative in this draft Environmental Assessment.</p> <p>3-6 The Hopi Cultural Preservation Office looks forward to continuing consultations on this proposal. If you have any questions or need additional information, please contact Terry Morgart at the Hopi Cultural Preservation Office. Thank you again for your consideration.</p> <p style="text-align: center;">Respectfully,  Leigh J. Kuwanwisiwma, Director Hopi Cultural Preservation Office</p> <p>xc: Colorado State Historic Preservation Office Ceal Smith, Crestone/Baca Land Trust, Box 893, Crestone, CO 81131 San Luis Valley Ecosystem Council, P.O. Box 223, Alamosa CO 81101</p>	<p>3-4 Thank you for your comments. USFWS policy provides for the exercise of non-federally owned mineral rights "while protecting USFWS resources to the maximum extent possible." The USFWS Manual chapter pertaining to oil and gas exploration on National Wildlife Refuges is contained in Appendix B of the Final EA. Regulations contained in the Code of Federal Regulations guiding the USFWS's management of excepted mineral rights appear on pages 1-6 and 1-7 of the Final EA.</p> <p>3-5 Thank you for your comments.</p> <p>3-6 Thank you for your comments.</p>

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	<p>STATE OF COLORADO</p> <p>Bill Ritter, Jr., Governor DEPARTMENT OF NATURAL RESOURCES DIVISION OF WILDLIFE AN EQUAL OPPORTUNITY EMPLOYER</p> <p>Thomas E. Remington, Director 6060 Broadway Denver, Colorado 80216 Telephone: (303) 297-1192 <i>wildlife.state.co.us</i></p> <p>RECEIVED MAR - 6 2008 SLV NWR COMPLEX</p>  <p>February 19, 2008</p> <p>Mr. Michael Blendon Project Leader San Luis Valley NWR Complex US Fish and Wildlife Service 9383 El Rancho Lane Alamosa, CO 81101</p> <p>RE: <i>Environmental Assessment of Proposed Gas and Oil Exploration, Baca National Wildlife Refuge, Saguache County, Colorado</i></p> <p>Dear Mr. Blendon:</p> <p>The Colorado Division of Wildlife (CDOW) has reviewed the US Fish and Wildlife Service (USFWS) <i>Environmental Assessment of Proposed Gas and Oil Exploration, Baca National Wildlife Refuge</i> (EA). CDOW appreciates the open dialogue that USFWS has had with CDOW during the preparation of this document, and the opportunity to comment on the proposal. In general, CDOW recognizes the efforts that USFWS has taken to incorporate measures to protect wildlife resources during the drilling of the two exploratory wells contemplated in the EA (see page 2-1). There remains, however, several issues that CDOW would like to see addressed in more detail prior to completion of the NEPA process:</p> <p>Well Completion and Testing The document does not contain a description of how the wells will be tested, or evaluate the potential impacts of well completion, testing, or limited production to test the wells. This is of concern to CDOW as a potential pipeline route along the proposed access road to produce the wells would need to cross habitats for sensitive aquatic resources. CDOW would be opposed to placing a production pipeline across Crestone Creek and North Crestone Ditch due to existing Rio Grande sucker and Rio Grande chub populations that inhabit these aquatic habitats. If there are no plans to complete the wells and test them through production or some other means, please make that explicit in the document. Otherwise, an analysis that evaluates the impacts of well completion, testing, and production to test the wells should be included in this document.</p> <p>Directional Drilling CDOW does not agree that it would be either technically or economically prohibitive to directionally drill the two wells from a single centralized well pad (Section 2.5.2, p. 2-9). Given the close proximity of the proposed well pad locations and the proposed 14,000 foot well depth, directionally drilling the two wells from a single centralized pad location would not seem impractical, even for exploratory wells. CDOW staff have seen this technology used successfully in similar situations. CDOW advocates more widespread use of directional drilling to reduce impacts to wildlife resources, and encourages USFWS to consider this method for the two proposed wells. While there would be some increased drilling cost and complexity, this cost and additional technical complexity would be justified by the sensitivity of the surface resources on the refuge and</p> <p>DEPARTMENT OF NATURAL RESOURCES, Harris D. Sherman, Executive Director WILDLIFE COMMISSION, Tom Burke, Chair • Claire O'Neal, Vice Chair • Robert Bray, Secretary Members, Dennis Buechler • Brad Coons • Jeffrey Crawford • Tim Glenn • Roy McAnally • Richard Ray Ex Officio Members, Harris Sherman and John Stulp</p>	<p>4-1 Open-hole flow testing (drill stem tests) may be conducted if hydrocarbon shows are encountered that warrant testing. Lexam does not propose to conduct production testing or construct pipelines as part of the planned activities described in the Final EA. If such facilities are contemplated, they will be assessed in subsequent NEPA analysis.</p> <p>4-2 See response to comment 2-7.</p>

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4-3	<p>the decrease in surface disturbance associated with building a single road and one well pad for both wells. Additionally, this would provide an opportunity to test the efficacy of directionally drilling oil and gas resources on the refuge; an issue that will certainly arise if additional wells are proposed.</p> <p>Big Game Winter Range and Production Areas Both wells are proposed in Severe Winter Range for elk, and winter range for mule deer and pronghorn. Additionally, Baca # 5 is located in a Winter Concentration area for pronghorn. CDOW currently recommends the following seasonal timing restrictions on new construction and drilling activities in these important habitats to protect wildlife resources:</p> <ul style="list-style-type: none"> • Elk Severe Winter Range (West of Interstate 25)--no development activity between 1 December and 15 April. In areas where a late big game hunting season extends to 31 December, this timing limitation runs between 1 January and 15 April. • Mule Deer Severe Winter Range (West of Interstate 25)--no development activity between 1 December and 15 April. In areas where a late big game hunting season extends to 31 December, this timing limitation runs between 1 January and 15 April. • Pronghorn Antelope Winter Concentration Areas (West of Interstate 25)--no development activity between 1 December and 15 April. In areas where a late big game hunting season extends to 31 December, this timing limitation runs between 1 January and 15 April. <p>Elk Production Areas exist at Spanish Creek Meadows and Crestone Creek riparian area. CDOW currently recommends no development in elk Production Areas between 15 May and 15 June (this is already covered by the migratory bird closure period of 1 May to 31 July described in the EA).</p> <p>Based on the potential for impacts to seasonal big game habitats in the project area, CDOW suggests that construction and drilling activities take place between 15 June and 1 December. Due to the additional concerns that USFWS describes in the EA related to migratory bird nesting and production (Section 2.2, p. 2-3), CDOW recommends that the window for construction and drilling activities be 1 August to 1 December in order to avoid impacts to these species.</p> <p>Sensitive Aquatic Habitats Crestone Creek and North Crestone Ditch contain self-sustaining populations of Rio Grande sucker, a state-listed endangered species, and Rio Grande chub, a Colorado species of special concern. Both species are particularly sensitive to any degradation of water quality or decrease in water quantity in Crestone Creek and North Crestone Ditch. Both of these water courses are currently crossed by "Lexam Road," which would be upgraded to provide access to the proposed well pad locations. CDOW recommends that USFWS consider an alternate route to access the proposed well pad locations, in order to avoid hauling construction equipment and drilling materials across Crestone Creek and North Crestone Ditch that could result in a spill having catastrophic consequences to the Rio Grande sucker and Rio Grande chub populations in this area. It appears that a potential alternative access exists from the east, across existing Saguache County and private roads. If an alternative route is not found, CDOW recommends that Lexam's emergency response plan contain a site-specific contingency plan for Crestone Creek and North Crestone Ditch that includes having sufficient spill control materials, equipment, and trained spill response personnel on-site to contain a worst-case spill event in that area without adverse impacts to either watercourse.</p> <p>Special Status Species In addition to the Rio Grande Sucker and Rio Grande chub, there are several other species found on the Baca National Wildlife Refuge or just outside its boundaries that are Federal and/or State-listed. The Gunnison's prairie dog was recently petitioned for Federal listing and protection under the Endangered Species Act and is now considered a candidate species. Other species include the Southwestern willow flycatcher (Federal endangered and Colorado endangered), Townsend's big-eared bat (Colorado species of special concern), and</p>	<p>4-3 Based on subsequent discussions with CDOW, the USFWS has determined (and CDOW has concurred) that the seasonal restrictions presented in the Final EA are indeed sufficient to alleviate significant big game breeding and wintering issues associated with this proposal.</p> <p>The CDOW's concern regarding impacts to wintering big game revolve around the duration of disturbance, severity of the winter, and size of the overall designated winter range and severe winter range where the disturbance is occurring. Their concerns regarding impacts to calving big game revolve primarily around disturbance while animals are actively calving and/or caring for new and immobile young. They concur with the USFWS that due to the temporary nature of the drilling of the two proposed wells, the use of one drill rig to drill each well, the restrictions on drilling and associated activities during calving season for elk, deer and pronghorn, and the fact that the project area is located within extraordinarily large sized designated winter ranges and severe winter ranges for these animals, that impacts to these species by Lexam's activities as proposed and restricted would be less than significant.</p> <p>As the name suggests, Severe Winter Ranges are areas that are of priority concern only during severe winters. CDOW has recommended, and Lexam has agreed, that in the event of a severe winter, Lexam commit to assisting the CDOW with managing for the needs of any wintering big game temporarily displaced by Lexam's activities within the designated areas., especially if the temporary displacement results in the potential for a decline in overall physiological health of the animals or in increased game damage claims by private landowners. This assistance could occur as a Lexam funded baiting program, feeding program or other form of distribution management as determined appropriate by CDOW within the severe winter range area. During normal winters, CDOW believes that animals distributed to other areas within the designated range by temporary disturbances is not a significant impact to their activities, physiological conditions or survival. However, CDOW requests that they are kept abreast of proposed activities that may disturb, redistribute or disburse wintering big game animals within their designated ranges.</p> <p>4-4 See response to comment 4-3.</p> <p>4-5 The USFWS considered the alternate access route proposed by CDOW and found that it would require substantial road improvement and construction activity and would increase the distance required to access the drill sites with support vehicles (thus increasing air emissions). The proposed alternate route also would direct some of the construction and support traffic through the Baca Grande subdivision which would increase the potential impacts on the local community and would be extremely unpopular.</p> <p>4-6 The special status species referenced in the comment are all documented in the Final EA. The USFWS's analysis shows that the potential impacts to these species from the Preferred Alternative would be minimal.</p>

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4-7	<p>Northern leopard frog (Colorado species of special concern). While none of these species is documented from the proposed well sites and project area, some could be expected to occur within the project area upon additional survey efforts. For example, several colonies of Townsend's big-eared bats are known from various mines in the area, and the only known maternity colony of this species in the San Luis Valley is located just south of the Cottonwood Creek area. Foraging bats are very likely utilizing all the riparian areas in this region. While we foresee no significant impacts to any of these species from this proposed oil and gas exploration project as described in the EA, we want to note that if this action leads to gas production or the drilling of additional exploratory wells, there will be a much greater potential for impacts to these species. More extensive evaluations and additional data will be required at that point, to fully assess the potential impacts to these species.</p> <p>CDOW appreciates USFWS's efforts to include in the EA measures to avoid, minimize and mitigate the impacts to wildlife resources from the proposed exploratory wells on the Baca National Wildlife Refuge. We recognize the constraints that your agency is under and the challenge of addressing Lexam's drilling proposal in a comprehensive manner. We submit these comments for your consideration in hopes that they will help you to address more fully the potential impacts to wildlife resources. If you have questions or concerns regarding these comments, please do not hesitate to contact me at (719) 587-6904.</p> <p>Sincerely,</p>  <p>Rick Basagoitia Area Wildlife Manager – San Luis Valley Colorado Division of Wildlife</p> <p>Cc: Ron Rivale, DWM - Alamosa Tom Spezze, SW Region Manager Mark Konishi, Asst. Director of Field Operations</p>	4-7 Thank you for your comments.

Comment #	Letter #5	Response
	 <p data-bbox="304 251 808 284">  OFFICE of ARCHAEOLOGY and HISTORIC PRESERVATION </p> <p data-bbox="294 357 430 381">February 22, 2008</p> <p data-bbox="294 397 514 495"> Michael Blenden San Luis Valley NWR Complex US Fish and Wildlife Service 9383 El Rancho Lane Alamosa, CO 81101 </p> <p data-bbox="294 511 913 560"> Re: Draft "Environmental Assessment of Proposed Gas and Oil Exploration, Baca NWR" (CHS #51875) </p> <p data-bbox="294 568 430 592">Dear Mr. Blenden:</p> <p data-bbox="294 609 976 690"> We have recently obtained the draft EA identified above from the US Fish and Wildlife Service (Service) website. As we wish to consult with the Service regarding the potential effects of proposed oil and gas exploration in the Baca National Wildlife Refuge on historic properties please include us on your distribution list for future correspondence regarding this EA. </p> <p data-bbox="157 722 976 803"> 5-1 Upon review of the draft document, we note with concern that the Service has determined that "the proposed action is not considered an undertaking as defined by NHPA [National Historic Preservation Act], and therefore is not subject to review" (pages 1-8, 3-35, etc.). The issue of allowing access to private subsurface mineral rights notwithstanding, the document does not adequately demonstrate that the proposed action is not an undertaking (36 CFR 800.3(a)). </p> <p data-bbox="157 836 976 1039"> 5-2 As stated in the draft EA, "the Service has both the responsibility and the authority to formulate standards and measures for ensuring that the surface estate of the Refuge and its associated resources are not unreasonably impacted" by activities associated with the subsurface estate (p. 1-4). The Service plans to use its authority to meet this responsibility "by establishing stipulations and recommendations to protect the surface estate and other resources of the Refuge from unreasonable damage during all phases of currently planned oil and gas exploration being conducted by Lexam, including the intended drilling of two exploratory gas wells on the Refuge" (page 1-1). Consequently, it is our opinion that the definition of an undertaking as defined in 36 CFR 800.16(y) is met by this Federal action which is under analysis in the EA. As a result, it is our opinion that the Service is required to comply with the NHPA. Compliance with the NHPA by the Service does not deny Lexam the reasonable opportunity to explore for minerals. </p> <p data-bbox="294 1055 976 1112"> We look forward to further consultation with the Service and other consulting parties as appropriate regarding this project. If we may be of further assistance, please contact Greg Wolff, Section 106 Compliance Coordinator, at (303) 866-4674. </p> <p data-bbox="294 1128 367 1153">Sincerely,</p> <p data-bbox="220 1144 556 1274">  Georgianna Contiguglia State Historic Preservation Officer GC/GAW </p> <p data-bbox="787 1323 1081 1339" style="text-align: right;"> COLORADO HISTORICAL SOCIETY </p> <p data-bbox="252 1339 1081 1372"> 1300 BROADWAY DENVER COLORADO 80203 TEL 303/866-3395 FAX 303/866-2711 www.coloradohistory-ohp.org </p>	<p data-bbox="882 276 987 389" style="text-align: center;"> RECEIVED FEB 28 2008 SLV NWR COMPLEX </p> <p data-bbox="1102 722 1942 803"> 5-1 Section 106 of NHPA, outlining the process for identifying, evaluating, conducting consultation, determining effects, and resolving impacts to historic properties, was followed during Lexam activities on the Refuge and will continue to be followed for future activities. </p> <p data-bbox="1102 852 1459 876"> 5-2 See response to comment 5-1. </p>

Comment #	Letter #6	Response
	 <p style="text-align: center;"> SAGUACHE COUNTY GOVERNMENT 501 Fourth Street P. O. Box 655 Saguache, Colorado 81149 Phone: (719) 655-2231 • Fax: (719) 655-2635 www.saguachecounty.net </p> <p style="text-align: right;">RECEIVED MAR - 2 2008 SLV NWR COMPLEX</p> <p style="text-align: right;">February 29, 2008</p> <p>Michael Blenden, USFWS Project Leader San Luis Valley NWR Complex 9383 El Rancho Lane, Alamosa, CO 81131</p> <p>Dear Mr. Blenden,</p> <p>Saguache County Commissioners, staff and consultants have reviewed the Environmental Assessment prepared by USFWS in collaboration with ENSR. The following are our comments and questions based on our understanding of the Environmental Assessment and the findings and recommendations contained therein.</p> <p>While recognizing that the Service has expended a great deal of time and effort, under difficult circumstances, the Saguache County Board of County Commissioners finds the Environmental Assessment (EA) prepared by USFWS for the Baca Wildlife Refuge to be inadequate in protecting the health, safety and welfare of the public, and the precious natural resources of the Refuge and our region, important to the local quality of life and economy. Our comments point out both broad and fine points that lead the Board to find that an Environmental Impact Statement (EIS) is indicated. We respectfully request that an EIS be completed to ensure that USFWS fulfills its charge to maximally protect the Refuge and effectively mitigate the many impacts, potential and real, which reach beyond the Refuge boundaries.</p> <p>The Commissioners, as discussed below, are very disappointed that the Service chose not to include the County as a Co-Operating Agency early in the scoping process. This would have provided the County the opportunity to fully participate in the NEPA process, as well as have a more complete understanding of the process and the factors that lead Fish and Wildlife to select an EA instead of an EIS approach. Such involvement may have alleviated some of the concerns expressed herein by the County. The Commissioners look forward to resolving the status issue as this process continues.</p> <p>The following is a summary of the key points, from Saguache County's point of view, substantiating the need for an EIS, or completion of a Comprehensive Conservation Plan:</p> <ul style="list-style-type: none"> • Compliance with NEPA's CEQ definitions of significance, and use of the EA's term: RFFA – Reasonably Foreseeable Future Action as a basis for no significance is questionable. • The draft EA does not provide adequate data, analyses, or documentation, as a basis for findings of no significance. • Studies / Plans / Reviews, stated to be completed in the future, are referred to in many clauses, which then go on to find no significance, in advance of those plans, studies and reviews. <p style="text-align: center;">1</p>	<p>6-1 Thank you for your comments.</p> <p>6-2 See response to comment 6-7, below.</p> <p>6-3 Thank you for your comments. Responses to these points are presented individually in the following sections.</p>

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6-7	<p>APPENDICES</p> <table border="1"> <thead> <tr> <th>PAGE</th> <th>APPENDIX</th> </tr> </thead> <tbody> <tr> <td>3</td> <td>APPENDIX A: NEPA Process</td> </tr> <tr> <td>5</td> <td>APPENDIX B: NEPA Council of Environmental Quality (CEQ) DEFINITION OF "SIGNIFICANCE"</td> </tr> <tr> <td>6</td> <td>APPENDIX C: Findings of no significance based on the temporary nature of the test well drilling, which fail to recognize future operations and longer term and cumulative effects as NEPA requires.</td> </tr> <tr> <td>7</td> <td>APPENDIX D: Future studies, reviews and plans referred to in the EA, without necessary details (who, what where, when and how they will be done), and referenced as a basis for finding no significance</td> </tr> <tr> <td>8</td> <td>APPENDIX E: Resource Protection</td> </tr> <tr> <td>10</td> <td>APPENDIX F: Oil and Gas Operations</td> </tr> </tbody> </table> <p>-----</p> <p>APPENDIX A - NEPA Process</p> <p>• COOPERATING AGENCIES</p> <p>EA section I. USFWS Environmental Assessment 5.0 Consultation and Coordination 5.1 Introduction</p> <p><i>"The USFWS is the lead agency for this EA. There are no cooperating agencies."</i></p> <p>Delay in USFWS offering Saguache County Cooperating Agency status resulted in loss of the opportunity for early involvement in the scoping process as local government decision-makers. As such, we understood we would be at the table during identification of the EA team, the issues and questions to be addressed in the EA, how, and by whom. While USFWS is responsible for the conduct and determinations in the EA, Cooperating Agency status is the NEPA mechanism for involving decision-makers and experts early in the process. Instead, the County, and participation of other interested and expert agencies and organizations, was relegated to review and commenting on the EA only during public comment periods. Given the unique refuge setting and hydrology, historical and current cultural qualities, and socio-economic factors, and with the potential for long term oil and gas operations - involvement and support of Cooperating Agencies is appropriate and prudent. Numerous clarifications are needed for the Cooperating Agency MOU presented to Saguache County by USFWS. We look forward to completing the MOU with you.</p> <p>3</p>	PAGE	APPENDIX	3	APPENDIX A: NEPA Process	5	APPENDIX B: NEPA Council of Environmental Quality (CEQ) DEFINITION OF "SIGNIFICANCE"	6	APPENDIX C: Findings of no significance based on the temporary nature of the test well drilling, which fail to recognize future operations and longer term and cumulative effects as NEPA requires.	7	APPENDIX D: Future studies, reviews and plans referred to in the EA, without necessary details (who, what where, when and how they will be done), and referenced as a basis for finding no significance	8	APPENDIX E: Resource Protection	10	APPENDIX F: Oil and Gas Operations	6-7
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While both the USFWS and Saguache County considered this agreement, work continued on the NEPA analysis. Although there continue to be opportunities for Saguache County and the USFWS to work on refuge oil and gas exploration cooperatively, the process is too far along for this draft agreement to have significant utility. The USFWS will continue to work with the County on all elements of gas exploration on the Baca NWR and will discuss the County's role in any future NEPA analysis before that formal process is initiated.

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6-8	<p>• RFFA - Reasonably Foreseeable Future Actions</p> <p>Section II. USFWS Environmental Assessment, Definitions - Page ii –</p> <p>MANY findings of no significance throughout the EA are stated to be based on the limited scope of the test well operations, and, no RFFA. The hope for future production is the goal of Lexam in drilling test wells. If they find resources - they will go to production. This is a reasonably foreseeable future action.</p> <p>Substantiation of the intended, reasonably foreseeable, future actions is apparent in Lexam's presentation at: http://www.lexamexplorations.com/energy_baca.php</p> <p><i>"Lexam's Baca Oil and Gas Project contains all of the ingredients necessary to make this an attractive, frontier exploration play. A discovery would turn Lexam's 100,000-acre land position into a strategic asset capable of adding substantially to the oil and gas reserves of participating companies."</i></p>	6-8
6-9	<p>• SIGNIFICANCE</p> <p>We have reviewed the N.E.P.A. document of the Council of Environmental Quality (CEQ), DEFINITION OF "SIGNIFICANCE", attached as APPENDIX B. See also: www.nepa.gov/nepa/regs/ceq/1508.htm - 1508.27</p> <p>Significance, as defined for the NEPA process requires addressing both context and intensity.</p> <p><i>"(a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and locality... Both short and long-term effects are relevant..."</i></p>	6-9
6-10	<p>The EA does not speak to the required consideration stated in CEQ Intensity Factors:</p> <p>"6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration."</p> <p>"7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts."</p> <p>Please see Appendix C for a list of examples of EA sections where findings of no significance were based on the temporary nature of the test well drilling and fail to address potential future operations, and longer term and cumulative effects as NEPA requires.</p> <p>— — — —</p> <p style="text-align: center;">4</p>	6-10

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6-11	<p>APPENDIX B - Council of Environmental Quality (CEQ) DEFINITION OF "SIGNIFICANCE" http://www.nepa.gov/nepa/regs/ceq/1508.htm - 1508.27</p> <p>*Sec. 1508.27 Significantly* "Significantly" as used in NEPA requires considerations of both context and intensity:</p> <p>(a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.</p> <p>(b) Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:</p> <ol style="list-style-type: none"> 1. Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial. 2. The degree to which the proposed action affects public health or safety. 3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. 4. The degree to which the effects on the quality of the human environment are likely to be highly controversial. 5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks. 6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration. 7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts. 8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources. 9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973. 10. Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment. <p style="text-align: center;"><i>~Provided by: Citizens for San Luis Valley Water Protection Coalition, (719) 256-5780 slvwater@thenver.com, slvwater.org ~</i></p> <p style="text-align: center;">5</p>	6-11 Thank you for your comments.

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6-12	<p>APPENDIX C Findings of no significance based on the temporary nature of the test well drilling, which fail to recognize future operations and longer term and cumulative effects as NEPA requires.</p> <p>4.0 Environmental Consequences / 4.2 Geology, Mineral Resources, and Soils, 4.2.1 Effects of Lexam's Planned Exploration Program - 2nd paragraph, last sentence:</p> <p><i>"Because of the temporary nature of the operations, the quantity of materials (oils and fuels) on-site would be relatively small. Impacts from spills would be short term and limited to the immediate vicinity of the spill and impacted soil would have to be removed and disposed offsite in accordance with applicable rules."</i></p> <p>Page 4-10, 4.6.2.1 Big Game</p> <p><i>"Impacts to big game species are expected to be minimal because of USFWS protective measures and because of the temporary nature of the activities."</i></p> <p>Page 4-11, 4.6.2.2 Small Game</p> <p><i>"Impacts to small game would be greater than those to large game because they are limited in their ability to temporarily relocate during periods of disturbance because of their smaller size. Temporary disturbances and habitat losses could cause unnatural movements of these species away from the disturbance and altered habitats, which may result in an increased vulnerability to predators..."</i></p> <p>Page 4-18, 4.10 Socioeconomic Resources / 4.10.1 Effects of Lexam's Planned Exploration Program, 4.10.5 Cumulative Impacts, 4.10.5.1 Proposed Action</p> <p><i>"Because no RFFAs have been identified in the cumulative effects area and socioeconomic impacts are anticipated to be minimal and temporary, there would be no cumulative impacts."</i></p> <p>Page 4-8, 4.5.2 Proposed Action Alternative / 4.5.2.1 Vegetation and Wetlands, 2nd paragraph</p> <p><i>"Areas temporarily disturbed by construction and operation activities would be reclaimed as described above. In 3 to 5 years following successful reclamation, these areas would provide food, cover and nesting wildlife habitat. However, it may require up to 15 to 20 years for vegetation communities, especially shrub communities, to return to predisturbance levels. Those areas disturbed by construction and operation activities would be temporarily unavailable to wildlife use and as habitat. Therefore, impacts to vegetation and wetlands would be less than significant."</i></p> <p>Page 4-19, 4.10.5 Cumulative Impacts / 4.10.5.1 Proposed Action</p> <p><i>"Because no RFFAs have been identified in the cumulative effects area and socioeconomic impacts are anticipated to be minimal and temporary, there would be no cumulative impacts."</i></p> <p style="text-align: center;">6</p>	6-12 <p>See response to comment 6-8. The USFWS has concluded that the impacts of the Preferred Alternative do not rise to the level of significance based on any of the NEPA definitions of significance (based on context and intensity). While the short duration of the proposed project is expected to help reduce the intensity and duration of impacts, the analysis does not avoid otherwise significant impacts by terming the action temporary.</p>

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6-13	<p>APPENDIX D Future studies, reviews and plans referred to in the EA, without necessary details (who, what where, when and how they will be done), and referenced as a basis for finding no significance</p> <p>Page 1-8, 1.5.2 Other Laws Relating to Oil and Gas Activity on NWR System Lands / 1.5.2.2 National Historic Preservation Act (NHPA) of 1966, as amended, last sentence</p> <p><i>"... USFWS is conducting a review of effects on historical and archaeological sites in order to ensure that the proposed measures protect cultural resources to the maximum extent practicable."</i></p>	6-13 <p>The USFWS has determined existing cultural resource data are adequate to support the determination of potential effects of the Proposed Action in the Final EA. Additional surveys and on-site monitoring will be conducted as enhanced protection measures. See also responses to comment 6-23, 6-24, and 6-25 regarding cultural resources.</p>
6-14	<p>What are the monitoring and compliance plans for USFWS requirements and others, as cited – Page 1-8, 1.5.3 Other Federal Regulations</p> <p><i>"The planned Lexam exploration activities also are governed by a number of other federal regulatory programs. The list below is not intended to be exhaustive:</i></p> <p><i>Clean Water Act Clean Air Act American Indian Religious Freedom Act (AIRFA) Native American Grave Protection and Repatriation Act (NAGPRA) Resource Conservation Recovery Act Occupational Health and Safety Administration (OSHA) regulations Department of Transportation (DOT) regulations"</i></p>	6-14 <p>The proposed project may have additional requirements under the referenced regulatory programs. Monitoring or compliance plans required under those programs, if any, are outside the scope of this NEPA analysis. See also the response to comment 6-43, regarding monitoring.</p>
6-15	<p>Page 2.7, Last paragraph</p> <p><i>"USFWS believes that impact of this planned drilling program on surface resources of the Refuge can be thoroughly assessed and evaluated prior to the completion of the CCP".</i></p> <p>What is the plan for the thorough assessment and evaluation referenced?</p> <p>Page 3-35, 3.7 Cultural resources 2nd paragraph</p> <p><i>"USFWS is conducting a review of effects on historical and archaeological sites in order to ensure that the proposed measures protect cultural resources to the maximum extent practicable."</i></p> <p>Page 4-11</p> <p>Preconstruction surveys for wildlife species are referenced in Big Game and Migratory Bird sections.</p>	6-15 <p>The USFWS anticipates that most, if not all, of the exploratory drilling program will be completed prior to the CCP process. Additional data about subsurface geology and commercially developable mineral resources, as well as the localized impacts of facilities on refuge resources, will be valuable for long-term planning in the CCP. For this reason, the USFWS has required that Lexam provide summary data for various activities as one of its standards and measures (item 19 and others).</p>
6-16	<p>Page 4-14</p> <p><i>"In accordance with applicant-committed environmental protection measures, all construction of roads and pads would occur in a way which best facilitates their complete removal and reclamation once Lexam activities have ceased at these sites."</i></p> <p>No Plan is offered or required.</p> <p>_____</p> <p style="text-align: center;">7</p>	6-16 <p>Preconstruction wildlife surveys and other environmental protection measures that have been agreed to by the USFWS and Lexam are described in the Final EA (Section 2.2) and in the FONSI.</p>

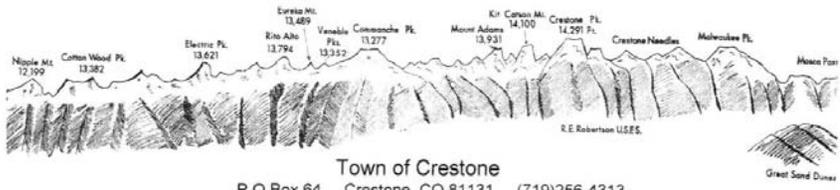
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	<p>APPENDIX E Resource Protection</p> <p>A) WATER</p> <p>6-17 i. HYDROLOGY - Extensive studies and models of the aquifer under the San Luis Valley have been completed in recent years, finding the aquifer to be unique, and the hydrology uncertain. This unique aquifer is critical to the ecology of the Great Sand Dunes, also unique, in the National Park. Protection of this most valuable and irreplaceable resource to the Park and the Valley is crucial.</p> <p>Applicable CEQ significance factors:</p> <p>3. <i>"Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas."</i></p> <p>5. <i>The degree to which the possible effects on the human environment are highly uncertain, or involve unique or unknown risks.</i></p> <p>6-18 It is our understanding that in this case "controversial" refers to scientific uncertainty and conflicts in understanding. This condition appears to apply to the aquifer, and may also be relevant to the fault geology, warranting consultation with scientific experts who contributed to the best models available, more explicit analyses and discussion with regard to significance.</p> <p>6-19 ii. WETLANDS and RIPARIAN protection - Likewise, consultation with other agencies and organizations is lacking in determining optimal locations for drilling and ensuring protection of wetlands and riparian areas.</p> <p>6-20 Risk analyses specific to deep wells was not presented. Nor was there discussion of the potential effects of water contamination, available clean-up measures and their effectiveness, and impacts on down stream water owners. (For example: spill drift, geothermal impacts, cross aquifer contamination, etc.) Such analyses are also needed to establish bonding and insurance requirements, which reflect the potential damage to water resources.</p> <p>Section 4.4.2 Proposed Action Alternative / 4.4.2.1 Surface Water Quality, last sentence</p> <p><i>"The primary hazardous materials to be used are fuels (diesel and gasoline), drilling mud additives, and cement."</i></p> <p>6-21 For maximum protection of the National Refuge, and the region's water – best practices are indicated in using known, NON-toxic options. If any hazardous substances are allowed, there are numerous other concerns, which warrant more complete attention, such as – preparation of community emergency first responders with knowledge of hazardous ingredients and treatments in the event of a contamination; and plans for OSHA compliance.</p> <p>B) AIR</p> <p>6-22 Section 4.3 Air Quality</p> <p>Analyses do not reference the Class 1 status of the Sand Dunes and discuss potential impacts/mitigations from that framework.</p>	<p>6-17 See response to comment 1-12.</p> <p>6-18 See response to comment 6-17.</p> <p>6-19 The USFWS has worked with Lexam to identify suitable well pad locations that minimize impacts to wetland and riparian habitats. This project proposal has no anticipated impacts on wetlands other than the potential replacement of existing culverts/bridges under an existing access road. The environmental protection measures documented in the Final EA and FONSI require that Lexam minimize impacts to wetlands. If culvert replacement is required, the Corps of Engineers will be consulted and necessary permits acquired and followed.</p> <p>6-20 See response to comment 6-17. The USFWS has concluded that the risk analysis described in the comment is not necessary to evaluate the effects of the USFWS's Proposed Action (the formulation of standards and measures to ensure that refuge resources are not unreasonably impacted).</p> <p>6-21 See response to comment 6-17. Recognizing concerns about and sensitivity of groundwater resources in the area, the USFWS required, and Lexam agreed to several measures to protect groundwater quality. See also response to comment 6-42, below.</p> <p>6-22 See response to comment 1-4.</p>

Comment #	Letter #6 Page 9	Response
	<p>Page 1-1, Introduction, paragraph 2, last sentence</p> <p><i>"Management of the refuge will emphasize migratory bird conservation and will consider the refuge's role in broader landscape conservation efforts" (USFWS 2005)."</i></p>	
6-22	<p>Data regarding the current status, and potential risks to the internationally recognized flyway is needed as a basis for analyses.</p>	6-22 The referenced statement is referring to the long-term management emphasis of the refuge, not the Final EA analysis. However, migratory birds are addressed in the Final EA, with anticipated impacts to be limited to habitat displaced by the 14 acre footprint of the proposed facilities and noise disturbance.
6-23	<p>Discussion of the broader conservation efforts also referenced in this section, fails to mention the Crestone Baca Land Trust, Manitou Habitat Conservation Program, and other Valley conservation efforts. Completion of consultations with adjoining agencies (NPS, FS) in this regard is unclear.</p> <p>C) Cultural/Historical protections</p> <p>Page 1-1, 3rd paragraph from the bottom</p> <p><i>"In addition to the plant and animal resources contained on the refuge, the area also is rich in historic and cultural resource sites, some of which date over 12,000 years ago. Many of these are eligible to be placed on the National Register of Historic Places."</i></p>	6-23 The referenced statement is referring to the long-term management emphasis of the refuge, not the Final EA analysis or its consultation process. "Broader landscape conservation" refers to local, state, regional, and international conservation efforts, especially in the context of migratory bird management and conservation. The scope of the Final EA and FONSI is the USFWS's Proposed Action to formulate standards and measures to ensure refuge resources are adequately protected. It is unclear how additional consultation with this list of stakeholders would change the list of standards and measures identified in the Final EA and FONSI. Collaborations related to broader conservation efforts will be addressed in a future Comprehensive Conservation Plan.
6-24	<p>Analyses should invite further Tribal input, and, consultation with the regional Smithsonian experts, in better defining the assets to be protected.</p> <p>Page 3-35, 3.7 Cultural Resources / 3.7.1 Regulatory Framework 2nd paragraph</p> <p><i>"Section 106 of the NHPA requires federal agencies to assess the effects of an undertaking on historical and archaeological sites. The proposed action is not considered an undertaking as defined by NHPA, and therefore is not subject to review."</i></p>	6-24 The cultural resources analysis was conducted in a manner that is consistent with USFWS policies as well as applicable state and federal laws and guidance.
6-25	<p>36 CFR PART 800 -- PROTECTION OF HISTORIC PROPERTIES (incorporating amendments effective August 5, 2004) Subpart B -- The Section 106 Process, 800.16 Definitions.</p> <p><i>"(y) Undertaking means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval."</i></p> <p>This would seem to apply; on what basis was it ruled out?</p>	6-25 All interested tribes and the Smithsonian have had ample opportunities to make comments and suggestions on this proposal (and some have provided useful input). As outlined in the Final EA, the USFWS contacted 16 Native American tribes to inform them about the process and solicit their comments about the potential impacts of the proposed project. The USFWS has determined that the rigorous monitoring of ground disturbing activities that will be required will minimize the chance of disturbing cultural resources.
6-26	<p>Page 3-36, 3.7.2 Cultural Resources Investigations</p> <p>Has a Class three inventory been performed for #7 well locations?</p> <p>D) Socio-economic impacts</p>	6-26 See response to comment 5-1.
6-27	<p>The presentation of the socio-economic context of the nearest community was cursory, given that its primary source of income is spiritual, artistic and recreational retreat, based on the pristine natural environment and quietude. Valley-wide, agriculture is a predominant economic factor, and is dependent on the health or water and ecological systems.</p> <p style="text-align: center;">9</p>	6-27 Yes, see Section 3.7.2 of the Final EA.
		6-27 The Preferred Alternative can be summed up as follows: The USFWS is proposing standards for ensuring that the planned exploration of the mineral estate underlying the Refuge by Lexam does not unreasonably degrade or impact the Refuge's surface estate and associated resources. As such the analysis of the effects of Lexam's planned exploratory drilling upon various socioeconomic resources does not fall within the purview of this EA. The Proposed Action or Preferred Alternative does not affect socioeconomic resources, spiritual centers, tourists, etc.

Comment #	Letter #6 Page 10	Response
6-28	<p>In section 3.10 it is stated that personnel will base in Alamosa and provide economic benefit there, rather than for the local community. Assessment is needed of the potential for degradation of property values and recreational and retreat tourism, due to aesthetic impacts of industrial activity in the near pristine Refuge environment.</p>	6-28 See response to comment 6-27.
6-29	<p>Risk, cost and benefit analyses are needed in order to further define socio-economic impacts and significance to those most directly impacted, and to establish financial responsibility of the operator. How has just compensation been established and guaranteed?</p> <p>Page 2-7, 2.4 No Mineral Exploration Alternative – states:</p> <p><i>"...USFWS has not, to date, pursued this alternative because no funds have been identified..."</i></p>	6-29 See response to comment 6-27.
6-30	<p>Discussion of the buyout option did not address the value or a projected value range of the mineral estate. What efforts, if any, were made to pursue funds?</p> <p>-----</p> <p>APPENDIX F Oil & Gas Operations</p> <p>Page 1-4, Section 1.3 Purpose and Need for the Proposed Action</p> <p><i>"The scope of this EA does not address production of natural gas and oil from any of the wells described above. If necessary, the USFWS regulation of production and associated transportation would be the subject of a separate analysis pursuant to the National Environmental Policy Act (NEPA)."</i></p>	6-30 Lexam has expressed its interest in proceeding with mineral exploration, and the USFWS is obligated to provide reasonable access while protecting refuge resources to the maximum extent possible. The USFWS has no funds at this time buy any minerals even if they were actively being marketed.
6-31	<p>If this EA, or a revised version of it, is the basis for the Record of Decision, it should be limited to the activities it assessed – the test wells only - and explicitly require a new EA and/or EIS review for any future activities.</p>	6-31 The USFWS agrees that, if necessary, a second NEPA effort will be required if additional exploration or production activity follows the Proposed Action. In addition to the referenced text in the Final EA (Section 1.3, and Section 4.1), this commitment also is clearly stated in the FONSI.
6-32	<p>The EA does not address the operator's procedures to manage a positive find. How will Lexam contain, process, transport or otherwise dispose of resources upon finding any? It is our understanding that the operator will somehow "prove it up", and any such procedures and their impacts should be fully defined and considered in determining significance. For example, flaring to rate findings would pose unacceptable risks to the Baca Refuge, the nearby community, and perhaps impact air quality detrimentally to the Class One asset of the Great Sand Dunes.</p> <p>Page 1-17, 1.6.2.4 Water Requirements, top paragraph</p> <p><i>"... In the event that well water would not be available, water will have to be purchased from an off-site source and trucked to the drilling locations. Depending on daily water needs of the rig and the capacity of the tanker truck, as many as 250 truckloads per well could be required to supply water to the drilling operations."</i></p>	6-32 None of the referenced actions are included in the current proposal or the USFWS's Proposed Action. However, the Final EA and FONSI includes a better description of such procedures.
6-33	<p>Such an eventuality increases the intensity factors with more significant traffic disturbance of wildlife, wear and tear on roads, dust, and potential for weed introduction. There is no reference to how this will be monitored and mitigated.</p>	6-33 Dust and noxious weed mitigation practices described in the Preferred Alternative in the Final EA will cover all vehicular traffic. The mineral company is responsible for maintaining roads on the refuge. Section 4.10.1.2 acknowledges the likelihood of negative impact to local traffic. It should be implied that increased trucking also will increase road wear correspondingly.

Comment #	Letter #6 Page 11	Response
6-34	<p>Page 2-9, 2.5.2 Directionally Drill the Wells from Outside of the Refuge, last sentence</p> <p><i>"Directional drilling of a 14,000-foot deep exploratory well was judged to be neither technically nor economically practical or feasible as described in the following discussion."</i></p> <p>Who made this judgment, and what are the facts analyzed to come to this conclusion?</p> <p>Page 2-11 2.5.3</p> <p><i>"Lexam believes drilling of the initial well will provide hard data regarding a number of the elements required for entrapment of oil or gas. It is highly likely that there will be significant changes in the interpretative model of the geology as a result of drilling the initial well. Therefore Lexam believes a second well will be required to test additional potential based upon the new information acquired from the initial well."</i></p>	6-34 See response to comment 2-7.
6-35	<p>Given the sequential nature of the exploration as described by the operator, why not approve one well now and base approval for second well on positive findings and presentation of the referenced changes in model the 1st well would indicate in a second, and presumably later 2nd well.</p> <p>Page 4-4, paragraph 1</p> <p>"The drill rig engine specifications are not known at this time ..."</p>	6-35 As referenced in the comment, the concept of allowing only one well was considered but eliminated from further analysis because Lexam found that two wells (and the cost of drilling two wells) are necessary to fully characterize subsurface conditions. The USFWS found that it can more efficiently and effectively meet its responsibilities to provide reasonable access while protecting refuge resources by analyzing the exploration phase as a single phase with similar environmental protection requirements.
6-36	<p>Air and noise impacts cannot be assessed if the drill engine is unknown and approved as such.</p> <p>Page 4-4, paragraph 5</p> <p><i>"... operators are required to implement a fugitive dust control plan, which can include but are not limited to watering roads, graveling roads, and controlling vehicle speeds."</i></p>	6-36 See response to comment 2-5.
6-37	<p>Has USFWS reviewed the referenced plan and confirmed that the COGCC/CPHE standards are adequate for a National Refuge?</p>	6-37 The USFWS has found that COGCC/CDPHE standards are adequate to protect refuge resources from dust emissions.
6-38	<p>Page 4-8, 4.5.2 Proposed Action Alternative / 4.5.2.1 Vegetation and Wetlands</p> <p>Invasive weeds are a growing problem in Saguache County and the Valley. The locations and methods of cleaning equipment are inadequately described.</p>	6-38 The USFWS has determined the level of detail in the proposed standards and measures is adequate to analyze the effects of the Proposed Action. Specific methods and locations will be determined at an operational level, based on USFWS policies, state and local weed laws, and the professional judgment of USFWS staff.
6-39	<p>Page 4-21, last 3 paragraphs</p> <p>Remove language that says Lexam will "strive" to obtain muffling equipment, and will use noise attenuating equipment "if available", and REQUIRE THAT THEY DO.</p>	6-39 The USFWS has concluded the proposed language will provide the drilling operator with sufficient direction, while allowing flexibility to adapt to certain factors such as the availability of certain equipment and timing of the operation.
6-40	<p>• Cross-jurisdictional issues</p> <p>• COGCC - The EA refers to COGCC conditions, which have subsequently changed, or are on hold until the EA is complete. Should COGCC implement new rules prior to granting the State permit, the new rules and associated conditions should apply.</p>	6-40 A COGCC permit would include conditions that are in effect at the time the permit is given. COGCC permits and permit conditions are outside the jurisdiction the USFWS and the scope of this NEPA analysis.

Comment #	Letter #6 Page12	Response
6-41	<p>• Emergency Plans - Limited volunteer personnel, and the potential need for equipment and training are of concern and not acknowledged. NOTE: COGCC has agreed to change the requirement of "a meeting" for Emergency planning, as referenced in the EA, to completion of an agreed upon Plan.</p> <p>Page 4-18 4.10.1.3 Emergency Services, last Sentence</p> <p><i>"Deficiencies in local emergency services will be identified and measures to emergency response will be discussed and implemented."</i></p>	6-41 Section 4.10.1.3 of the Final EA states that deficiencies in local emergency services will be identified and discussed with the refuge manager and local governments prior to commencement of the drilling program.. The proposed drilling program will include an Emergency Preparedness Plan that will be provided to the Refuge Manager, local governments, and the COGCC. The Emergency Preparedness Plan would include plans and contingencies for fires, accidents, spills, and other emergencies.
6-42	<p>Local and regional emergency personnel, such as Saguache County's OEM, EMS, Fire Depts, and SLV RETAC and All Hazards should be involved in determining deficiencies and developing an agreeable plan, well in advance of operations commencing.</p> <p>• MONITORING PLANS</p>	6-42 See response to comment 6-41.
6-43	<p>In the absence of a Comprehensive Conservation Plan, inadequate baseline data has been collected and presented in the EA, and commensurate monitoring plans are not described.</p> <p>Qualifications and training of independent monitoring personnel, and details with regard to frequency of monitoring and reporting are lacking.</p> <p style="text-align: center;">12</p>	6-43 The USFWS's Proposed Action is to formulate standards and measures to ensure refuge resources are adequately protected. These standards and measures include the presence of trained environmental monitors on site. In addition, refuge staff is very familiar with the biological resources of the project area and will notice and report any unanticipated or irregular impacts to refuge resources.

Comment #	Letter #7	Response
	 <p data-bbox="331 418 470 440">February 29, 2008</p> <p data-bbox="331 456 470 477">Dear Mr. Blenden,</p> <p data-bbox="163 509 1024 607">7-1 The Town of Crestone Board of Trustees urgently request a complete Environmental Impact Statement (EIS) of the planned oil and gas exploration on the Baca National Wildlife Refuge (BNWR). The Draft Environmental Assessment (DEA) did not adequately address the concerns of our town, located less than six miles from the proposed drilling site. The full potential impact of any exploration and/or development on the Town needs to be determined before drilling commences.</p> <p data-bbox="163 647 1024 716">7-2 A review of the DEA found it lacking evidence to support its findings on effects to our environment from drilling. This has created credibility issues regarding the DEA's findings. As a municipality, we are economically and culturally linked to our delicate high desert eco system. The need for verifiable evidence to support the DEA's claims is necessary so we can determine if the proposed drilling is in the best interest of our Town.</p> <p data-bbox="331 732 785 753">The adopted vision statement for the Town of Crestone states:</p> <p data-bbox="163 777 1024 846">7-3 "Historic Crestone, CO exemplifies small mountain town beauty within a community committed to sustainable living practices and spiritual traditions. The Town continues to celebrate its pioneering spirit and unique diversity through contemporary self-reliance. Crestone's goals are to enhance economic viability, environmental preservation, renewable energy use, and social responsibility."</p> <p data-bbox="163 867 1024 992">7-4 Oil and gas drilling are not in alignment with the Town's vision statement, which was derived from surveys of and meetings with our citizens. Drilling for oil and gas on the BNWR would grossly effect the serenity and beauty of our old mining town, which is a retreat for spiritual seekers, mountain climbers, and descendants of old mining families who return here for the summer. The greatest impact from drilling would be experienced by our full time residents. Oil and gas development so near to our municipality could significantly impact our civic vision for environmental preservation.</p> <p data-bbox="163 1013 1024 1081">7-5 Other communities dealing with oil and gas drilling such as Rock Springs, WY have experienced a sharp and discernible rise in drug use and crime. Crestone currently has little crime or drug use. We would like to keep it as safe as possible for our citizens. The DEA failed to show how these social effects of drilling would potentially affect the Town.</p> <p data-bbox="163 1105 1024 1252">7-6 Our struggling economy is based in, driven by and honors the sustainable nature of our businesses. Our community is supported economically and spiritually by the environmental beauty and quiet of our mountains, drainages and wetlands. The impact on the wildlife, which enhances our quality of life and adds to our economy in many forms from birders to hunters, is important to the town and not adequately addressed in the assessment. Lexam's proposed drilling would potentially affect our natural resources drastically and adversely. These issues must be addressed completely with supporting evidence in a comprehensive Environmental Impact Statement.</p>	<p data-bbox="1108 509 1976 634">7-1 Thank you for your comments. The USFWS has concluded that the Final EA and FONSI adequately describe the impacts of the Proposed Action on refuge resources. It is important to note that the federal action that provides the legal basis for this NEPA analysis is the formulation of standards and measures to ensure that Refuge resources are not unreasonably impacted. USFWS policy provides for the exercise of non-federally owned mineral rights "while protecting USFWS resources to the maximum extent possible." This policy is consistent with Colorado law.</p> <p data-bbox="1213 656 1927 693">The USFWS has concluded that the effects of Lexam's proposed activities are not significant enough to warrant a full Environmental Impact Statement.</p> <p data-bbox="1108 729 1451 750">7-2 See response to comment 7-1.</p> <p data-bbox="1108 781 1451 802">7-3 Thank you for your comments.</p> <p data-bbox="1108 867 1451 888">7-4 Thank you for your comments.</p> <p data-bbox="1108 1029 1976 1110">7-5 As described in the Final EA, the proposed project will require up to 30 people on site at any given time. The USFWS has concluded that it is not only unreasonable to speculate on the behavior of project staff, but such an analysis is outside the scope of the Proposed Action on which the analysis is based.</p> <p data-bbox="1108 1143 1451 1164">7-6 See response to comment 7-1.</p>

Comment #	Letter #7 Page 2	Response
7-7	<p>The DEA grossly understates the capacity of our local communities to provide emergency services. It ignores the impact of noise, dust and water quality on the Town of Crestone. Transportation safety issues are of major concern, as the drilling will require the traversal of County Rd. T, our only access in and out of our town, by hundreds of trucks for months on end. This concern was not addressed to our satisfaction. School buses transporting our children travel this road daily in all kinds of weather, and an increase in heavy truck traffic is a potential safety risk that must be addressed.</p>	<p>7-7 As described in the Final EA, the proposed drilling program will include an Emergency Preparedness Plan that will be provided to the Refuge Manager and local governments. The Emergency Preparedness Plan would include plans and contingencies for fires, accidents, spills, and other emergencies.</p> <p>In terms of traffic impacts, the proposed project is expected to result in increased truck traffic and temporary impacts to local traffic patterns. Vehicles associated with the project would be subject to all state, federal, and local regulations concerning traffic safety.</p>
7-8	<p>The issue of possible fire was not satisfactorily addressed in the DEA. Issues of fire danger or toxic pollution for the Town of Crestone need to be fully assessed, and results provided with verifiable supporting evidence. The Town's volunteer fire department must be able to respond effectively to any possible health and safety issues the proposed drilling could bring. Our community has an increasing population of infants, small children and senior citizens. What potential hazards do the proposed drilling, chemicals and compounds connected with it, or possible pollution of air and water hold for them? What are Lexam's intentions to commence with production activities, including a full Reasonably Foreseeable Future Action scenario? A complete and thorough EIS would address these concerns.</p>	<p>The proposed project includes measures to minimize dust emissions, and is not expected to impact ground or surface water quality.</p> <p>7-8 See response to comment 7-7.</p>
7-9	<p>The DEA judgment of possible noise pollution did not use criteria appropriate to our Town. We have fewer decibels in sound than agricultural areas. Quiet is important to our citizens and visitors alike. Town and Saguache County noise ordinances were not addressed in the DEA. What provisions will be in place to assure Lexam honors our ordinances?</p>	<p>7-9 See response to comment 2-5. As discussed in the comment, the noise analysis was based on noise monitoring of drill rigs at the Pinedale Anticline Field in Wyoming. The noise monitoring at Pinedale was used because the drill rigs used there are comparable to the rig that would be used to drill the proposed Lexam wells. The wells at Pinedale are commonly drilled to depths of 13,000 to 14,000 feet (measured depth) or deeper.</p>
7-10	<p>The Town of Crestone requests your commitment for an EIS immediately, so as not to burden other agencies, government organizations and the public with additional review on a seriously lacking EA. We favor exploring the No Mineral Exploration Alternative more fully. This alternative would need to contain a feasibility analysis of a federal minerals buyout of Lexam Explorations mineral interests and other mineral interests in the Baca National Wildlife Refuge, leading to the ultimate end of potential mineral exploration and development.</p>	<p>7-10 Thank you for your comments. See response to comment 7-1.</p>
7-11	<p>In conclusion, for the long term good of our town and the continued health and safety of it's citizens, we urgently request completion of an Environmental Impact Statement that addresses the concerns of the Town of Crestone and its citizenry. This municipality has sustained itself since 1880, in adverse conditions, including "boom and bust" economies, largely due to the pristine natural environment. It is vital that a thorough study of the concerns enumerated in this letter is conducted, backed up with facts that can be substantiated.</p> <p>Thank you for your timely consideration of these concerns.</p> <p>Sincerely,</p> <p>Kizzen Laki Mayor</p>	<p>7-11 Thank you for your comments.</p>

Appendix H

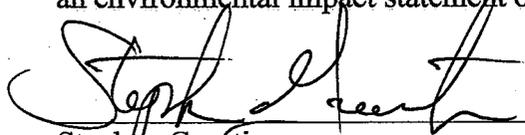
Environmental Action Statement and Finding of No Significant Impact

ENVIRONMENTAL ACTION STATEMENT

Environmental Assessment for Planned Gas and Oil Exploration on
Baca National Wildlife Refuge
Saguache County, Colorado
U.S. Fish and Wildlife Service, Region 6
Lakewood, Colorado

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record.

Based on a review and evaluation of the information contained in the *Environmental Assessment for Planned Gas and Oil Exploration on Baca National Wildlife Refuge, Saguache County, Colorado*, I have determined that the establishment of the terms and conditions as described in the Preferred Alternative is not a major federal action which would significantly affect the quality of the human environment within the meaning of Section 102(2) (C) of the National Environmental Policy Act of 1969. Accordingly, we find that the imposition of these terms and conditions on time, place and manner of exploration will not unreasonably interfere with exploration of Lexam's mineral estate, and exploration conditioned by these terms will not have a significant impact on the human environment associated with the surface estate of the Baca Refuge and the preparation of an environmental impact statement on the proposed action is not required.

 10/20/08

Date

Stephen Guertin
Regional Director, Region 6
U.S. Fish and Wildlife Service
Lakewood, CO

 10/17/08

Date

Richard A. Coleman, PhD
Assistant Regional director, Region 6
National Wildlife Refuge System
U.S. Fish and Wildlife Service
Lakewood, CO

 10/17/2008

Date

Bud Oliveira
Refuge Supervisor (CO and KS)
U.S. Fish and Wildlife Service, Region 6
Lakewood, CO

Michael Blenden

10/17/08

Michael Blenden

Date

Project Leader

San Luis Valley Complex

Alamosa, CO

FINDING OF NO SIGNIFICANT IMPACT
Environmental Assessment for Planned Gas and Oil Exploration on
Baca National Wildlife Refuge
Saguache County, Colorado

The U.S. Fish and Wildlife Service (USFWS) is proposing stipulations and recommendations to protect the surface estate and other resources of the Baca National Wildlife Refuge (Refuge) from unreasonable damage during all phases of currently planned oil and gas exploration being conducted by Lexam Explorations (U.S.A.) Inc. (Lexam). This includes drilling two exploratory gas wells on the Refuge. The USFWS seeks to protect Refuge resources while honoring Lexam's vested rights and explore the mineral estate. The scope of the EA does not address production of natural gas and oil from any of the wells described above. If necessary, the USFWS regulation of production and associated transportation would be the subject of a separate analysis pursuant to the National Environmental Policy Act (NEPA).

The Refuge was authorized with passage of Public Law 106-530, also known as the "Great Sand Dunes National Park and Preserve Act of 2000." The proposed purpose of the Refuge is "to restore, enhance and maintain wetland, upland, riparian and other habitats for wildlife, plants and fish species that are native to the San Luis Valley, Colorado. Management will emphasize migratory bird conservation and will consider the Refuge's role in broader landscape conservation efforts."

Lexam owns the mineral interest, including the right to explore for and develop oil and gas, beneath land now included within the Refuge. Lexam acquired its mineral interest prior to acquisition of the surface interest in what was known as the Baca Ranch by the USFWS and inclusion of the surface estate in the National Wildlife Refuge (NWR) System. According to State of Colorado law, the subsurface property owner has rights to pursue recovery of its minerals. Lexam has provided satisfactory evidence to the USFWS showing that it is legal owner of the separated mineral rights below portions of the Refuge. Consequently, it is legally entitled to make use of the surface for exploration.

The U.S. owns the surface estate of the Refuge, and it is administered by the USFWS as a NWR pursuant to the Great Sand Dunes National Park and Preserve Act of 2000, the NWR System Administration Act, and other applicable laws and regulations. As the surface owner, the USFWS has a responsibility to protect the surface estate of the Refuge and its associated resources. Pursuant to Colorado law and the Surface Use Agreement that was entered into between the previous landowner and Lexam's predecessors-in-interest, the USFWS has discretion to ensure that Lexam's use of the surface estate is reasonable and does not cause undue surface disturbance. Thus, the USFWS has both the responsibility and the authority to formulate standards and measures for ensuring that the surface estate of the Refuge and its associated resources are not unreasonably impacted by Lexam's planned activities.

The USFWS, Land Use Series, 612 FW2, Oil and Gas provide standard policy guidance and background information on management of oil and gas activities on NWR lands. Additionally, reserved and excepted rights are addressed in the NWR System Administration Act of 1966 and addressed by regulation in Chapter 50 of the Code of Federal Regulations (50 CFR 29.32) in conformance. The proposed project will be conducted in compliance with these regulations and policies. Lexam recognizes the authority of the Refuge Manager to stop work for any activity that imperils a Threatened or Endangered species or its habitat, that threatens cultural or historic resources, that causes significant harm to Refuge resources, or that endangers public safety.

The final environmental assessment identifies terms and conditions that define the time, place and manner for Lexam's activities that, if followed, will limit surface disturbance to that considered reasonable by the USFWS. Terms and conditions were considered for 1) geology, minerals and soils; 2) air quality; 3) water resources; 4) vegetation and habitats; 5) wildlife and fisheries; 6) cultural resources; 7) native American traditional values; 8) recreation; 9) socioeconomic resources; and 10) aesthetics.

The final environmental assessment compares three alternatives. The Preferred Alternative establishes the aforementioned terms and conditions as the procedures Lexam will employ on the Refuge during its exploration activities. The No Federal Involvement Alternative is comprised of those terms and conditions Lexam would follow voluntarily and as a result of state, county or other federal regulations. Most analysis contained in the environmental assessment compares environmental consequences of these two alternatives. The No Mineral Exploration alternative would result if Lexam sold or donated the mineral estate to the USFWS. At this time the USFWS has insufficient funds to consider such an acquisition.

The Preferred Alternative outlines over fifty terms and conditions. Of particular interest are those that minimize disturbance to wildlife by restricting the seasons of exploration activity so as not to interfere with migratory bird breeding and big game calving, minimize the risk of ground and surface water contamination, eliminate impacts to wetland habitat, sensitive fish populations and plant types, reduce conditions that would encourage noxious weed infestations, manage fugitive dust, and reduce air pollution from exploration activities. The document contains a full description and listing of all the identified terms and conditions.

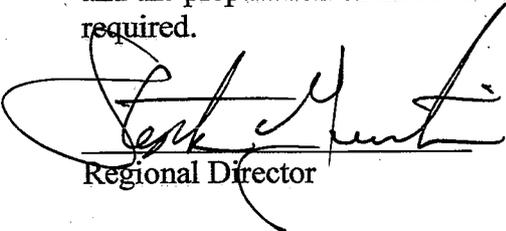
Air and water quality, impacts to wetlands and big game animals, socioeconomic effects, and concerns over noise were frequently expressed during the public and agency comment period. The USFWS finds no significant impact will occur in these categories if the terms and conditions are followed. An analysis of emissions from the generator powering the drill rig and the fugitive dust from support activity predicted during the 180-day drilling period resulted in impacts to air quality and visibility that were not significant. Impacts from the Proposed Action Alternative are unlikely to be measurable above and beyond the windblown dust from upwind agricultural and other activities, especially in the late winter through early summer when strong southwesterly diurnal winds are the rule. These winds impact air quality and visibility in this area typically

from late February to June of each year. Extension of well surface casing to a depth of 3000 feet below land surface to protect available groundwater is consistent with the most current data describing the upper confined aquifer in the San Luis Valley. The project and its footprint will not overlay or impact wetland habitat other than the possible replacement of a small bridge and culverts on an existing access road to ensure safe transport of equipment, materials and staff. If replacement of these structures is determined to be necessary, it will follow all wetland regulations and guidelines of the U.S. Army Corps of Engineers, U.S. Fish and Wildlife USFWS, State of Colorado and any other regulatory agencies.

Although most socioeconomic concerns expressed are beyond the scope of the federal action of protecting the surface estate of the Refuge, the EA does address impacts of the exploration on the economy, traffic and emergency services. The response to National Park Service comments regarding noise produced by this drilling project describe the predicted noise levels at varying distances from the source compared to background levels. At two miles from the source noise levels are predicted to be below background levels. Most concern expressed over big game species was the impact exploration might have upon elk during a severe winter. This concern was erased when the commenter understood the temporary nature of the exploration activities and Lexam agreed to assist in wildlife mitigation measures if a severe winter occurs and their activities are impact big game.

Lexam has consulted with the USFWS regarding the project's impact on federally listed threatened or endangered species. The USFWS has provided Lexam a letter stating a determination of no effects to federally listed species including the Canada lynx and southwestern willow flycatcher.

Based on a review and evaluation of the information contained in the *Final Environmental Assessment for Planned Gas and Oil Exploration on Baca National Wildlife Refuge, Saguache County, Colorado*, I have determined that the establishment of the terms and conditions as described in the Proposed Action Alternative is not a major federal action which would significantly affect the quality of the human environment within the meaning of Section 102(2) (C) of the National Environmental Policy Act of 1969. Accordingly, I find that the imposition of these terms and conditions on time, place and manner of exploration will not unreasonably interfere with exploration of Lexam's mineral estate, and exploration conditioned by these terms will not have a significant impact on the human environment associated with the surface estate of the Baca NWR and the preparation of an environmental impact statement on the proposed action is not required.


Regional Director

12/20/02
Date

Reference and Supporting Documentation:

U.S. Fish and Wildlife USFWS. 2008. Final Environmental Assessment for Planned Gas and Oil Exploration on Baca National Wildlife Refuge, Saguache County, Colorado

Appendix I

Intra-Service Section 7 Biological Evaluation



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Colorado Field Office
P.O. Box 25486-DFC (MS 65412)
Denver, Colorado 80225

IN REPLY REFER TO:
ES/CO: EC/Baca NWR
Mail Stop 65412 Lakewood

JUL 18 2007

Mr. Jack Clark
Clark Mining Services, LLC
6052 S. Newport Street
Centennial, CO 80111

Dear Mr. Clark:

In response to your letter dated 21 March 2007 and other communications with you, we are providing comments addressing Lexam Exploration's drilling program on the Baca National Wildlife Refuge. The enclosed species list and comments should be helpful in your finalization of work plans. These comments are prepared in accordance with Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et. seq.).

A determination of No Effect was made for all federally listed species, including Canada lynx and Southwestern Willow Flycatcher, which may occur in Saguache County.

We concur with your determination based on the information you supplied and since listed species are unlikely to occur near the drilling sites.

Thank you for the opportunity to review the proposed work. If we can be of further assistance, please contact Laura Archuleta at (303) 236-4752.

Sincerely,

Susan C. Linner
Colorado Field Supervisor

Enclosure

cc: Ron Garcia, Baca National Wildlife Refuge

ref: h:\Archuleta\BacaNWR\Lexam\T & E ltr July 2007.rtf

Colorado Field Office County List Updated December 2006

<p>Symbols: * Water depletions in the Upper Colorado River and San Juan River Basins, may affect the species and/or critical habitat in downstream reaches in other states. ▲ Water depletions in the South Platte River may affect the species and/or critical habitat in downstream reaches in other states. © There is designated critical habitat for the species within the county. T Threatened E Endangered P Proposed X Experimental C Candidate</p>		
<p><i>For additional information contact: U.S. Fish and Wildlife Service, Colorado Field Office, P.O. Box 25486, DFC (65412), Lakewood, Colorado 80228, Telephone 303-236-4773. U.S. Fish and Wildlife Service, Western Colorado Field Office, 764 Horizon Drive, Building B, Grand Junction, Colorado 81506, Telephone 970-243-2778.</i></p>		
Species	Scientific Name	Status
ADAMS		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Least tern (interior population) ▲	<i>Sternula antillarum</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Pallid sturgeon ▲	<i>Scaphirhynchus albus</i>	E
Piping plover ▲	<i>Charadrius melodus</i>	T
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	T
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	T
Whooping crane ▲	<i>Grus americana</i>	E
ALAMOSA		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
ARAPAHOE		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E

Colorado Field Office County List Updated December 2006

<p>Symbols: * Water depletions in the Upper Colorado River and San Juan River Basins, may affect the species and/or critical habitat in downstream reaches in other states. ▲ Water depletions in the South Platte River may affect the species and/or critical habitat in downstream reaches in other states. © There is designated critical habitat for the species within the county. T Threatened E Endangered P Proposed X Experimental C Candidate</p>		
<p><i>For additional information contact: U.S. Fish and Wildlife Service, Colorado Field Office, P.O. Box 25486, DFC (65412), Lakewood, Colorado 80228, Telephone 303-236-4773. U.S. Fish and Wildlife Service, Western Colorado Field Office, 764 Horizon Drive, Building B, Grand Junction, Colorado 81506, Telephone 970-243-2778.</i></p>		
Species	Scientific Name	Status
ADAMS		
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Least tern (interior population)▲	Sternula antillarum	E
Mexican spotted owl	Strix occidentalis lucida	T
Pallid sturgeon▲	Scaphirhynchus albus	E
Piping plover▲	Charadrius melodus	T
Preble's meadow jumping mouse	Zapus hudsonius preblei	T
Ute ladies'-tresses orchid	Spiranthes diluvialis	T
Whooping crane▲	Grus americana	E
ALAMOSA		
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E
Canada lynx	Lynx canadensis	T
Mexican spotted owl	Strix occidentalis lucida	T
Southwestern willow flycatcher	Empidonax traillii extimus	E
Yellow-billed cuckoo	Coccyzus americanus	C
ARAPAHOE		
Bald eagle	Haliaeetus leucocephalus	T
Black-footed ferret	Mustela nigripes	E

RIO GRANDE		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Uncompahgre fritillary butterfly	<i>Boloria acrocneuma</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
ROUTT		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Bonytail*	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Humpback chub*	<i>Gila cypha</i>	E
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
SAGUACHE		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Bonytail*	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Humpback chub*	<i>Gila cypha</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Uncompahgre fritillary butterfly	<i>Boloria acrocneuma</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
SAN JUAN		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
Uncompahgre fritillary butterfly	<i>Boloria acrocneuma</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
SAN MIGUEL		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E

Whooping crane ▲	<i>Grus americana</i>	E
PHILLIPS		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
PITKIN		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Bonytail*	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow*	<i>Ptychocheilus lucius</i>	E
Humpback chub*	<i>Gila cypha</i>	E
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
Razorback sucker*	<i>Xyrauchen texanus</i>	E
Uncompahgre fritillary butterfly	<i>Boloria acrocnema</i>	E
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
PROWERS		
Arkansas darter	<i>Etheostoma cragini</i>	C
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Least tern (interior population)	<i>Sternula antillarum</i>	E
Lesser prairie chicken	<i>Tympanuchus pallidicinctus</i>	C
Piping plover	<i>Charadrius melodus</i>	T
PUEBLO		
Arkansas darter	<i>Etheostoma cragini</i>	C
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Greenback cutthroat trout	<i>Oncorhynchus clarki stomias</i>	T
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
RIO BLANCO		
Bald eagle	<i>Haliaeetus leucocephalus</i>	T
Black-footed ferret	<i>Mustela nigripes</i>	E
Bonytail*	<i>Gila elegans</i>	E
Canada lynx	<i>Lynx canadensis</i>	T
Colorado pikeminnow©	<i>Ptychocheilus lucius</i>	E
Dudley Bluffs bladderpod	<i>Lesquerella congesta</i>	T
Dudley Bluffs twinpod	<i>Physaria obcordata</i>	T
Graham beardtongue	<i>Penstemon grahamii</i>	C
Humpback chub*	<i>Gila cypha</i>	E
Razorback sucker*	<i>Xyrauchen texanus</i>	E
White River beardtongue	<i>Penstemon scariosus</i> var. <i>albifluvis</i>	C
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C

Appendix J

Air Emissions Calculations



Air Sciences Inc.

ENGINEERING CALCULATIONS

PROJECT TITLE: Lexam Baca Drilling Project		BY: Sabrina Pryor		
PROJECT NO: 243 - 1 - 1		PAGE: 1	OF: 4	SHEET: 1
SUBJECT: Drilling Program Emissions		DATE: September 26, 2008		

DRILLING ELECTRIC COMBUSTION EMISSIONS

		Reference
Power Generator Horsepower (capacity)	1,476 hp/engine	CAT 3512B
Number of Operating Engines	2 engines	Drill supervisor Apr 10, 2008
Power Engine Use	24 hrs/day	Maximum schedule per day
Power Generator Starter Engine Hp (capacity)	500 hp/engine	Drill supervisor Apr 10, 2008
Starter Engine Use	1.0 hr/day	Drill supervisor Apr 10, 2008
Length of drill activity per hole	90 days	J. Clark March 10, 2008
Number of holes drilled in program	2 holes/yr	J. Clark March 10, 2008
Engine max daily operating capacity factor	70%	Drill supervisor Apr 10, 2008*

* long-term avg = 40%, short term max = 100%

ASSUMPTIONS

Heat Content of Diesel	137,000 Btu/gal	EPA AP-42 Appendix A
Sulfur Content of Diesel	0.0015%	Ultra Low sulfur - highway grade
Density of Diesel	7.05 lbs/gal	EPA AP-42 Appendix A
Internal Combustion Engine Efficiency	7,000 Btu/hp-hr	AP-42 Table 3.3-1

FUEL CONSUMPTION

	Annual	Maximum Daily	Maximum Hourly
Power Production	8,989,848 hp-hr/yr	49,944 hp-hr/day	3,452 hp-hr/hr
Diesel consumption	459,335 gal/yr	2,552 gal/day	176 gal/hr

EMISSION FACTORS - GENERATORS (assumed to meet or exceed Tier 2 standards)

Pollutant	g/kW-hr	g/hp-hr	g/MMBtu	Reference
NO _x	6.4	4.8	681.8	40 CFR part 89.112, kW ≥ 560 (Tier 2)
VOC	1.3	1.0	138.5	40 CFR part 89.112, kW ≥ 560 (Tier 2)
CO	3.5	2.6	372.8	40 CFR part 89.112, kW ≥ 560 (Tier 2)
PM ₁₀ *	0.20	0.15	21.31	40 CFR part 89.112, kW ≥ 560 (Tier 2)
PM _{2.5} *	0.20	0.15	21.31	40 CFR part 89.112, kW ≥ 560 (Tier 2)
SO ₂	--	--	0.70	calculation

*All particulate assumed to be ≤ 1µm in diameter (AP-42 Table 3.3-1)

EMISSIONS - GENERATORS

Pollutant	Emissions			
	tons/yr	lbs/day	lb/hr	
NO _x	47.3	525.5	36.3	Conversion Factors 453.59 g/lb 2,000 lb/ton 1.341 hp/kW
VOC	9.6	106.7	7.4	
CO	25.9	287.4	19.9	
PM ₁₀	1.5	16.4	1.1	
PM _{2.5}	1.5	16.4	1.1	
SO ₂	0.05	0.5	0.04	

blue values are input

black values are calculated



Air Sciences Inc.

ENGINEERING CALCULATIONS

PROJECT TITLE: Lexam Baca Drilling Project		BY: Sabrina Pryor		
PROJECT NO: 243 - 1 - 1		PAGE: 2	OF: 4	SHEET: 1
SUBJECT: Drilling Program Emissions		DATE: September 26, 2008		

MOBILE SOURCE EMISSIONS

Vehicle Operation	<i>hrs/day*</i>	<i>days/yr</i>	<i>units*</i>	<i>gal/hr/unit*</i>	<i>gal/day</i>	<i>gal/yr</i>	
Service Vehicles	2	180	6	10.0	120	21,600	<i>(watering, lube/fuel, mud removal)</i>
Supervisory Trucks	12	180	6	0.3	20	3,600	
Total					140	25,200	

* Project-specific estimates

ASSUMPTIONS

Heat Content of Diesel	137,000 <i>Btu/gal</i>	<i>EPA AP-42 Appendix A</i>
Sulfur Content of Diesel	0.0015%	<i>40 CFR part 80.29</i>
Density of Diesel	7.05 <i>lbs/gal</i>	<i>EPA AP-42 Appendix A</i>
Internal Combustion Engine Efficiency	7,000 <i>Btu/hp-hr</i>	<i>AP-42 Table 3.3-1</i>

EMISSION FACTORS - MOBILE (assumed to meet or exceed Tier 1 standards)

Pollutant	<i>g/kW-hr</i>	<i>g/hp-hr</i>	<i>g/MMBtu</i>	<i>Reference</i>
NO _x	9.2	6.9	980.1	<i>40 CFR part 89.112, 75 ≤kW≤225 (Tier 1)</i>
VOC	1.3	1.0	138.5	<i>40 CFR part 89.112, 75 ≤kW≤225 (Tier 1)</i>
CO	11.4	8.5	1,214	<i>40 CFR part 89.112, 75 ≤kW≤225 (Tier 1)</i>
PM ₁₀ *	0.54	0.40	57.53	<i>40 CFR part 89.112, 75 ≤kW≤225 (Tier 1)</i>
PM _{2.5} *	0.54	0.40	57.53	<i>40 CFR part 89.112, 75 ≤kW≤225 (Tier 1)</i>
SO ₂	--	--	0.70	

*All particulate assumed to be ≤1µm in diameter (AP-42 Table 3.3-1)

EMISSIONS - MOBILE

Pollutant	Emissions		
	tons/yr	lbs/day	lb/hr
NO _x	3.7	41.4	18.25
VOC	0.5	5.9	2.58
CO	4.6	51.4	22.62
PM ₁₀	0.2	2.4	1.07
PM _{2.5}	0.2	2.4	1.07
SO ₂	0.003	0.030	0.013

CONVERSIONS

453.59 g/lb
2,000 lb/ton
1.341 hp/kW



Air Sciences Inc.

ENGINEERING CALCULATIONS

PROJECT TITLE: Lexam Baca Drilling Project		BY: Sabrina Pryor		
PROJECT NO: 243 - 1 - 1		PAGE: 3	OF: 4	SHEET: 1
SUBJECT: Drilling Program Emissions		DATE: September 26, 2008		

FUGITIVE DUST EMISSIONS

	Number of holes drilled	2 holes
Length of access road to site	4.0 miles	0.02 holes/day
Round-trips on access road	15.0 trips/day	2 holes/yr
Vehicle miles traveled (VMT)	120 VMT/day 21,600 VMT/yr	
		<u>Conversion Factors</u>
		453.6 g/lb
Vehicle Operation	180 days/yr	<u>2,000 lb/ton</u>

EMISSION FACTOR - UNPAVED ROAD FUGITIVES

Reference

where: $E = k (s/12)^a \times (W/3)^b$
 E= Emission Factor (lb/VMT)
 k= constant (lb/VMT)
 s= surface material silt content (%)
 W= mean vehicle weight (tons)

AP-42 Chapter 13.2.2.2

	PM_{10}	$PM_{2.5}$
k=	1.5	0.15
s=	2.6 %	
a=	0.9	0.9
W=	5.0	
b=	0.45	0.45

AP-42 Table 13.2.2-2; Industrial Roads

AP-42 Section 13.2.2, Related Info. r13s0202_dec03

AP-42 Table 13.2.2-2; Industrial Roads

Project-specific estimate

AP-42 Table 13.2.2-2; Industrial Roads

PM_{10}	E=	1.5(2.60/ 12) ^{0.9}	x (5/ 3) ^{0.45}	
$PM_{2.5}$	E=	0.15(2.60/ 12) ^{0.9}	x (5/ 3) ^{0.45}	
	E=	0.48 lb PM_{10} /VMT		$E_{watering\ controlled} =$ 0.12 lb PM_{10} /VMT
	E=	0.05 lb $PM_{2.5}$ /VMT		0.01 lb $PM_{2.5}$ /VMT

Watering Control Effectiveness for Unpaved Travel Surfaces

Moisture Ratio, M	2	Operational estimate
Control Efficiency	75%	AP-42 Figure 13.2.2-2

EMISSION FACTOR - DRILLING FUGITIVES

E=	1.3 lb/hole TSP	EPA AP-42 Table 11.9-4 (Overburden Drilling)
Scaling Factors	PM_{10} 0.52 $PM_{2.5}$ 0.03	EPA AP-42 Table 11.9-1 (Overburden Blasting)
E=	0.676 lb/hole PM_{10} 0.039 lb/hole $PM_{2.5}$	

EMISSIONS - FUGITIVE

Pollutant	Un-Paved Road Emissions		Drilling Emissions	
	tons/yr	lbs/day	tons/yr	lbs/day
PM_{10}	1.29	14.3	0.001	0.015
$PM_{2.5}$	0.129	1.4	0.0000	0.001



Air Sciences Inc.

ENGINEERING CALCULATIONS

PROJECT TITLE: Lexam Baca Drilling Project		BY: Sabrina Pryor		
PROJECT NO: 243 - 1 - 1		PAGE: 4	OF: 4	SHEET: 1
SUBJECT: Drilling Program Emissions		DATE: September 26, 2008		

OTHER POLLUTANT EMISSIONS

EMISSION FACTORS

Pollutant	<i>lb/10¹² Btu</i>	<i>lb/MMBtu</i>	<i>g/MMBtu</i>	Reference
Pb		2.9E-05	1.3E-02	<i>L & E Air Emissions from Sources of Lead and Lead Compounds, Section 5.2.2 (EPA 454/R-98-006)</i>
Hg	6.2	6.2E-18	2.8E-15	<i>L & E Air Emissions from Sources of Mercury and Mercury Compounds, Table 6-12 (EPA-454/R-97-012)</i>
H ₂ CO		1.2E-03	5.4E-01	<i>AP42 Table 3.3-2, Gasoline and Diesel Industrial Engines</i>

EMISSIONS - GENERATORS

Pollutant	Emissions	
	tons/yr	lbs/day
Pb	9.12E-04	0.01
Hg	1.95E-16	2.17E-15
H ₂ CO	3.71E-02	4.13E-01

EMISSIONS - MOBILE

Pollutant	Emissions	
	tons/yr	lbs/day
Pb	5.01E-05	5.56E-04
Hg	1.07E-17	1.19E-16
H ₂ CO	2.04E-03	2.26E-02

EMISSIONS TOTALS

Pollutant	tons/yr	lbs/day
NO _x	51.0	566.9
VOC	10.1	112.6
CO	30.5	338.7
PM ₁₀	3.0	33.2
PM _{2.5}	1.8	20.3
SO ₂	0.1	0.6
Pb	9.63E-04	1.07E-02
Hg	2.06E-16	2.29E-15
H ₂ CO	3.92E-02	4.35E-01



Air Sciences Inc.

ENGINEERING CALCULATIONS

PROJECT TITLE: Lexam Baca Drilling Project		BY: Tim Martin		
PROJECT NO: 243-1-1		PAGE: 1	OF: 4	SHEET: 1
SUBJECT: Source Characteristics		DATE: September 22, 2008		

SOURCE RELEASE CHARACTERISTICS FOR AERMOD MODELING

Source Description	Model Src ID	Source Type	Vertical or Horizontal?	Source Location		Rel Ht. ¹	Stk Dia.	Exit Temp.	Exit Vel.	Sigma Y	Sigma Z
				X (m)	Y (m)	(m)	(m)	(deg K)	(m/s)	(m)	(m)
Generator 01	GEN01	POINT	horizontal	432751.8	4197205.4	7.00	0.40	500	0.001	N/A	N/A
Generator 02	GEN02	POINT	horizontal	432758.8	4197212.4	7.00	0.40	500	0.001	N/A	N/A
Fugitive ¹	FUGTV	VOLUME	N/A	432755.3	4197208.9	2.29	N/A	N/A	N/A	39.1	1.1

¹ Fugitives are emissions from mobile sources, un-paved roads, and drilling activities.
 These emissions are released from a 15 foot tall by 7 acre volume source surrounding the location of the generators.
 N/A = not applicable

EMISSION RATES FOR AERMOD MODELING

Source Name	Model ID	Emission Rate					
		1-Hour		24-Hour		Annual	
		lb/hr	g/sec	lb/day	g/sec	ton/year	g/sec ²
<i>NOx Emissions</i>							
Generator 01	GEN01	---	---	---	---	23.6	0.68
Generator 02	GEN02	---	---	---	---	23.6	0.68
Fugitives ¹	FUGTV	---	---	---	---	3.7	0.11
<i>PM_{2.5} Emissions</i>							
Generator 01	GEN01	---	---	8.2	0.04	0.7	0.02
Generator 02	GEN02	---	---	8.2	0.04	0.7	0.02
Fugitives ¹	FUGTV	---	---	3.9	0.02	0.3	0.01
<i>PM₁₀ Emissions</i>							
Generator 01	GEN01	---	---	8.2	0.04	0.7	0.02
Generator 02	GEN02	---	---	8.2	0.04	0.7	0.02
Fugitives ¹	FUGTV	---	---	16.7	0.09	1.5	0.04
<i>SO₂ Emissions</i>							
Generator 01	GEN01	0.02	0.002	0.3	0.001	0.02	0.001
Generator 02	GEN02	0.02	0.002	0.3	0.001	0.02	0.001
Fugitives ¹	FUGTV	0.01	0.002	0.03	0.0002	0.003	0.0001

¹ Fugitives are emissions from mobile sources, un-paved roads, and drilling activities.
² On an annual basis, modeled emissions are adjusted to account for 180 days when the source is operating and 185 days when the source is not operating. Thus, the model is run for a period of 180 days (Oct. 1 - Mar 29) and the resultant model output is representative of impacts from the source on an annual basis.



Air Sciences Inc.

ENGINEERING CALCULATIONS

PROJECT TITLE: Lexam Baca Drilling Project		BY: Tim Martin		
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SUBJECT: Building Downwash		DATE: September 22, 2008		

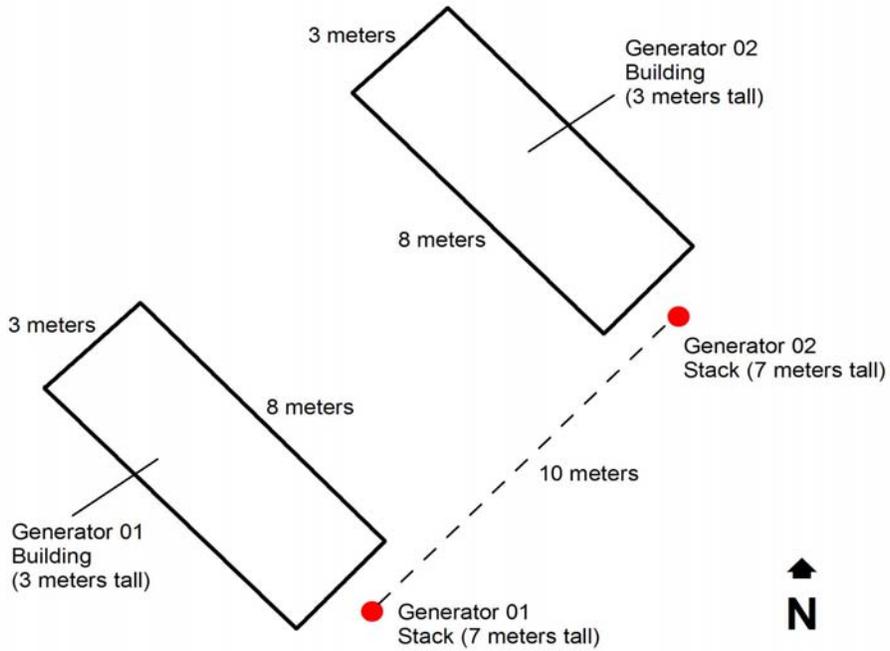
BUILDING INFORMATION FOR BPIP ANALYSIS

Structure Name	Generator 01 Bldg.	Generator 02 Bldg.
Height Above Ground *	3.0 m	3.0 m
# Structure Corners	4	4

Structure Corner #	Coordinate		Coordinate	
	X(m)	Y(m)	X(m)	Y(m)
1	432750.0	4197205.0	432757.1	4197212.1
2	432744.3	4197210.7	432751.4	4197217.7
3	432746.5	4197212.8	432753.5	4197219.9
4	432752.1	4197207.1	432759.2	4197214.2

* Base elevation for buildings and stacks is 2311.9 meters above sea level.

CONFIGURATION OF GENERATOR SOURCES





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ENGINEERING CALCULATIONS

PROJECT TITLE: Lexam Baca Drilling Project		BY: Tim Martin		
PROJECT NO: 243-1-1		PAGE: 3	OF: 4	SHEET: 3
SUBJECT: Deposition Calculations		DATE: September 22, 2008		

NITROGEN AND SULFUR DEPOSITION CALCULATIONS - GREAT SAND DUNES NP CLASS I AREA

The U.S.D.A. Forest Service provides a screening methodology to calculate nitrogen and sulfur deposition (USDA, 2000).

Some models (e.g., AERMOD) may report all S outputs as SO₂ and all N outputs as NO₂. In this case, the calculation below is used to estimate total (wet plus dry) deposition of S from SO₂ and N from NO₂.

Ds or Dn = (X)(Vd)(R)(DEP)(Fc), where:

- Ds = sulfur deposition flux (kg/ha/yr)
- Dn = nitrogen deposition flux (kg/ha/yr)
- X = pollutant concentration (ug/m³)
- Vd = deposition velocity of 0.005 m/sec for SO₂ or 0.05 m/sec for HNO₃ (ref. IWAQM Phase1)
- R = Ratio of molecular weights of elements to convert from SO₂ to S and NO₂ to N (14/46 = .3 for NO₂; 32/64 = .5 for SO₂).
- Molecular weight of H=1, N=14, O=16, S=32.
- DEP = total deposition to dry deposition ratio (assume this equals 2.0 unless there is other info)
- Fc = units conversion of ug/m³ x m/sec to kg/ha/yr (315.4)

Nitrogen Deposition Calculations

X = max. modeled NO ₂ concentration (ug/m ³)	0.045
Vd = deposition velocity (m/sec)	0.05
R = ratio of molecular weights of elements to convert from NO ₂ to N (14/46 = .3 for NO ₂)	0.3
DEP = total deposition to dry deposition ratio	2
Fc = units conversion of ug/m ³ x m/sec to kg/ha/yr	315.4
<i>Dn = nitrogen deposition flux (kg/ha/yr)</i>	<i>0.4</i>
FLM Screening Threshold (kg/ha/yr)	3.0

Sulfur Deposition Calculations

X = max. modeled SO ₂ concentration (ug/m ³)	0.00005
Vd = deposition velocity (m/sec)	0.005
R = ratio of molecular weights of elements to convert from SO ₂ to S (32/64 = .5 for SO ₂)	0.5
DEP = total deposition to dry deposition ratio	2
Fc = units conversion of ug/m ³ x m/sec to kg/ha/yr	315.4
<i>Ds = sulfur deposition flux (kg/ha/yr)</i>	<i>0.0001</i>
FLM Screening Threshold (kg/ha/yr)	3.0



Air Sciences Inc.

ENGINEERING CALCULATIONS

PROJECT TITLE: Lexam Baca Drilling Project		BY: Tim Martin		
PROJECT NO: 243-1-1		PAGE: 4	OF: 4	SHEET: 4
SUBJECT: VISCREEN Model Inputs		DATE: September 24, 2008		

VISCREEN MODEL INPUT INFORMATION

Input emissions for ³:

Particulates	0.75 lb/hr
NOx (as NO ₂)	23.62 lb/hr
Primary NO ₂	0 lb/hr
Soot ¹	0.63 lb/hr
Primary SO ₄	0 lb/hr

** Default Particle Characteristics Assumed

Transport Scenario Specifications:

Background Ozone:	0.04 ppm
Background Visual Range ² :	170 km
Source-Observer Distance:	16.1 km
Min. Source-Class I Distance:	16.1 km
Max. Source-Class I Distance:	31.6 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	6 (6 = F stability)
Wind Speed:	1.0 m/sec

¹ For diesel-burning sources, assume that 80% of particulate emissions are soot (carbon). *Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements*, Federal Register: January 18, 2001 (Volume 66, Number 12).

² Background visual range value provided in Figure 9 EPA's *Workbook for Plume Visual Impact Screening and Analysis (Revised)*. Oct 1992. Research Triangle Park, NC. EPA-454/R-92-023.

³ Emissions most representative of expected short-term operations (max. daily values adjusted to hourly values).