Decision Memo

SG Interests I LTD, Federal 11-90-9 #3 Well
Surface Use Plan of Operations

USDA Forest Service
Paonia Ranger District, Grand Mesa, Uncompahgre, Gunnison National Forest Service
Gunnison County, Colorado

Background

The Grand Mesa, Uncompahgre and Gunnison National Forest (GMUG), Paonia Ranger District, is proposing to authorize SG Interests I LTD (SG) to exercise federal oil and gas lease rights, conducting surface operations associated with accessing, drilling, testing, and completing an initial natural gas well and the possibility of four additional wells from one, multiple-well drill pad on the Gunnison National Forest. In addition, the proposal includes the installation of approximately 5.5 miles (29,060 ft.) of temporary, surface HDPE poly-pipeline to the McIntyre Flowback Pits on the Bull Mountain Unit on private land. Of the total 5.5 miles of surface HDPE pipeline, approximately 1.43 miles (7556 ft.) will travel on National Forest System lands. The surface poly-pipeline will be used to transport water for use and re-use for drilling and completion activities.

The proposed gas well/s is located on federal lease COC-8905 in Township 11 South, Range 90 West; Section 9 in Gunnison County. Three additional well pad locations have also been considered (another location on lease COC-8905 and two on adjoining lease COC-42314) in response to input from the Colorado Department of Parks and Wildlife and public scoping comments related to minimizing impacts to wildlife (see Appendix B).

In addition to the construction of a ~3 acres drill pad, sized for drilling of up to 5 gas wells, the following activities will also need to be authorized for the completion and production of the well site:

- The construction of approximately 1/3 mile (~1700 feet) of access road from Sheep Park Spur A (851.1A) with co-located gas and water lines on COC-8905.
- Ancillary facilities such as well heads, separators, meter houses, tank battery, and water transfer equipment.
- The installation of a temporary (used during completion operation) 2.61 mile over-land HDPE poly-pipeline to either the McIntyre Flowback Pits 3 and 4 or to Pits 1 and 2, as well as booster pumps along the pipeline to maintain constant pressure and flow (see project file for details).

The proposal for the Federal 11-90-9 #3 well was evaluated according to Section 390 of the Energy Policy Act of 2005 which established categorical exclusions under NEPA that apply to five categories of oil and gas exploration and development activities conducted pursuant to the Mineral Leasing Act (30 USC et seq., as amended). Category 1 of Section 390 of the Energy Policy Act of 2005 was applied to the 11-90-9 #3 project proposal. Forest Service direction is to apply the categorical exclusions of the Energy Policy Act Section 390 when a proposal fits the Category. Compliance with the Energy Policy Act and USFS direction is documented below.

Project Description

The APD/SUPO includes the following activities:

- Clearing and leveling one multiple-well 250' x 350' drill pad (disturbing approximately 3 acres).
- Constructing approximately 1/3 mile (~1700 feet length; 14 foot running surface) of new access road to the proposed 11-90-9 #3 well. Along this right-of-way, co-located gas gathering and water transmission lines will be buried to connect to the existing pipeline infrastructure on the 851.1A Road that connects with the Ragged Mountain gathering system.
- Conducting drilling operations for the 11-90-9 #3 well for approximately 35 days beginning in July 2013.
- Installing approximately 2.61 miles of temporary, surface HDPE (High Density Polyethylene) poly-pipe from the McIntyre Flowback Pits on the Bull Mountain Unit, to the 11-90-9 #3 well pad. The 12 inch diameter poly-pipeline will be moved into place prior to the completion of the 11-90-9 #3 well and is expected to be on the surface for one to three months (see project file for more information). Note: The HDPE pipeline from the McIntyre Flowback Pits to the 11-90-9 #3 well will be approximately 5.5 miles in total length. Of these 5.5 miles, only 2.61 miles will travel within the Gunnison National Forest Boundary, and in total only 1.43 miles will actually travel on Forest Service surface.
- Completing and testing the well for production, including casing and cementing the well per BLM and State requirements which is anticipated to take between 14-28 days.
- Reclaiming pipeline corridors, and as much of each well pad as possible once completion operations have ceased;
- Reclaiming all project disturbances once production operations have ceased.

Decision

The 11-90-9 #3 well project proposal and associated development proposed by SG fits within the guidance given under Category 1, Section 390 Categorical Exclusions for Oil and Gas Activities.

> *Individual surface disturbances of less than five (5) acres so long as the total surface disturbance on the lease is not greater than 150 acres and site-specific analysis in a document prepared pursuant to NEPA has been previously completed.*

In addition to this project fitting a Section 390 CE under the Energy Policy Act, this proposal also fits the Categorical Exclusion under 36 CFR 220.6(e)(17), which states:

> *Approval of a Surface Use Plan of Operations for oil and natural gas exploration and initial development activities, associated with or adjacent to a new oil and/or gas field or area, so long as the approval will not authorize activities in excess of any of the following:(i) One mile of new road construction;(ii) One mile of road reconstruction;(iii) Three miles of individual or co-located pipelines and/or utilities disturbance; and (iv) Four drill sites.*

However, it is USFS policy that if a project fits an Energy Policy Act CE, then the Authorized Officer should use the Section 390 CEs for approval and documentation. Consistent with Western Energy Alliance v. Salazar, this decision does not consider extraordinary circumstances in accordance with Forest Service Handbook 1901.15.

The 11-90-9 #3 well pad (250' x 350') is projected to disturb approximately 3 acres in total. Assuming a 40 foot width for the road corridor to allow adequate room for the road surface, cut and fill, and the co-located water and gas pipelines, the road disturbance will be approximately 1.6 acres. In total the well pad and road disturbance will be approximately 4.6 acres. This disturbance total fits within the disturbance threshold for this categorical exclusion.

	Dimension (Feet)	**Acreage**
Pad Disturbance	250' x 350'	2.98
Road Disturbance	1700' x 40'	1.6
	Total	**~4.6 Acres**

Temporary Surface HDPE Poly-Pipeline
Consistent with the Mineral Leasing Act (as amended), the 1987 Onshore Oil and Gas Leasing Reform Act and the 2005 Energy Policy Act the temporary surface poly-pipeline will be approved under the SUPO, as well as two locations suitable for booster pumps on NFS lands (see Exhibit 1).

Disturbance Totals on Lease COC-8905
In addition to having a total surface disturbance of less than five acres, the second disturbance criteria for Category 1 of Section 390 Categorical Exclusions for Oil and Gas Activities is the 150 acre disturbance threshold on the lease. Lease COC-8905 has reclaimed pipeline associated with the Bull Mountain Pipeline, the Ragged Mountain Pipeline, the Henderson Lateral which is part of the Bull Mountain Gathering System, and one gas well, the Henderson 1R, that contribute to this disturbance total. The disturbance totals for these activities are listed in the table below and total 9.17 acres which is within the acreage threshold of 150 acres. (See map in project record for locations of disturbances)

	Length (Feet)	**Width (Feet)**	**Square Feet**	**Acreage**
Bull Mtn. Pipeline	1,305	50	65,250	1.50
Ragged Mtn. Pipeline	12,933	20	258,660	5.94
Henderson Lateral	1,586	24	38,064	0.87
Henderson 1R Well	150	250	37,500	0.86
			Total Acreage:	**9.17 Acres**

NEPA Analysis Requirement of Section 390
The final requirement that must be fulfilled under Category 1 of Section 390 is that site-specific analysis in a document pursuant to NEPA must have been completed for the project. This requirement has been fulfilled by the NEPA analysis that was carried out for the Gunnison Energy 16 Well Master Development Plan. This Master Development Plan (MDP) analyzed several well locations in close proximity to the proposed 11-90-9 #3 location, and in doing so analyzed impacts of drilling in this project area. The NEPA analysis for this MDP was issued in a Decision Memo in 2010. To date, no drilling or APDs have been submitted under the MDP.

Therefore based upon the review above, and the supporting documentation in the project record, it is my decision to approve with conditions, the Surface Use Plan of Operations, as submitted, for the 11-90-9 #3 well, contingent upon the project Conditions of Approval as listed in Appendix A (see Exhibit 1).

The Conditions of Approval were derived from USFS policy and guidance, industry best management practices, Interdisciplinary Team input, public input, comments submitted by other agencies, and previous related experience and project analyses on the Forest.

Additional Analysis and Documentation

Although not required under the Energy Policy Act Categorical Exclusions, due to public interest and CPW concerns for big game winter range the Forest Service analyzed 3 alternate drilling pad locations. These locations were brought up during onsite visits as well as scoping comments. Please refer to Appendix B, for a discussion of the alternative sites.

In addition, air quality concerns and cumulative effects associated with gas development in the area were also a major concern for commenters. Air quality is discussed in Appendix C, and a cumulative effects discussion can be found in Appendix D.

Lastly, a Response to Comments document was created and can be reviewed as Appendix E.

Implementation Date

This project is scheduled to be implemented in the summer of 2013.

Administrative Review of Appeal Opportunities

This decision is subject to administrative review pursuant to Federal Regulations at 36 CFR 215. Appeals (including attachments) must be in writing and filed (regular mail, fax, e-mail, hand-delivery, express delivery, or messenger service) with the Appeal Deciding Officer ($ 215.8) within 45 days following the date of publication of the notice of this decision in the Paper of Record, which is the Delta County Independent. Attachments received after the 45-day appeal period will not be considered. The publication date of the legal notice in the Federal Register is the exclusive means for calculating the time to file an appeal ($214.15 (a)). Those wishing to appeal should not rely upon dates or timeframe information provided by any other source.

The appeal must be filed (regular mail, fax email, hand-delivery, or express delivery) with the Appeals Deciding Officer at:

Appeals Deciding Officer
U.S.D.A. Forest Service
Rocky Mountain Region
740 Simms Street
Golden, Colorado 80401

Fax: 303-275-5134 to the attention of "Appeal"
E-mail: appeals-rocky-mountain-regional-office@fs.fed.us

The office business hours for those submitting hand-delivered appeals are 8:00 a.m. to 4:30 p.m. Monday through Friday, excluding federal holidays. Electronic appeals must be submitted in a format such as an e-mail message, plant text (.txt), rich text format (.rtf), MSWord (.doc / .docx), or Adobe format (.pdf). In cases where no identifiable name is attached to an electronic message, a verification of identity will be required. A scanned signature is one way to provide verification. Individuals or organizations who expressed interest during the

comment period specified at 36 CFR 215.6 may appeal this decision. The notice of appeal must meet the appeal content requirements at 36 CFR 215.14.

Contact Person

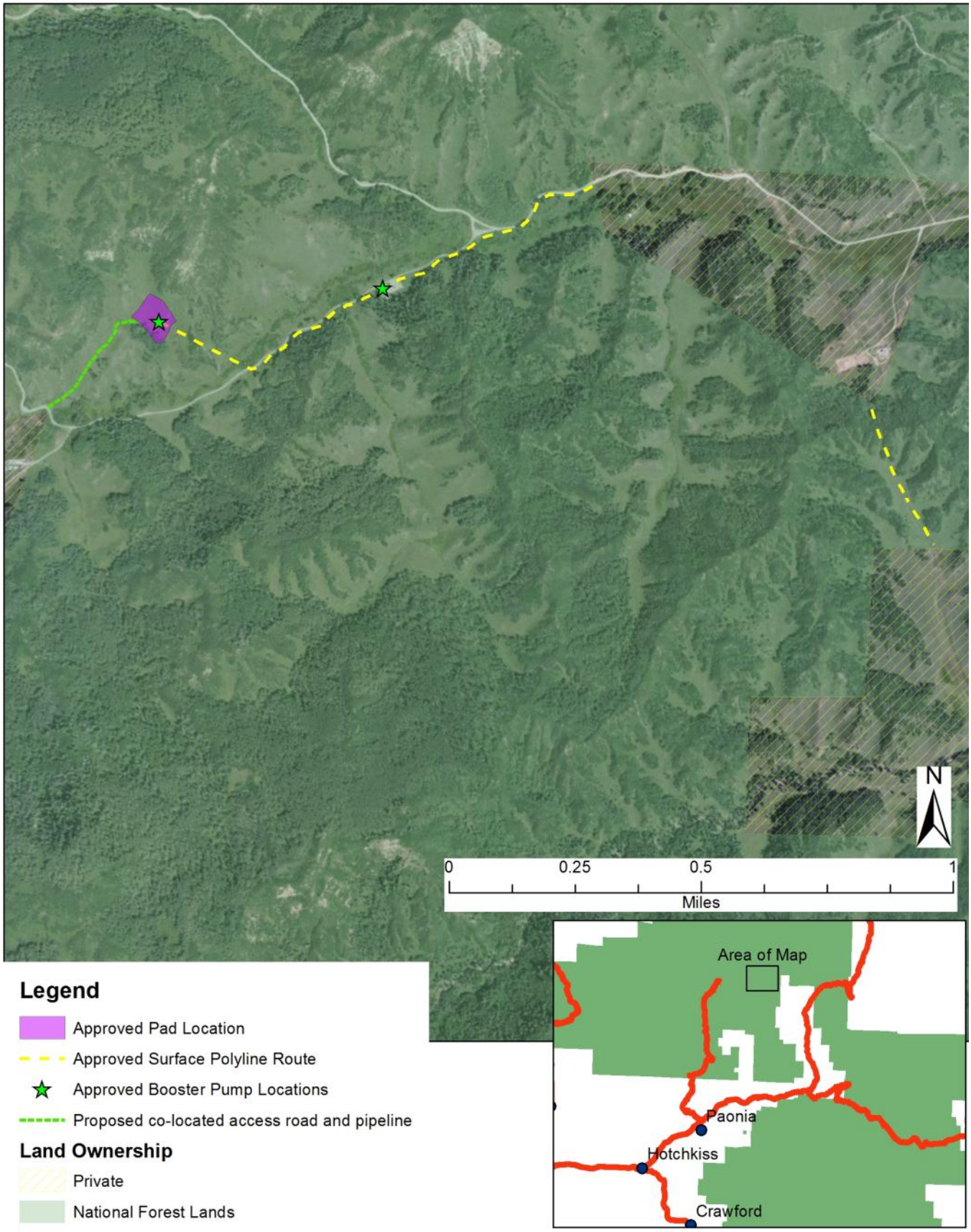
For additional information concerning this decision, contact: Ryan Taylor, Paonia Ranger District, 970-527-4131, rztaylor@fs.fed.us .

Authorized Officer Signature:

Levi K. Broyles, Paonia District Ranger,
GMUG National Forest

3/12/2013
Date

Exhibit 1 - Approved Location and Access SG 11-90-9-#3



Appendix A
Conditions of Approval for 11-90-9 #3 Surface Use Plan of Operation

Administrative

1. The operator will notify the USFS. Paonia Ranger District 48 hours in advance of mobilizing heavy equipment (including road maintenance equipment) onto National Forest System lands.

2. Lessees and Operators have the responsibility to see that their exploration, development, production and construction operations are conducted in such a manner which 1) conforms with applicable Federal laws and regulations, and 2) with State and local laws and regulations to the extent that such State and local laws are applicable on Federal leases.

3. Subsequent APD submittals for the multi-well 11-90-9 #3 pad will identify any deviation from the common 8 point drilling plan and 12 point Surface Use Plan of Operations if there are any.

4. An authorized representative of the operator, with the authority to make decisions will be on site during initial disturbance and set up.

5. SG will be required to a post a reclamation bond (36 CFR 228.109) prior to any ground disturbing activities with the Forest Service for the pad site and access road associated with the project proposal.

6. The Operator will utilize best management practices (see http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices.html) in the construction, layout, and production of the well site, road and pipelines.

Air Quality

7. To further understanding the levels of emissions from drill rigs in the Piceance Basin, the Operator will be required to provide the FS with daily fuel consumption logs for the drill rigs throughout the entire drilling program.

8. Any drill rig, completion rig, or auxiliary equipment used on the 11-90-9 #3 location will be powered by Tier 2 engines or better.

Wildlife

9. Surveys for raptors shall be conducted in forest habitats within the appropriate buffers around proposed surface operations to determine locations of individuals or populations, prior to disturbance.

10. Prior to pad construction, a USFS Wildlife Biologist, or their representative will work with the operator to identify any aspen trees that which contain active purple martin nests. No cutting or removal of these trees will be authorized.

11. If nesting goshawks are found within a quarter mile radius of proposed operations, the Operator will consult the Forest Service to determine when operations may occur so as not to disrupt nesting birds. Operations will not be allowed until the young have fledged.

12. If nesting flammulated owls are found within a quarter mile radius of the proposed operations, the Operatory will consult with the Forest Service to determine when operations may occur so as not to disrupt the nesting birds. Operations will not be allowed until the young have fledged.

13. New oil and gas roads on public lands will be closed to the public.

14. To minimize effects to big game winter range, no heavy construction or drilling operations will be allowed from March 1-April 30, unless specifically authorized by the Paonia District Ranger after consultation with Colorado Parks & Wildlife regarding the presence/absence of big game in that area.

15. To mitigate for increases in road mileage and density within the HUC6 watershed in which the project is proposed, the proponent will physically decommission 1.5 miles of closed low-use motorized routes by ripping with a dozer or other implement and construct water bars, dips, or other erosion control or access control structures as designed by USFS personnel, provided:
    a. The Forest Service, not the proponent, conduct appropriate required environmental analysis prior to the mitigation work being conducted.
    b. The Forest Service identifies the route(s) to be decommissioned.
    c. The Forest Service identifies on the ground the location and type of work needed onsite prior to or in conjunction with the work being conducted.
    d. If such work is not found to be needed within the watershed, as determined by the analysis, such work may occur in other nearby watersheds, if suitable routes are located.

16. To mitigate for losses of available wildlife forage within the HUC6 watershed in which the project is proposed, the proponent will seed the above decommissioned routes with the Paonia district approved mountain shrub seed mix in conjunction with or after ground work on the decommissioning, under the same provisions as stated above.

Water Resources

17. To reduce the potential effect on surface and ground water resources, no reserve pits will be allowed to be constructed on pad 11-90-9 #3 . Drilling fluid systems must be closed-loop on these locations. Only temporary cuttings pits will be allowed. After drilling, all cuttings must be removed from USFS administered lands.

18. In order to detect and determine water quality impacts from future oil and gas activities, SG will conduct a baseline water quality study for the 11-90-9 #3 well. In addition SG will be required to follow a Water Resources Monitoring Plan (see below) that has been developed for the Paonia Ranger District. This monitoring plan includes a pre- and post-drilling water monitoring of springs and streams around the 11-90-9 #3 well.

19. No refueling or lubricating will be allowed to take place within 100 feet of wetlands and other waterbodies or drainages. Hazardous materials, chemicals, fuels etc. will not be stored within 100 feet of wetlands or surface waters.

20. If water for gas operations is drawn directly from live water, the rate of withdrawal must be less than 1 cfs unless specifically authorized by the District Ranger.

Vegetation

21. Prior to mobilizing onto National Forest System lands, all equipment will be pressure-washed and cleaned to prevent the spread of noxious weeds.

22. SG will be responsible for controlling noxious weed infestations on all NFS project disturbance from the date of discovery up to the point of the release of the reclamation bond and associated reclamation liability. Any herbicides used must be EPA approved and will be applied at the recommended rates.

23. The Operator will reseed disturbed soils in a manner which facilitates successful seed germination and establishment. Reseeding will be completed using a certified weed free seed mixture using methodologies and rates as approved by the District Range Specialist.

24. A Forest Service representative will conduct an inspection of the HDPE pipeline route from the forest boundary to the 11-90-9 #3 well to assess the vegetative condition. The Operator will be responsible to return the route to an acceptable condition when operations are completed and the pipeline will no longer be needed.

25. For documentation purposes, the Operator and USFS will establish monitoring photo points along the pipeline to document before and after conditions.

Land Use and Recreation

26. To avoid conflicts with hunter use in the area, mobilization or demobilization of heavy equipment, drilling equipment, and fracking units will not be allowed March 1-April 30 or on Thursday, Friday, Saturday or Sunday of the opening weekends of muzzleloader season, and the first and second big game rifle seasons unless specifically authorized by the Paonia District Ranger after consultation with Colorado Parks & Wildlife regarding the presence/absence of big game in that area.

27. If fencing is required to protect re-vegetation efforts, the operator will provide , install, maintain, and removing all fencing material. Operatory will coordinate with livestock permittees in installing all protective fencing.

Transportation

28. The Operator and the USFS will conduct a pre-use road condition assessment for affected USFS roads.

29. Any project –related damage to any roads must be repaired as soon as possible to avoid adverse impacts on other authorized road uses in the GMUG National Forest. Repairs will be made under agency specifications and terms in the Road Use Permit.

30. Final design of new road construction must be reviewed and approved by the District Ranger. All road design packages must conform to AASHTO Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT<400).

Hazardous Waste

31. The Operator shall take all reasonable precautions to prevent any dumping or spilling of oil or hazardous material on National Forest System lands, and shall take appropriate preventative measures to ensure that any spill of such oil or hazardous materials shall be immediately picked up and removed from National Forest System lands. All releases of any substance to soil or water will be immediately reported to BLM and USFS Compliance Officers as outlined in SG's submitted Spill Prevention and Countermeasure Plan. Containment of the spill will occur immediately, cleanup of a spill, and removal of contaminated soil to an off-site facility, will occur as soon as practicable and proof of cleanup provided for the record.

32. Operator shall conduct daily inspections of surface poly pipeline route for leaks during active storage or transfer of fluids. Inspections shall be conducted by viewing the length of the pipeline; operator will endeavor to minimize surface disturbance during pipeline monitoring. The operator shall maintain records of inspections, findings and repairs, for the life of the pipeline, and will provide copies of such documents to the USFS upon request.

33. Before construction and use, SG will submit a Spill Prevention, Control, and Countermeasures Plan that addresses the polyline and booster pump locations to the USFS for review.

34. Any booster pump locations will contain spill kits and be located out of riparian areas and out of the Water Influence Zone as defined by the Watershed Conservation Practices Handbook -Forest Service Handbook 2509.25

Health and Safety

35. To further facilitate coordination with local emergency services, SG will provide mapped locations of the proposed well sites, including GPS location (latitude/Longitude) to the Federal agencies with responsibility for drilling activities. A courtesy copy will be provided to the respective emergency services personnel, as applicable, in advance of any exploration drilling activities.

36. SG is responsible for using appropriate MUTCD traffic control devices when any heavy equipment is moved on Forest Roads. SG will post warning signs, at locations designated by the USFS, to warn the public of increased traffic on roads resulting from project activities. Additional security and public safety measures may be considered and approved or directed by the District Ranger.

37. The Operator will comply with any fire restrictions in effect at the time of proposed operations. The Forest Service reserves the right to suspend operations during periods of high fire potential. Forest Service will provide SG as much advance notice of anticipated closure orders as possible.

38. The Operator will have the ability to contact emergency services, including Montrose Interagency Fire Dispatch at all times. Fire prevention measures for all equipment will be in place prior to operations. The Operator will have water available, and provide a means for pumping water for fire suppression. Fire extinguishers, at least 5 lbs., ABC with an Underwriters Laboratory rating of 3A-40BC or greater, will be on or near each internal combustion engine.

39. All gasoline, diesel, and steam-powered equipment must be equipped with effective spark arresters or mufflers. Spark arresters must meet Forest Service specifications discussed in the "General Purpose and Locomotive (GP/L) Spark Arrester Guide, Vol. 1, April, 1988"; and "Multi-position Small Engine (MSE) Spark Arrester Guide, April,, 1989." In addition, all electrical equipment must be properly insulated to prevent sparks.

40. SG will be responsible for damage and suppression costs for fires started as a result of operations to the extent permitted by state and federal law. Fires must be reported to the Forest Service as soon as possible.

Water Resource Monitoring Plan
For Gas Operations
Paonia Ranger District

I. Introduction

The exploration, development, and production of natural gas on the Paonia Ranger District requires wells to be drilled through a hydrostratigraphic unit with an active ground-water system that provides ground-water to springs seeps, springs and stream baseflow. There remains a perceived uncertainty how this unit interacts with an inactive ground-water system in deeper bedrock units. Preventing disruption and contamination of water resources through proper pad construction techniques, use of best management practices (BMPs), well drilling, completion and cementing procedures is the first and best line of defense in protecting water resources, and standards must be met in accordance with the law and regulations. However, construction and drilling methods, well design and BMPs may not always be 100% effective all the time and occasional undesirable events may occur. In order to verify understanding of existing conditions and potential effects, there is a desire to expand on the current baseline data set, monitor the effects of operations on water resources (using a systematic monitoring schedule using standard sampling methodologies) and validate the assumptions and current understanding of local hydrogeologic conditions.

This plan recognizes that for gas operations, there is a desire to evaluate water resources within the GMUG National Forest boundaries. The Forest Service does not have the authority to require operators to conduct or fund water resource monitoring outside the boundaries of the national forest.

This plan further recognizes that the project proposals and timelines are sometimes uncertain; thus the plan is prepared to account for implementing monitoring in a phased fashion, and is generally fashioned to initiate water monitoring efforts when actual drilling or development operations are proposed. In the event operators do not conduct any drilling or development operations on the District, the operator will not implement any of the provisions of this Water Resource Monitoring Plan until such time as natural gas drilling or development operations are proposed in the area.

II. Legal Framework

Protection of water resources on national forest system (NFS) lands is directed by congressional intent as contained in the Organic Administration Act of 1897. Management of water resources on NFS lands is also mandated by the National Forest Management Act, the Clean Water Act, among others.

For oil and gas operations, provisions of 43 CFR subpart 3162, contains protections for water resources with which Operators must comply. Specifically, section 3162.5-1, Environmental Obligations, requires that the operator shall conduct operations in a manner, which protects the mineral resources, other natural resources and environmental quality.

Protection of fresh water zones during drilling and production of oil and gas is also required in specific language addressing this issue (43 CFR section 3162.5-2(d)). Testing and surveys of water resources to monitor the effectiveness of protection measures for fresh water zones is also required in this subpart.

Lessees must also comply with the Onshore Oil and Gas Orders, 43 CFR section subpart 3164. Onshore Order Nos. 1 and 7, apply to protection of water resources, and requires that operators conduct their operations using minimum standards to protect surface and ground waters from contamination from produced water.

Thus, there is a regulatory basis to monitor and protect both surface and ground water quality within the District while natural gas pad locations are constructed drilled and developed over time.

III. Monitoring Plan Objectives

This plan was developed using the concept of objective-based monitoring, with the intent that the data and information gained will be usable in future projects and will have tangible results and data to use in future projects.

The objectives of the plan are as follows:

1. Expand baseline condition data set (including surface and ground-water quality and quantity).

2. Monitor effects of operations (construction of pads, drilling, and production) on surface water and groundwater features (seeps, springs, wetlands and surface drainages, and water wells where available) in proximity to drilling locations.

Other water monitoring data collected as part of other natural gas project approvals in the area, if available, will be used together with the data collected as part of this plan to better understand the hydrologic system.

IV. Monitoring Process

The following section details how each objective will be met using various elements. A summary of the following is given in Table 2.

Objective 1: Expand baseline condition data set

Element 1A. After a site-specific APD is filed, and prior to any surface disturbance at a particular well location, the operator and the FS will conduct a field survey of all surface water resources (seeps, springs, wetlands, surface drainages) with a reasonable area of influence (up-gradient and down-gradient) of the well site. This area would generally not exceed 3,000 feet, however it could vary (more or less) depending on the particular location. Each surface water resource will be inventoried with GPS and recorded on a project map. The FS and operator will jointly select sites for monitoring that are representative of the particular area (see Objective 2). The survey will incorporate to the extent possible methodologies outlined in the Forest Service Spring Inventory and Monitoring Protocol (in draft Form as of May 2006).

Objective 2: Monitor effects of operations

Once representative monitoring locations are identified for a particular site (see Objective 1), monitoring will proceed as described in the following paragraphs (results will be recorded on form, Attachment A).

Element 2A. Prior to any surface disturbance, each selected site will be monitored on 2 occasions. At each monitoring event, field parameters of temperature, pH, conductivity and turbidity will be collected. A baseline water quality analytical sample will also be taken to include the parameters listed in Table 1. Results will be conveyed to the FS within one week of the operator receiving the lab results.

Element 2B. During the time period when activity is occurring ('activity' being defined as drill pad construction, drilling, well completion and interim reclamation), field parameters of temperature, pH, conductivity, field total petroleum hydrocarbons and turbidity will be collected at the selected sites weekly. Results will be conveyed to the FS within 24 hours. If field parameter monitoring indicates a change in conditions, then an analytical sample will be taken at the suspect location which will include the parameters listed in Table 1. Regardless of change in conditions, within 2 weeks of a completion activity, analytical samples will be taken at selected sites approved by the Forest Service (analysis will include the parameters listed in Table 1).

If production occurs, then field parameters and an analytical sample (which will include the parameters listed in Table 1) would be collected twice annually for each monitoring location until production is ceased.

Element 2C. Within two months of activity ceasing one analytical water sample will be collected from each monitoring location, the analysis will include the parameters listed in Table 1. Results will be conveyed to the FS within one week of the operator receiving the lab results.

Table 1
Analytical Parameters for Monitoring Locations

pH;
Alkalinity;
Specific conductance;
Major cations/anions (chloride, fluoride, sulfate, sodium);
Total dissolved solids (if sample location is stream);
BTEX/GRO/DRO;
TPH;
PAH's (including benzo(a)pyrene);
Metals (arsenic, barium, calcium, chromium, iron, magnesium, selenium);

Table 2
Water Resource Monitoring Schedule

Monitoring Element	What	Who	When	Why
1A	Conduct a field survey of surface water resources around drill sites	Operator/FS	After site-specific APD filed, before surface disturbance occurs	Expand baseline data
2A	Pre-disturbance water quality monitoring at selected locations near drill site	Operator	Variable as sites are used	Monitor effects of operations
2B	Collect field parameters, and analytical samples as needed at selected sites during activity.	Operator or assigns	Weekly during activities. Analytical if change occurs, or within 2 weeks of completion activity. If production occurs, then twice annually.	Monitor effects of operations
2C	Collect one analytical water sample	Operator or assigns	Within two months of activity ceasing	Monitor effects of operations

Attachment A

Sampling Protocols and Reporting Form

Sampling Protocols:

The following sampling and measuring protocols will be followed by FS and the operator (or designated agents, consultants, etc) for water resource monitoring on the District. All data will be recorded as appropriate on the attached form. Equipment will be calibrated each day prior to use according to protocols on Table A1.

Personnel Experience/Training

Those conducting the sampling will be trained in sampling procedures based on this Sampling and Analysis Plan and associated standards. The safety of sampling personnel is of primary importance. Situations that present a risk to the sampler or to sampling equipment will be avoided, and/or addressed prior to sampling.

A. Ground-water wells

A static water level will be taken each time the well is sampled (prior to purging, see below). Static water level will be measured from a marked point at the top of casing to 0.01 foot. The height (ground to top of casing) and diameter of the casing will be measured. Measurement will be made using an electronic water level meter (or equivalent).

Field parameters and/or analytic samples will be taken when pH, conductivity and temperature have stabilized during purging of the well casing (usually 3 borehole volumes). These indicator parameters are needed to determining when aquifer water is being sampled, rather than casing water. Bailers and/or submersible pumps will be used to evacuate the borehole volumes. Any equipment will be cleaned before placement in the well bore, and in between use in different wells.

Sampling will be in accordance with ASTM Standard D 4448, Sampling Guide for Sampling Ground Water Monitoring Wells. The method used to obtain samples will be noted. Lab protocols will be followed specific to each analytical parameter to ensure proper sampling and handling of the samples.

B. Surface Water features

Field parameters and/or analytic samples will be taken according to instructions on equipment and per lab protocols specific to each analytical parameter to ensure proper sampling and handling of the samples.

Sampling Equipment Maintenance and Calibration

All equipment used for water quality monitoring will be maintained and calibrated according to operational manuals and standard protocols.

Standard field sample acquisition and preservation methods as well as general laboratory holding times and analysis methods for general water quality and total petroleum hydrocarbons (TPH) will follow standard protocols and laboratory recommendations. These may vary based on laboratory used. Other specialty parameters (BTEX, radioactive isotopes, etc) will follow laboratory recommendations.

Stable isotope sampling will follow lab recommended collection protocols. The analyses must be completed by a lab equipped to handle such samples. The Operator's choice of lab will be subject to consultation with the Forest Service.

Sample Labeling

Sample labels will contain the following information: name of site, month, day, year, well or surface water feature identification number, full initials of sampler, and the time using 24 hour military time which the sample was collected. This information will be recorded on the bottle, the chain of custody form, and the field book.

Chain of Custody

The Chain of Custody Form supplied by the analysis laboratory will be completed for each sampling set at the time of shipping.

Data Archives

All data from the field sampling forms and laboratory reports will be entered into a database the FS will maintain. Copies of field sampling forms will be filed electronically with the FS and the operator within 48 hours of sampling event.

Data Review

The FS will review the results of water resource monitoring annually to assess if effects have occurred, and analyze the hydrogeologic information and analyze the effectiveness of BMPs for use in other projects.

Quality Assurance/Quality Control Design

To ensure quality assurance/quality control all data will be collected using the methods set forth in this Sampling and Analysis Plan, along with associated standards.

Sample Bottle Care

All bottles used for sampling will be acquired from the analyzing laboratory. These bottles will be stored in the shipping container until use.

Safety and Health Issues

Safety of all personnel is a priority and must be considered at all times. Any hazard to health or human safety should be addressed immediately. FS employees shall conduct themselves according to standards in the USDA-FS health and Safety Code handbook (FSH 6709.11). Any applicable material safety data sheets (MSDS) will be made available to field personnel.

Field safety equipment shall include protective clothing, gloves, safety glasses, first aid kit and a cellular phone or radio. To preserve integrity of samples, personnel shall wear rubber gloves when handling water samples and preservation chemicals.

Paonia District
Field Water Monitoring Report

Note to User: All information pertinent to the field activity must be entered on this form or a comparable form with identical information. Upon completion of the day's field activities, this form shall be filed electronically with the Paonia RD Minerals Administrator and the Operator. Language must be objective, factual, and free of personal feelings or any other inappropriate terminology. This form may be modified per recommendations in the Forest Service Spring Inventory and Monitoring Protocol (in draft form as of May 2006).

Date and Time:
Personnel on site:
Weather/Climatic Conditions:
Equipment calibrated:

WATER RESOURCE INFORMATION
Check one: Well_____ Spring _____Seep_____ Wetland_____Stream_____
Location ID: _____
Description of location (includes GPS coord/sketch map of site):_____

If well:
Well data (static water level below ground surface, height of casing measurements, in feet):_____equipment used_____

Analytical sample taken? Yes or No
Sampling method (bailer, pump)
Borehole volume (gallons)_____ Quantity purged (gals)_____

Sample containers (type, size, and number):_____
Parameters to be analyzed:_____
Time of sample collection:_____
Sample identification numbers:_____

Field observations (include references to photos taken)
Field measurements pH, temperature, and conductivity:
_____
Equipment Used: _____
Comments: _____

If Seep, Spring or Stream
Analytical sample taken? Yes or No
Sample containers (type, size, and number):_____
Parameters to be analyzed:_____
Time of sample collection:_____
Sample identification numbers:_____

Field observations (include references to photos taken)
Field measurements pH, temperature, and conductivity:
_____

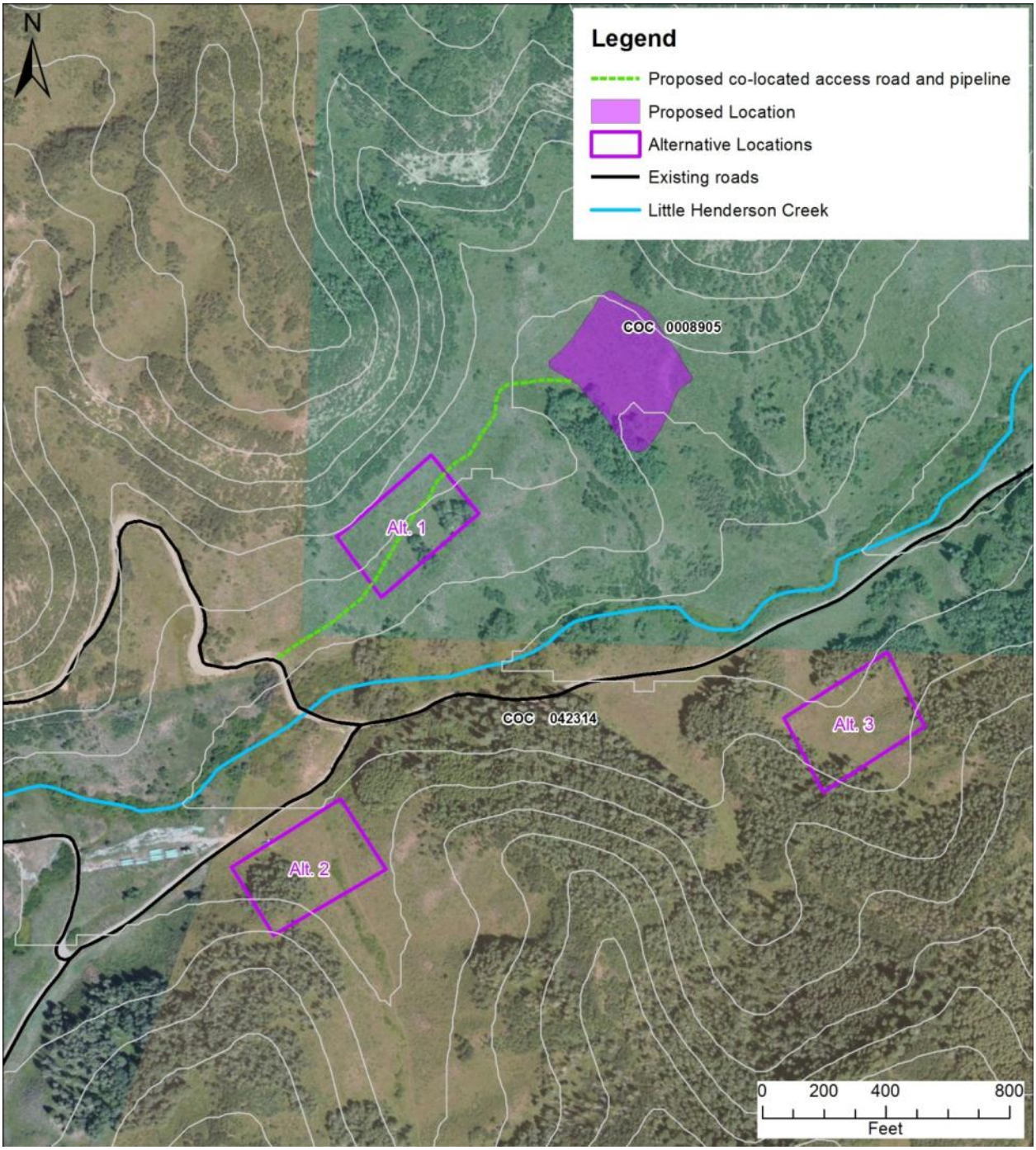
Comments: _____

Appendix B

11-90-9 #3 Proposed Gas Well - Alternative Site Analysis

The USFS received feedback from Colorado Parks and Wildlife (CPW) and members of the public during the two onsite visits and through the public scoping process indicating a request to analyze alterative pad locations for the 11-90-9 #3 well. Most of this desire was driven by concerns for elk winter range. In consideration of these comments and concerns four alternative locations were considered in this document.

Map of Alternative Sites



Alternative 1 Drill Site

This alternative location is located approximately 600 ft southwest of the proposed pad location on federal lease COC-8905. This location was brought forward as an alternative location through discussions with CPW at the onsite visits. The CPW felt that it had less of an impact on elk winter range habitat because of shortened access road length, and it would be located in an area that connected visually to other development areas. They felt the original location over the small ridge to the east might provide a better location for winter habitat being visually sheltered from other gas development and existing road infrastructure.

Moving the operation to the Alternative 1 pad would reduce the amount of road disturbance from 1/3 to 1/2 the mileage, depending on final alignment. By one metric (road density) this would be an improvement, however by considering other aspects such as pad construction it is expected that Alternative location #1 would not be substantially different than the proposed action in terms of overall disturbance, in all likelihood the footprint could be larger considering the steeper slopes and larger cut/fill profiles for the drill location. On the northwest side of the Alternative 1 site there is a steep slope, and on the southeast side there is a steep drop-off toward Little Henderson Creek. Fitting a pad in this area would require a large cut into the hillside to create a level spot for drilling.

Alternative 1 location is within 500 ft of Little Henderson Creek, whereas the proposed location is around 600 ft away.

This location was not quantitatively analyzed in HABCAP due to the minor effects shown in the model by the proposed action and the loss of meaning of measuring changes at those scales.

As indicated in the Biological Evaluation, the original proposed road/pad location as well as the Alternative 1 is between two existing Forest Service roads approximately 0.75 miles apart (NFSR 851 and NFSR 265). Both of these routes, in this portion of the forest, are all-season routes. Therefore from a big game winter range perspective the area is already affected by the existing road alignments. The proposed disturbance, as well as the Alternative 1 lie within the ½ mile disturbance buffers of the existing routes, so according to models for big game disturbance both areas are already within lands impacted by existing roads.

The most significant issue with Alternative 1 is the small patch (about 20 trees) of dead and dying aspen that would be removed because of the needed cut/fill profile of a drill pad at that location. There are a number of purple martin nests in this little grove. Purple martins are a Forest Service sensitive species, and removal of their nesting sites would be against FS policy. There are likely martins nesting in the aspen grove at the proposed pad location, although this stand has a limited number of trees large enough for martins.

View looking southeast from a ridge north of Alternative 1 location. The proposed well site is below the blue arrow. An aspen grove is visible near the arrow. It would be removed if pad placed at Alternative 1.

View within Alt. 1 pad location looking E/NE.

Martin cavity nest in small aspen grove. Several of the trees are marked as wildlife trees.

<u>Alternative 2 Drill Site</u>

The Alternative 2 well pad site I looked at lies just to the south of the 851/851.1A intersection and the Gunnison Energy laydown yard on federal lease COC-42314. There is a closed motorized trail (UT-8054) that is blocked off in this draw that heads south toward Sheep Mountain.

This location was brought forward as an alternative location discussed with CPW, as an area that is adjacent to existing disturbances (laydown area). Moving the operation to the Alternative 2 pad would eliminate and/or greatly reduce the amount of road disturbance needed, depending on final alignment. As with Alternative 1 by one metric (road density) this would be an improvement, however by considering other aspects such as pad

construction it is expected that Alternative location #1 would not be substantially different than the proposed action in terms of overall disturbance. Because the mouth of the draw narrows down considerably as one goes south up the draw, the footprint could be larger considering the larger cut/fill profiles for the drill location.

The Alternative 2 location is within 300 ft of Little Henderson Creek, whereas the proposed location is around 600 ft away.

This location was not quantitatively analyzed in HABCAP due to the minor effects shown in the model by the proposed action and the loss of meaning of measuring changes at those scales.

The Alternative 2 pad location is adjacent to an all-season route. Therefore from a big game winter range perspective the area is already affected by the existing road alignments. The proposed disturbance, as well as the Alternative 2 lie within the ½ mile disturbance buffers of existing routes, so according to models for big game disturbance both areas are already within lands impacted by existing roads.

In the bottom of the draw that there is a healthy riparian willow community suggesting that the draw carries a significant amount of water to support this vegetation. The presence of riparian habitats at this location present challenges from a lease stipulation standpoint and from a stormwater perspective.

Alt. 2 well pad site indicated by blue arrow. View looking S/SW. The draw is wide at the mouth but quickly tightens up as you head south up the draw. The ridges on either side would require a great deal of cut and fill to fit the pad even in a north south configuration.

View looking down draw at Alt. 2 site back toward 851 Road. The ridges on the east and west sides pinch the draw in quickly back from the road.

<u>Alternative 3 Drill Site</u>

The Alternative 3 well pad site analyzed lies just to the south of the NFSR 851 on federal lease COC-42314. It is approximately 1200 ft south-southeast of the proposed location.

This location was brought forward as an alternative location discussed with CPW and others at the onsite, as an area that was close to the proposed location and near NFSR 851. Moving the operation to the Alternative 3 pad would reduce the amount of road disturbance about 2/3 (totaling ~600 ft), depending on final alignment. As with Alternative 1 by one metric (road density) this would be an improvement, however by considering other aspects such as pad construction it is expected that Alternative location #3 would not be substantially different than the proposed action in terms of overall disturbance. It appears that a slightly smaller pad, oriented east-west could be fit at this location though the cut and fill would be significant. The location has a small bowl/meadow that has a draw running through it to the north. There is a ridge to the west and a slightly lower ridge to the east that would require a significant amount of leveling up the bottom of the drainage. Some spruce/fir and aspen would have to be removed on the margins of the pad.

The Alternative 3 location is within 350 ft of Little Henderson Creek, whereas the proposed location is around 600 ft away.

This location was not quantitatively analyzed in HABCAP due to the minor effects shown in the model by the proposed action and the loss of meaning of measuring changes at those scales.

The Alternative 3 pad location is adjacent to an all-season route. Therefore from a big game winter range perspective the area is already affected by the existing road alignments. The proposed disturbance, as well as the Alternative 3 lie within the ½ mile disturbance buffers of existing routes, so according to models for big game disturbance both areas are already within lands impacted by existing roads.

View from NE corner of Alt. 3 site looking west. Ridge on west side of pad visible. Photo taken from gentle ridge on east side of site.

View from NE corner of site looking back to SW. Topography is not severe but would be difficult from a cut and fill standpoint. Some aspen and spruce/fir would be removed if pad constructed here.

Discussion

In weighing the environmental consequences of the proposed location versus the alternative locations the USFS must consider a wide range of resource concerns. Gas development is a long term disturbance; pad locations and access roads can be expected to be on the ground for decades. Therefore the proper placement of these facilities on the landscape is crucial for balancing land management goals.

Overall surface disturbance, wildlife concerns, proximity to streams, and scenic integrity are the resources most heavily weighted in this particular analysis. These issues were considered for each location in addition to fulfilling the purpose and need of the leaseholder.

Surface Disturbance

Because of the need for a larger, multiple-well drill pad and the general topography of the area, surface disturbances can fluctuate greatly depending on placement.

Although engineered cut/fill diagrams were not generated for alternative locations, by examining the slope profile of the sites one can see topographic differences easier than that on the topographic map (see Map of Percent Slope below). The boundary for the Proposed Location is from an engineered drawing showing maximum extent of disturbance (including cut and fill slopes). The boundaries of the Alternative locations are roughly 300 x 400 ft square, the actual disturbance areas although not calculated, would be larger than what is shown on the maps.

All pad locations contain areas with 20-40% slope. Alternative pad locations 1 and 2 both contain, and are adjacent to, areas with 40% slope and greater. By examining the topographic and slope differences, once can conclude that the Proposed Location and Alternative 3 location would require the least amount of disturbance with respect to constructing the pad location. It is important to note however that because of stability, the cut slopes are typically laid back at a 2:1 slope. Because of the terrain, the Alternative 3 location would have a larger area of disturbance overall than the Proposed Location.

With respect to road construction, Alternatives 2 and 3 have the least amount of disturbance required for access. The Proposed Location has the longest access route requirements.

With respect to the proposed placement and use of the surface polyline, all alternatives have no discernible advantage or disadvantage.

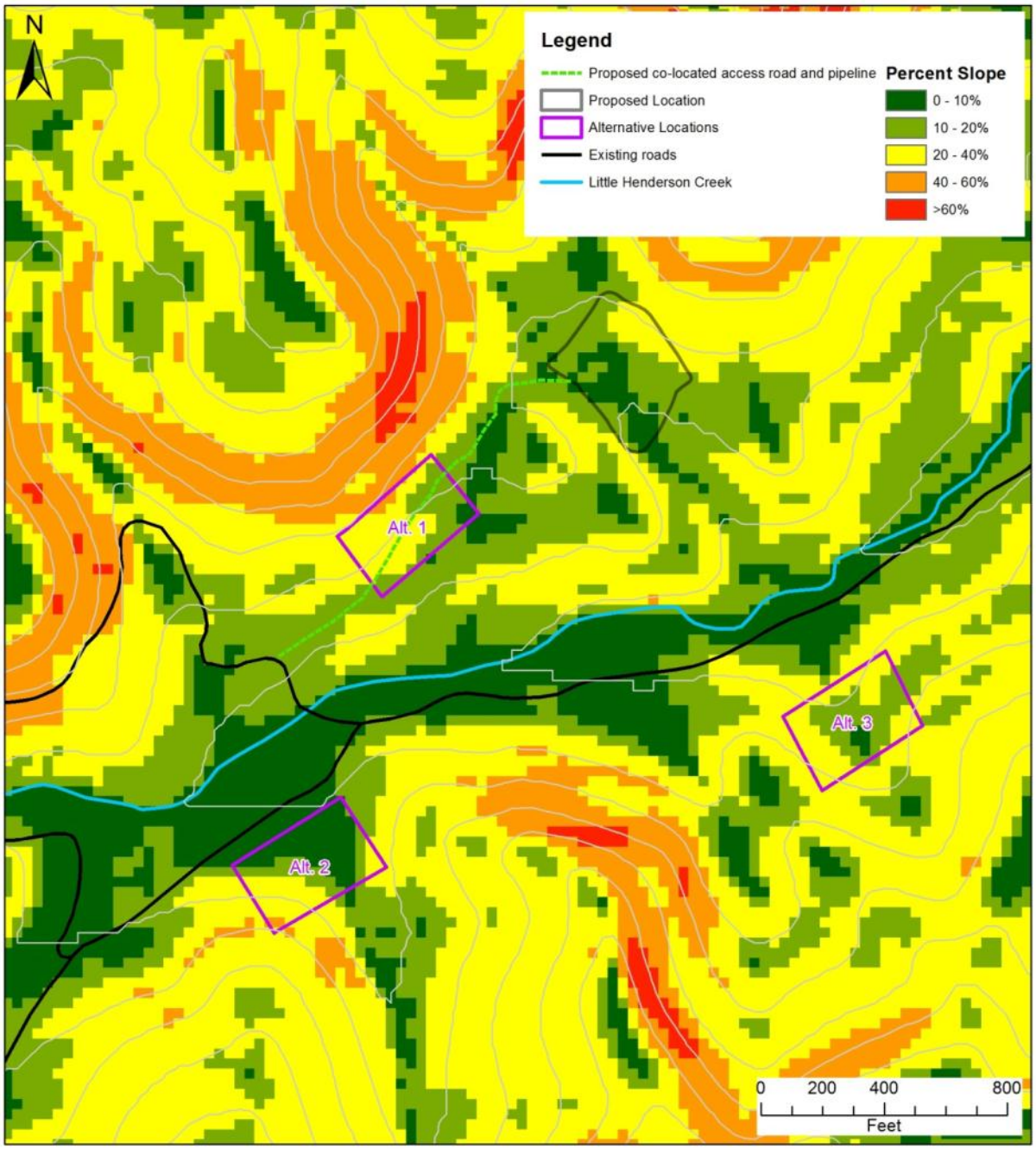
Wildlife Concerns

All locations and access roads are located within a Big Game Winter Concentration Area. In accordance with comments submitted by CPW, the GMUG quantitatively compared the proposed location with identified Alternatives. As suggested, we used impact buffers from Hebblewhite (2008) (1131 m for roads, and 1125 m for pads) for our analysis. The follow table compares the relative impact acreages from each alternative.

Acreage of Big Game Habitat Impact by Alternative

Name	Acres of impact
Proposed Location	1307
Alternative 1	1151
Alternative 2	1101
Alternative 3	1122

Map of Percent Slope

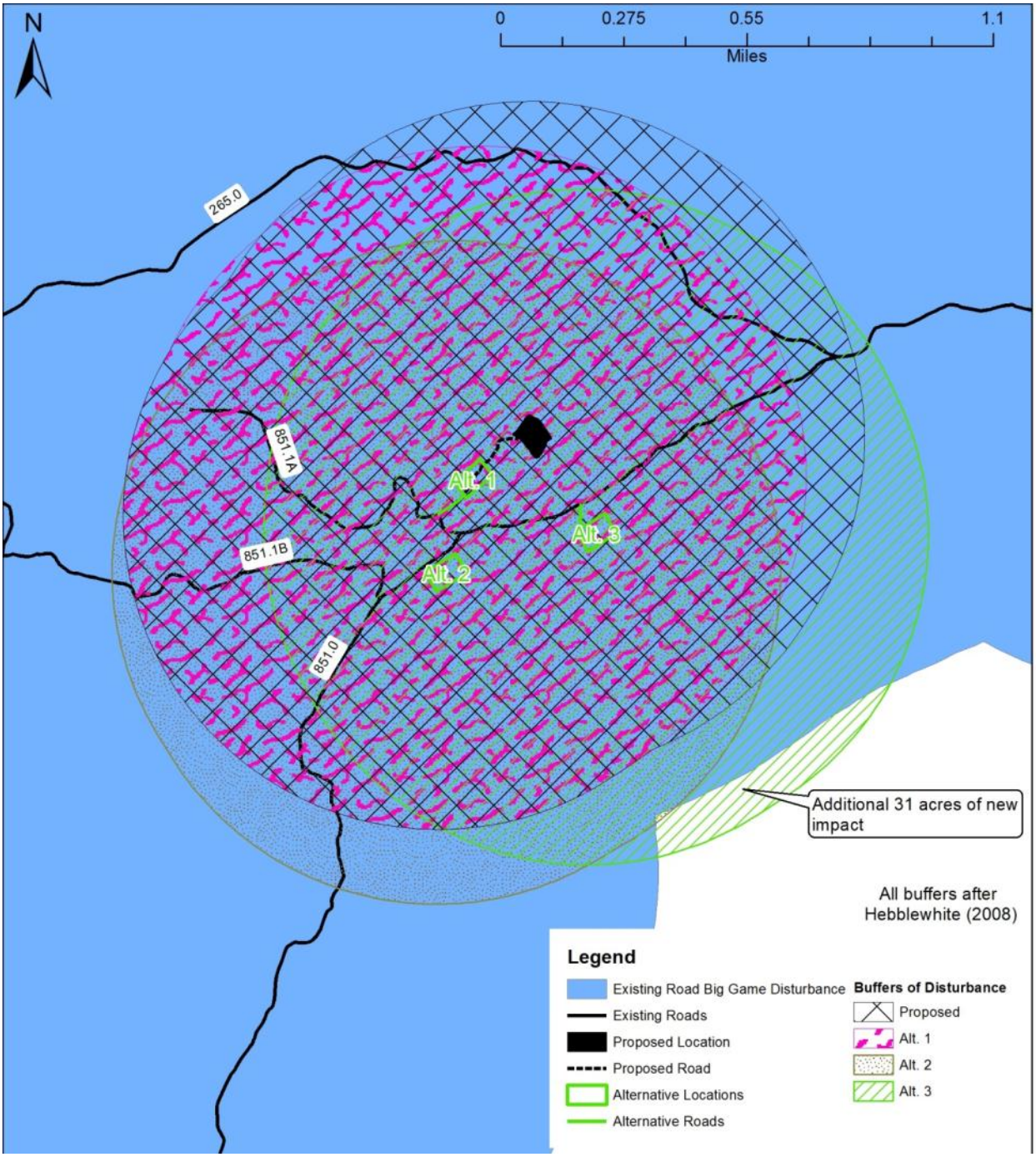


Relatively speaking, Alternative 2 because of lack of access road construction would impact the least amount of big game habitat. Conversely, the Proposed Location and associated access road impacts the greatest amount of area.

Upon further consideration however, when existing road infrastructure is taken into account and using the same model, the majority of the area is already negatively impacted by existing conditions (see Map of Impacted Area by Alternative using Buffers below). Using Hebblewhite (2008), the Proposed Location and Alternative 1 are the only scenarios that would not add to the existing impacted area.

Other than big game winter range, the other major wildlife concern in the area is purple martin colonies. Purple martins are a Forest Service sensitive species. Active purple martin nests have been identified in

Map of Impacted Area by Alternative using Buffers from Hebblewhite, 2008



the aspen grove within the area identified as Alternative 1. There are likely martins nesting in the aspen grove at the proposed pad location, although this stand has a limited number of trees large enough for martins. No purple martin nesting has been identified at the Alternative 2 or 3 locations.

Proximity to Streams

The distance between well operations and live stream courses is a concern do to the potential for spills, contamination, and stormwater controls. The following table list the approximate distances from the Alternative Pad locations and Little Henderson Creek.

Distance from Well Pad to Little Henderson Creek

Name	Distance to Creek (~ft)
Proposed Location	600
Alternative 1	500
Alternative 2	300
Alternative 3	350

Scenic Integrity

With respect to visibility, all well pad alternatives will be able to be seen via NFSR 851. The Proposed Location and Alternative 3 offer the best opportunities for screening, however it is unlikely that construction could take place without some part of the disturbance being visible. Current Forest Planning documents have identified this area as having a Scenic Integrity Objective of Moderate, which is defined as: *landscapes where the valued landscape character "appears slightly altered." Noticeable deviations must remain visually subordinate to the landscape character being viewed".*

Gas activities at any of the alternative locations will meet this definition.

Other Considerations

SG Interests proposed activities in the original location with the intent of drilling and producing gas via a horizontal wellbore from zones under federal gas lease COC-8905, COC-42314, and COC-13483 (see Map of Generalized Drilling Profile below). In considering the placement of the Alternative locations, only Alternative 1 could provide access via one well bore to produce from all three leases. In drilling one gas well, Alternatives 2 and 3 would not be able to reach reserves under COC-8905.

It is reasonable to assume that if Alternative 2 or 3 were selected, it would require the construction of an addition pad or the drilling of an additional well, in order to produce from the same number of leases, when compared to the Proposed Location or Alternative 1.

Conclusion

With respect to impacts to big game winter range, considering existing infrastructure, it is difficult to conclude that there is any quantitative difference between the Proposed Location and any of the Alternatives. With respect to purple martins, selection of Alternative 1 has the most negative impact; selection of the Proposed Action and the other Alternatives would be more in line with NFS policies on sensitive species.

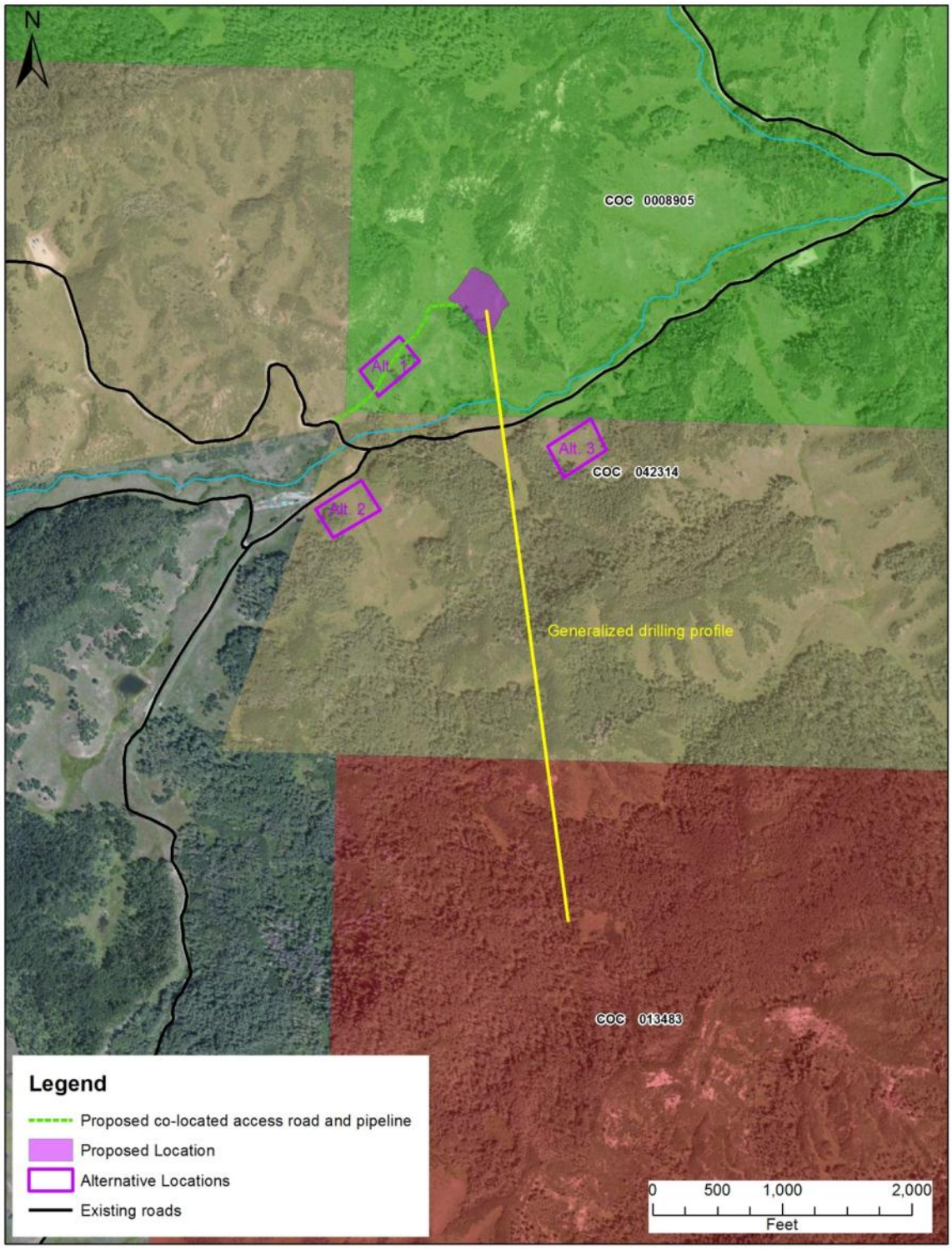
Regarding surface disturbance of the pad location, the Proposed Location is located in an area that is the most level. The other Alternative locations all have relatively higher degree of slope and would require a larger amount of cut and fill to properly stabilize slopes.

Considering potential for spills and contamination, the Proposed Location has the greatest amount of buffer between drilling operations and live water.

The two sites that would allow for the maximum amount of resource recovery from all three leases, for the least amount of surface disturbance are the Proposed Location and Alternative 1.

Considering all the resource concerns noted above, the overall best choice for a pad location is the original Proposed Location.

Map of Generalized Drilling Profile



Appendix C

Air Quality – SG Interests 11-90-9 #3

Land management and development activities both on and off federally managed lands can potentially affect air quality on USFS lands. Air pollution is transient and can be transported over long distances, with a potential to contribute to effects over a large area. Air pollutants of concern include fine particulate matter, nitrogen oxides, sulfates, volatile organic compounds, and carbon monoxide. Elevated concentrations of these pollutants can adversely affect human health, reduce visibility, cause acidic deposition in sensitive, high-elevation lakes and contribute to the formation of ground level ozone.

Local emission sources of these pollutants on and off federally managed lands include highway vehicles, wildland fires, slash burning, wood burning stoves, and industrial facilities, including those associated with oil and gas exploration and development. It is these latter emission sources that currently dominate air quality concerns in the Western Slope Region of Colorado.

Legal Framework

The Clean Air Act, passed in 1970 and amended in 1977 and 1990, requires the Environmental Protection Agency (EPA) to set standards for air pollutants to protect the public health and welfare. The standards, known as National Ambient Air Quality Standards, limit the amount of these pollutants that can be present in the atmosphere. The EPA has set standards for six common pollutants known as "criteria" air pollutants-ozone (O_3), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), lead (Pb), and carbon monoxide (CO). There are standards for two categories of particulate matter-one for suspended particles less than 10 micrometers in diameter (PM_{10}) and one for fine particles less than 2.5 micrometers in diameter ($PM_{2.5}$). Primary standards are designed to protect public health, while secondary standards are designed to protect public welfare. These standards are shown in Table C1. Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb) by volume, and micrograms per cubic meter of air ($\mu g/m^3$).

Air Quality

The project area is located in Gunnison County, and is within the Mountain Counties Region for air quality planning (Colorado Department of Public Health and Environment – CDPHE, 2010). The Mountain Counties Region includes counties that generally are on or near the Continental Divide.

Air quality impacts from pollutant emissions are limited by regulations, standards, and implementation plans established under the Federal Clean Air Act, as administered by the CDPHE under authorization of the U.S. Environmental Protection Agency (EPA). Under the Federal Land Policy and Management Act (FLPMA) and the Clean Air Act; Federal agencies cannot conduct or authorize any activity which does not conform to all applicable local, state, tribal or federal air quality laws, statutes, regulations, standards, or implementation plans.

As such, significant impacts to air quality from project-related activities would result if it is demonstrated that:

- National Ambient Air Quality Standards (NAAQS) or Colorado Ambient Air Quality Standards (CAAQS) would be violated;
- Class I or Class II Prevention of Significant Deterioration (PSD) Increments would be exceeded;

- Concentrations of hazardous air pollutants or other toxic air pollutants are predicted to be above designated thresholds;
- Air Quality-Related Values (AQRVs) would be impacted beyond acceptable levels such that:
    - The project would contribute to visibility impacts that would exceed 1.0 deciview (dv) change at a Class I area,
    - Changes in nitrogen or sulfur deposition would exceed the Level of Concern (LOC)
    - Changes in lake acid neutralizing capacity are predicted to be above the Limit of Acceptable Change (LAC)

The CAAQS and NAAQS are health-based criteria for the maximum acceptable concentrations of air pollutants at all locations to which the public has access. Although specific air quality monitoring has not been conducted within the project area, all of Gunnison County is designated as "attainment" by the CDPHE for all criteria pollutants (CDPHE, 2010). Criteria pollutants for which CAAQS and NAAQS exist include carbon monoxide (CO); nitrogen dioxide (NO_2); ozone (O_3); particulate matter less than 10 microns in effective diameter (PM_{10}); particulate matter less than 2.5 microns in effective diameter ($PM_{2.5}$); sulfur dioxide (SO_2); and lead (Pb).

Table C1. National Ambient Air Quality Standards

Pollutant [final rule cite]	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]	primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]	primary and secondary	Rolling 3 month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]	primary	1-hour	100 ppb	98th percentile, averaged over 3 years
	primary and secondary	Annual	53 ppb (2)	Annual Mean
Ozone [73 FR 16436, Mar 27, 2008]	primary and secondary	8-hour	0.075 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution [71 FR 61144, Oct 17, 2006] $PM_{2.5}$	primary and secondary	Annual	15 µg/m^3	annual mean, averaged over 3 years
		24-hour	35 µg/m^3	98th percentile, averaged over 3 years
PM_{10}	primary and secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010]	primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
[38 FR 25678, Sept 14, 1973]	secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m3 as a quarterly average) remains in effect until one year after an area is

Pollutant [final rule cite]	Primary/ Secondary	Averaging Time	Level	Form

designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
(2) The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.
(4) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.
(5) The Colorado state standard for sulfur dioxide requires that the concentration shall not exceed 0.267 ppm over a 3-hour period more than once in any twelve-month period (http://www.cdphe.state.co.us/regulations/airregs/5CCR1001-14.pdf)

Unlike most other criteria pollutants, ozone is not emitted to the atmosphere directly; it is formed when nitrogen oxides and volatile organic compounds react in the presence of sunlight. In general, ozone concentrations in the lower atmosphere are highest during warmer months and lower in the cooler months. In some parts of the western U.S., high winter-time ozone concentrations have been monitored. The project area is not in an airshed with monitored high winter-time ozone concentrations. The chemical reactions that form ozone are complicated and nonlinear, making it difficult to predict ozone concentrations that will result from increasing the amount of the ozone precursors (i.e., nitrogen oxides and volatile organic compounds) in the atmosphere. The effect of adding nitrogen oxides or volatile organic compounds to the atmosphere on the concentration of ozone depends upon the ratio of the two precursors already present. Ozone formation is also highly dependent on meteorological conditions, including temperature, wind speed, and solar radiation. Ozone in the lower atmosphere is harmful to human health and vegetation. Some fine particulates ($PM_{2.5}$), particularly ammonium sulfate and ammonium nitrate particles, can also be formed in the atmosphere from the interaction of either SO_2 or nitrogen oxides and ammonium. These types of $PM_{2.5}$ particles are referred to as secondary particulates, while particles emitted directly from a source are referred to as primary particulates.

Fine particulate matter ($PM_{2.5}$) is chiefly comprised of five mass types: organic mass, elemental carbon (also known as soot or black carbon), ammonium sulfates, ammonium nitrates, and crustal materials (i.e., soil). Primary fine particulate emissions result from combustion processes (including fossil fuel combustion and biomass combustion that occurs in wild fires) and include black carbon. In general, however, black carbon and crustal materials comprise a relatively small proportion of the fine particulate mass suspended in the atmosphere. The largest constituents of fine particulate are usually organic mass, ammonium nitrates, and ammonium sulfates.

The Clean Air Act contains provisions for protection of air quality in areas that are meeting the ambient air quality standards. This is known as the prevention of significant deterioration (PSD) program. Under this program, areas of the country are designated as Class I, Class II, or Class III. Class I areas are defined as areas of special national or regional natural, recreational, or historic value. The Act established mandatory federal Class I areas including wilderness areas over 5,000 acres in size and national parks over 6,000 acres in size that were in existence in 1977. These areas receive special protection under the Act. All other areas of the country have been designated as Class II. An area's classification determines the maximum amount of additional air pollution, called an increment, that can be added beyond a baseline value. Increment consumption analysis falls under the PSD major sources permitting program, which is administrated by the Colorado Air Pollution Control Division. Only small amounts

of pollution can be added in Class I areas, while Class II areas permit moderate amounts of pollution to be added. Larger amounts of pollution can be added to Class III areas, but there are as yet no areas in the country designated Class III.

Class I Air Quality Protection

The Clean Air Act outlines different levels or classes of air quality protection. Class I areas have the most stringent degree of protection from current and future air quality degradation. Within the geographic scope of analysis there are five Class I areas and one Class II area as described in Table C2 below.

Table C2. Class I and Sensitive Class II Areas

Sensitive Area	Federal Land Manager	PSD Designation	Distance from Project (miles)
Black Canyon of the Gunnison NP	National Park Service	I	44.1
Flat Tops WA	U.S. Forest Service	I	36.6
Eagles Nest WA	U.S. Forest Service	I	69.4
West Elk WA	U.S. Forest Service	I	31.2
Maroon Bells-SnowmassWA	U.S. Forest Service	I	24.1
Raggeds WA	U.S. Forest Service	II	22.5

Under the Clean Air Act's PSD provisions, the Forest Service has "…an affirmative responsibility to protect the air quality- related values (including visibility)…" within a Class I area it manages. As part of this responsibility, the Forest Service and National Park Service monitor air quality related values (AQRV's) in several Class I areas in the vicinity of the project area. The Wilderness Act (1964) directs the Forest Service to preserve and protect the natural condition of designated wilderness areas, including the intrinsic wilderness value of air quality in all Wilderness Areas. Class II wilderness areas in Colorado are given similar air quality protections under the Wilderness Act and Colorado Clean Air Act.

Table C3 identifies the levels of acceptable change for these areas (Federal Land Manager's Air Quality Related Values Workshop (FLAG) Phase I Report, December, 2000.
The Grand Canyon Visibility Transport Commission (GCVTC), created by Congress in 1991, advises the EPA on strategies for protecting visual air quality in national parks and wilderness areas on the Colorado Plateau.

The EPA's Regional Haze Regulation specifies that states must establish goals to improve visibility to natural background conditions in Class I areas.

Grand Mesa, Uncompahgre, and Gunnison National Forest's (GMUG) Land and Resource Management Plan, as amended 1991. Direction specific to air resource management states the following: "Comply with state and federal air quality standards."

Other resources can be found at FSM 2580.

Table C3. Levels of Acceptable Change (LAC)*

AQRV	Concern Threshold (LAC)
Visibility	
	Effects greater than or equal to 0.5 deciview (5% change in extinction)
	Effects greater than or equal to 1.0 deciview (10% change in extinction)
Water	1 ueq/liter reduction in acid neutralizing capacity in lakes with ANC <= to 25
	10% reduction in acid neutralizing capacity in lakes with ANC>25
	No change for lakes with ANC <=0
*from: http://www.fs.fed.us/r6/aq/natarm/r2/class1r2.htm	

In Colorado, authority to issue construction permits that allow sources to emit air pollutants has been delegated by the Environmental Protection Agency to the state. Stationary sources are classified as major or minor, depending on the amount of pollutants emitted. In general, a construction permit is required for a facility with uncontrolled actual emissions of any criteria pollutant equal to or greater than the amounts listed in Table C4:

Table C4. Colorado Minor Source Permitting Limits for Attainment Areas

Criteria Pollutant	Attainment Area uncontrolled actual emissions in tons per year
volatile organic compounds	5
PM_{10}	5
Total Suspended Particulates	10
Carbon Monoxide	10
Sulfur Dioxide	10
Nitrogen Oxides	10
Lead	200 pounds per year
*other Criteria Pollutants	2

* * Other criteria pollutants include: fluorides, sulfuric acid mist, hydrogen sulfide, total reduced sulfur, reduced sulfur compounds, and municipal waste combustor emissions. (Source: http://www.cdphe.state.co.us/ap/conperm.html #New or Modified)

In addition, the state can issue ambient air quality standards that are at least as stringent as the national standards. The state tracks the PSD increments in its Class I and Class II areas as part of its permitting program and is responsible for ensuring that the increments are not exceeded.

The Clean Air Act amendments of 1977 set a national goal of preventing future and remedying any existing impairment to visibility in Class I areas that is caused by man-made pollution. The EPA promulgated the Regional Haze Rule in order to meet this goal. Visibility is a measure of not only how far one can see, but how well one can see important characteristics of the landscape such as form, color, geologic features, and texture. Visibility impairment is caused by the scattering of light by gases and particles in the atmosphere. Man-made pollution

results in the addition of very small particles to the atmosphere, resulting in haze. A monitoring network was established by the Interagency Monitoring of Protected Visual Environments (IMPROVE) program to measure atmospheric particulate concentrations near Class I areas. The Regional Haze Rule requires states to develop and implement plans to improve visibility in Class I areas in order to achieve "natural" visibility levels within a 60- year period.

Air pollutants that may cause cancer or other harmful effects such as birth defects are classified as hazardous air pollutants (HAPS). EPA is required to control emissions of 187 such hazardous air pollutants. Examples of hazardous air pollutants include benzene, which is found in gasoline; perchlorethlyene, which is emitted from some dry cleaning facilities; and methylene chloride, which is used as a solvent and paint stripper by a number of industries (http://www.epa.gov/ttn/atw/allabout.html). EPA has issued rules requiring that facilities belonging to 96 different classes meeting emissions standards for hazardous air pollutants in order to reduce these emissions. Hazardous air pollution emissions standards can be found on the EPA's web site (http://www.epa.gov/ttn/atw/mactfnlalph.html) as well as information on progress that has been made on reducing toxic emissions (http://www.epa.gov/ttn/atw/allabout.html#progress).

Air quality in the area is generally good. Areas that meet federal ambient air quality standards are classified as being in attainment, while areas not meeting standards are classified as being in nonattainment. On April 30,2012, the EPA finalized its ozone nonattainment designations with respect to the 2008 ozone standard (http://www.epa.gov/airquality/ozonepollution/designations/2008standards/final/region8f.htm). EPA identified only one nonattainment area in Colorado for ozone that includes part or all of Denver, Adams, Arapahoe, Boulder, Broomfield, Douglas, Jefferson, Larimer, and Weld counties (roughly the Denver-Boulder-Greeley-Fort Collins metropolitan areas; http://www.epa.gov/oaqps001/greenbk/ancl.html). This area is located along the Front Range approximately 110 miles to the east of the project area. EPA has not identified any current nonattainment areas in Colorado for any of the other criteria pollutants.

Colorado maintains a network of monitors that track compliance with ambient air quality standards. Most of the monitors are located in the eastern half of the state, particularly along the more urban Front Range. Western Colorado, by comparison, is relatively sparsely populated, and there are no monitors in the immediate vicinity of the proposed well site. In addition to the state monitors, the EPA maintains a network of rural monitors known as the Clean Air Status and Trends Network (CASTNET). In addition several non-EPA monitors are also located across the west, the USFS Rocky Mountain Research Station operates an ozone monitor near McClure pass, operational since 2010, the 2011 average 8-hr measurement at that location was 0.04778 ppm ozone, and a 1st and 2nd max of 0.06 ppm, which is under the limits. Table C5 shows the maximum monitored values by county for selected locations in the western portion of the state for 2009-2011. Not every county has monitoring, and counties that do have monitors do not necessarily have monitoring for all criteria pollutants. While these monitors cannot provide information regarding air quality in the immediate vicinity of the mine, they do provide insight into regional air quality conditions. There are no SO_2 monitors located in the selected counties. The table indicates exceedances of the $PM_{2.5}$ 24-hour standard in Mesa County for 2009 and 2010, but the 3-year average value ending in 2011 indicates that the 24-hour standard was met. The Mesa County monitor is located in Grand Junction, approximately 60 miles from the project area. One ozone exceedance occurred in 2011 in La Plata County at a monitor located roughly 110 miles from the project area. No other exceedances of ambient air quality standards are noted in the table. An exceedance occurs whenever an individual measurement is recorded that is above the level of the standard, but as the standards are generally defined as an average of several

values, an individual exceedance does not necessarily indicate a violation of an ambient air quality standard. None of the listed monitors indicates a violation of any ambient air quality standard.

Table C5. Air Pollutant Monitoring Results for Selected Counties in Western Colorado.

County	CO 2nd Max 1-hr (ppm)	CO 2nd Max 8-hr (ppm)	NO_2 98th Percentile 1-hr (ppb)	Ozone 2nd Max 1-hr (ppm)	Ozone 4th Max 8-hr (ppm)	$PM_{2.5}$ 98th Percentile 24-hr ($\mu g/m^3$)	$PM_{2.5}$ Weighted Mean 24-hr ($\mu g/m^3$)	PM_{10} 2nd Max 24-hr ($\mu g/m^3$)	PM_{10} Mean 24-hr ($\mu g/m^3$)
2009									
Delta								58	25
Garfield				0.07	0.062			71	25
Gunnison								86	27
La Plata	1.4	0.9	47	0.08	0.071	12	4.4	40	20
Mesa	2.3	2.2		0.07	0.064	41	9.6	122	31
Montezuma				0.08	0.069	15	6.8		
San Miguel								72	18
2010									
Delta								115	23
Garfield				0.07	0.066			55	26
Gunnison								92	24
La Plata	1.2	0.7	39	0.08	0.074	11	4.3	88	21
Mesa	1.7	1.1		0.08	0.068	37	9	131	28
Montezuma				0.08	0.066	13	6	.	.
San Miguel								52	15
2011									
Delta								48	21
Garfield				0.07	0.066			73	21
Gunnison				0.07	0.064			74	24
La Plata	1.3	0.7	38	0.08	0.077	12	4.5	50	18
Mesa	1.8	1.1		0.08	0.068	22	7.1	54	25
Montezuma				0.08	0.071	15	6.1		
San Miguel								61	16

Source: http://www.epa.gov/airdata/ad_rep_con.html

One exceedance of the PM_{10} 24-hour standard occurred at a monitor in Grand Junction, in Mesa County, in 2010 that is not reflected in Table 3.3c. A large regional wind and dust event occurred on the day of the exceedance, with exceedances recorded at other locations in western Colorado including Durango, Crested Butte, Rifle, and Clifton. The Colorado Air Pollution Control Division has therefore requested EPA to flag this day as an exceptional event (personal communication, Debra Miller, USFS, with Bradley Rink, Particulate Matter Monitoring Lead, Colorado Air Pollution Control Division, 11 July 2012). Exceptional events are defined as "unusual or naturally occurring events that can affect air quality but are not reasonably controllable using techniques that tribal, state or local air agencies may implement in order to attain and maintain the National Ambient Air Quality Standards" (http://www.epa.gov/ttn/analysis/exevents.htm). A day that is determined by EPA to qualify as an exceptional

event is not used to determine whether a violation of the ambient air quality standard has occurred, and therefore the 2010 exceedance that occurred at the Grand Junction monitor is not shown in the table above.

The closest Class I areas to the mine are the Black Canyon of the Gunnison National Park, roughly 35 miles away, and the West Elk Wilderness, which is about 20 miles from the proposed pad. The State of Colorado prepared a state implementation plan for visibility as required under the EPA's Regional Haze Rule that documents the steps the state will take in order to meet the national goal of achieving natural visibility conditions in its Class I areas by 2064(*Colorado Visibility and Regional Haze State Implementation Plan for the Twelve Mandatory Class I Federal Areas in Colorado*, Colorado Air Pollution Control Division, January 7, 2011, http://www.cdphe.state.co.us/ap/regionalhaze.html).

The plan also included the results of detailed modeling analyses that examined the impacts of regional emissions sources, including those in Colorado, to visibility in all Class I areas in the state. The state developed emissions inventories that examined current emissions (as of 2002) as well as projected emissions through 2018 to evaluate the progress that would be made by 2018 toward the visibility goal.

Air pollutants can be deposited through precipitation (such as rain or snow) or by dry settling processes to surfaces on the ground such as soils and water bodies. Deposition of some types of pollutants, particularly nitrogen and sulfur compounds (e.g., nitrate and sulfate), can lead to acidification of lakes and streams. Acidification of surface waters can negatively affect aquatic organisms such as zooplankton, algae, diatoms, invertebrates, amphibians, and fish. Nitrogen can cause other ecosystem impacts by fertilizing both soils and water. These excess inputs of nitrogen can disrupt the natural flora and fauna by allowing certain species that would not naturally occur in abundance to out-compete those that thrive in pristine nitrogen-limited systems. The end result is an unnatural shift in species composition for sensitive species, which may have a subsequent impact on other components of the ecosystem.

The chemistry of wet precipitation (rain and snow) is monitored by the National Atmospheric Deposition Program (NADP), an interagency organization that maintains a network of samplers located across the country. The nearest NADP monitor to the West Elk Mine is located near Gothic, approximately 25 miles to the east of the mine. Figures C5 and C6 show trend plots of nitrate and sulfate concentrations in wet deposition as measured by the Gothic NADP wet deposition monitor. As indicated on the plots, some years (2006, 2008, 2009, 2010) did not meet the NADP program's completeness criteria, but the trends suggest that concentrations of nitrate and sulfate have decreased somewhat since monitoring began in 1999. Figure C7 shows trends in inorganic wet nitrogen (N) deposition (where the amount of nitrogen is the sum of nitrogen from nitrate and ammonium in wet deposition). It is important to note that measured wet deposition (as opposed to the concentration of a substance in precipitation) is influenced by the amount of precipitation that occurs, and thus the trend in nitrogen deposition may not reflect trends in the amount of a substance that is present in the atmosphere. However, the plot does show that for years with complete data the deposition of nitrogen at Gothic varied from approximately 1 to 1.5 kilograms per hectare. The National Park Service has set a critical load for nitrogen deposition for Rocky Mountain National Park, located in the Front Range northwest of Denver, of 1.5 kilograms per hectare per year (http://www.nature.nps.gov/air/Studies/criticalloads/criticalLoadExplain.cfm). A critical load is a level of deposition below which significant harmful ecosystem effects are not known to occur. As the mountainous terrain and sensitive alpine areas found near Gothic (such as the West Elk Wilderness) are similar to those found

in Rocky Mountain, this suggests that present levels of nitrogen deposition are not likely to be a problem in the area. No critical load for sulfur deposition has been established by a federal land manager in Colorado.

Figure C5. Annual trends in nitrate (NO3) concentrations in wet deposition collected by the Gothic, Colorado (CO10) National Atmospheric Deposition Program monitor.

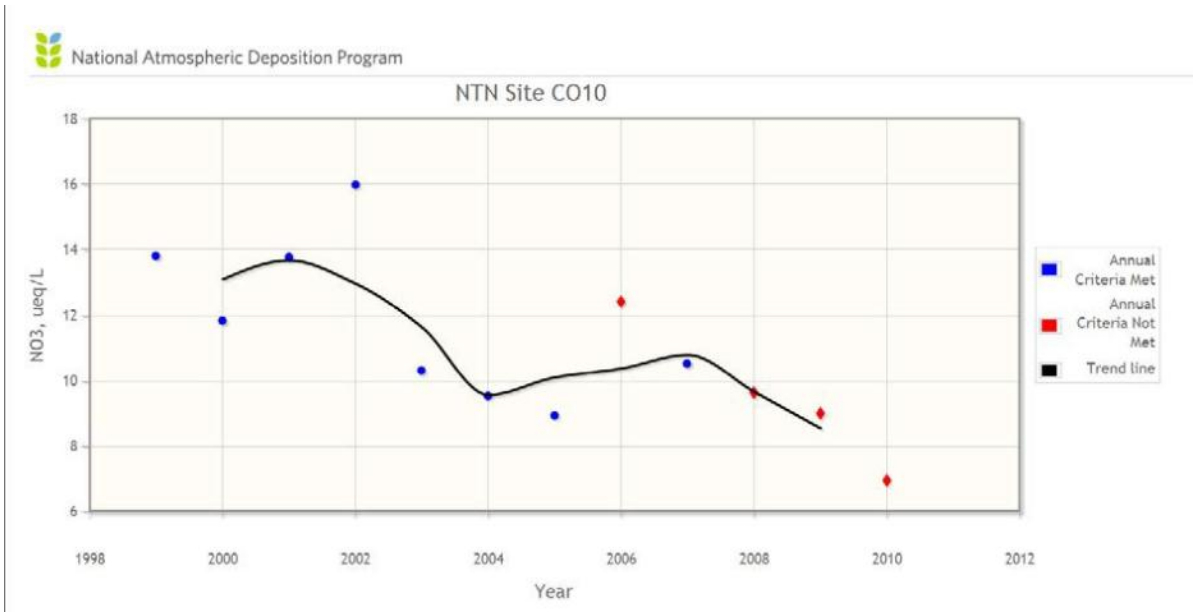


Figure C6. Annual trends in sulfate (SO4) concentrations in wet deposition collected by the Gothic, Colorado (CO10) National Atmospheric Deposition Program monitor.

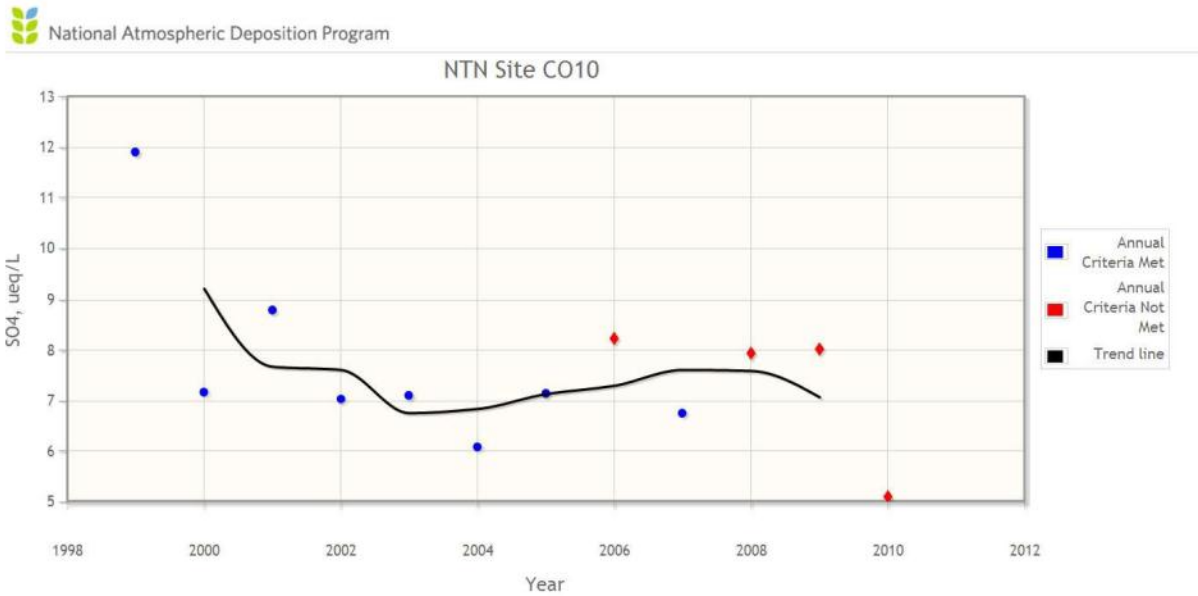
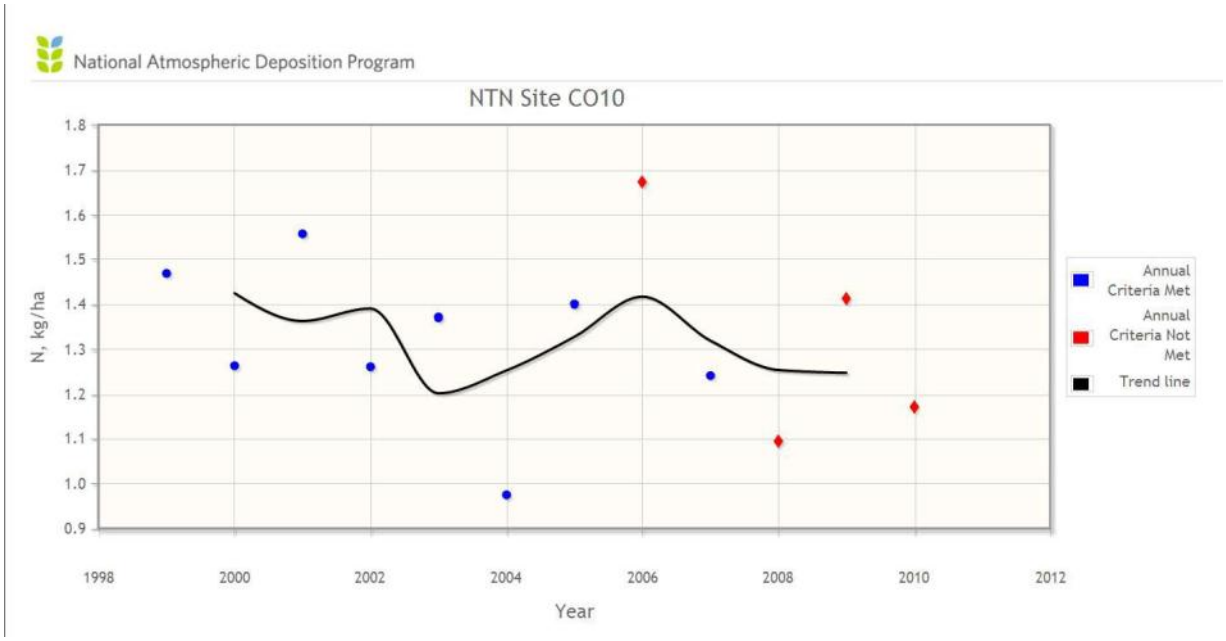


Figure C7. Annual trends in nitrogen (N) wet deposition as measured by the Gothic, Colorado (CO10) National Atmospheric Deposition Program monitor.



Plot notes (applicable to Figures 3.3a-3.3c):

The annual weighted mean concentrations and depositions are characterized as meeting or not meeting the NADP's data completeness criteria for the 1-year period.

1.Valid samples for 75% of the time period

2.Valid samples for 90% of the precipitation amount

3. Precipitation amounts for 75 % of the time period

Trend line

The trend line is a smoothed 3-year moving average with a one-year time step. The line is only displayed where the minimum data completeness criteria is met for the 3-year period.

Source: http://nadp.sws.uiuc.edu/sites/siteinfo.asp?net=NTN&id=CO10

Emissions of air pollutants in the region surrounding the mine result from industrial sources, smoke from prescribed and wildfire, mobile sources such as trains and vehicles, off-road vehicles, wind-blown dust from areas of exposed soil such as fields and unpaved roads, road construction, and other activities. State emissions data for Gunnison and Delta counties for 2008 are given in Table C8 below.

Table C8. 2008 Emissions Inventory by Source Category for Gunnison and Delta Counties, Colorado, in tons.

Source	*Delta County*						*Gunnison County*					
	Benzene	**CO**	**NO2**	**PM10**	**SO2**	**VOC**	**Benzene**	**CO**	**NO2**	**PM10**	**SO2**	**VOC**
Agricultural Tilling				270.88						0.79		
Aircraft	0.65	288.03	1.56	5.67	0.24	27.07	0.22	121.58	4.17	2.33	0.48	9.39
Biogenic		2040.81	232.53			16546.90		2681.08	192.99			20474.30
Combustion	0.00	231.14	47.37	5.12	15.18	9.91	0.00	29.73	19.55	0.62	1.82	1.81
Construction				367.98						400.97		
Forest and Agricultural Fires	4.62	1051.06	34.90	130.29	7.88	61.39	16.42	3389.85	89.51	469.02	28.64	218.40
Non Road	7.22	1206.47	248.62	27.57	0.77	270.94	16.57	2097.71	275.42	39.32	0.84	664.81
Oil Gas Area		4.97	0.11	0.00		0.57		23.23	20.36	2.21	0.44	54.92
Oil Gas Point							2.81	131.56	147.24	0.97	0.07	84.79
Pesticides						27.52						13.48
Point Source	0.13	0.86	6.09	378.17	0.19	17.27	1.10	38.06	36.05	215.46	0.92	60.71
Portables	0.03					10.49	0.05					15.03
Railroad	0.02	22.14	224.75	5.58	12.80	8.37	0.01	8.22	83.43	2.07	4.75	3.11
Refueling	0.15					14.55	0.11					10.77
Restaurants	0.13	2.94	0.02	7.93	0.02	7.33	0.06	1.44	0.01	3.88	0.01	3.59
Road Dust				961.00						1229.75		
Solvents						116.38						57.25
Structure Fires		1.91	0.04	0.34		0.35		0.93	0.02	0.17		0.17
Surface Coating						89.46						52.22
Tank Trucks	0.00					0.33	0.00					0.29
Vehicles	14.53	5027.39	745.32	30.95	5.80	461.62	11.49	3830.83	537.35	21.50	3.95	365.69
Wood burning	18.52	2254.55	30.50	312.36	4.73	435.96	9.17	1115.69	15.09	154.58	2.34	215.74
Total	**46.00**	**12,132.27**	**1,571.84**	**2,503.85**	**47.61**	**18,106.41**	**58.01**	**13,469.91**	**1,421.20**	**2,543.65**	**44.28**	**22,306.46**

(Source: http://www.colorado.gov/airquality/inv_maps_2008.aspx)

Air Quality Environmental Consequences

Emissions

Air quality effects from the project would result from short term and long term pollutant emissions. Short term fugitive dust (PM 10 and PM 2.5) emissions and associated vehicle and equipment exhaust would be produced during construction of the drilling location, road and pipelines, and from drilling and completion activities. Long term emissions would consist of drilling location and facility emissions, and vehicle emissions from operations and maintenance activities. Drilling location emission sources include ten separator heater boilers (two on each drilling location), a three phase separator, a generator, and one 2,000 barrel condensate tank.

Emissions would consist of nitrogen oxides (NO_x), carbon monoxide (CO), Volatile Organic Compounds (VOC), fine particulates (PM10 and PM 2.5), sulfur dioxide (SO2) and hazardous air pollutants (HAP). Hydrogen sulfide, a candidate HAP) is not expected to be present in the gas.

Effects to Climate Change:

To address the project's effects to climate change, carbon dioxide and methane emissions associated with the project were estimated. Estimates for one drilling rig are 1,583 tons per year of carbon dioxide and 0.32 tons/year of methane (modified from Hightower MDP EIS). The drilling phase is short term (12-16 months in duration).

Over the long term during the life of the wells, separator heaters and compressors will contribute to greenhouse gases (See Table C9). The two wellsite separator heaters would contribute 1,030 tons/year of carbon dioxide and 0.012 tons/year of methane.

Table C9. Esimated Project Emissions (tons per year; modified from Hightower MDP analysis)

	Separator Units (1.0MMBtu/hr)	NOx Per Unit (tpy)	NOx Total (tpy)	CO Per Unit (tpy)	CO Total (tpy)	PM 2.5 Per Unit (tpy)	PM 2.5 Total (tpy)	PM10 (tpy)
Drill Location	2	0.44	0.88	0.37	0.74	0.03	0.07	
Drill rig engine (3 rigs)		13.06	39.18	7.45	22.35	3.11	9.33	
Generator (one)		2.03	2.03	2.03	2.03	0.05	0.05	
Dehydration Unit (1.5 MMBtu)		0.66	0.66	0.24	0.24	0.05	0.05	
Truck Traffic			0.35				0.78	7.00
TOTAL PROJECT EMISSIONS (tons/year) WHILE DRILLING			42.22		24.62		10.21	7.00
TOTAL PROJECT EMISSIONS (tons/year) AFTER DRILLING			1.23		0.74		0.85	7.00

Table C10. Estimated Maximum Ambient Air Quality Effects in Class I/II Areas from cumulative sources (data extracted from Hightower MDP).

Class I Area	Pollutant[1]	Averaging Period	Ambient Air Concentration (µg/m^3)	PSD Class I/II Significance Level (µg/m^3)
Black Canyon of the Gunnison National Park	NO_x	Annual Avg.	7.04 E-04	0.1
	PM_{10}	Annual Avg	1.35 E-04	0.2
		24-hour Max	3.72 E-03	0.3
	PM 2.5	Annual Avg	5.62 E-051	None
		24-hour Max	1.68 E-03	None
Eagle's Nest Wilderness	NO_x	Annual Avg	1.38 E-03	0.1
	PM_{10}	Annual Avg	2.37 E-04	0.2
		24-hour Max	2.71 E-03	0.3
	PM 2.5	Annual Avg	9.74 E-05	None
		24-hour Max	1.14 E-03	None
Flat Tops Wilderness	NO_x	Annual Avg	4.95 E-03	0.1
	PM_{10}	Annual Avg	6.67 E-04	0.2
		24-hour Max	8.42 E-03	0.3
	PM 2.5	Annual Avg	2.67 E-04	None
		24-hour Max	2.68 E-03	None
Maroon-Bells/ Snowmass Wilderness	NO_x	Annual Avg	6.16 E-03	0.1
	PM_{10}	Annual Avg	9.00 E-04	0.2
		24-hour Max	1.74 E-02	0.3
	PM 2.5	Annual Avg	3.87 E-04	None
		24-hour Max	7.50 E-03	None
Raggeds Wilderness (Class II)	NO_x	Annual Avg	6.19 E-03	1.0
	PM_{10}	Annual Avg	7.26 E-04	1.0
		24-hour Max	1.89 E-02	5.0
	PM 2.5	Annual Avg	3.67 E-04	None
		24-hour Max	8.08 E-03	None
West Elk Wilderness	NO_x	Annual Avg	1.91 E-03	0.1
	PM_{10}	Annual Avg	3.08 E-04	0.2
		24-hour Max	7.07 E-03	0.3
	PM 2.5	Annual Avg	1.38 E-04	None
		24-hour Max	2.83 E-03	None

[1] *NO_2 is represented by NO_x for this analysis*

Potential ambient far-field effects resulting from the proposed project were calculated for the Class I and Class II areas identified in the geographic analysis area. Table C10 shows that the maximum ambient air concentrations of pollutants would be less than the Class I/II Significance Levels (i.e., the levels considered to cause or contribute to a NAAQS or PSD increment violation), indicating compliance with applicable air quality standards (data extracted from Hightower MDP).

Visibility

When compared to similar projects in the region (coal projects and the Hightower MDP) changes in visibility compared to the "natural condition" are expected to be below the U.S. Forest Service and National Park Service level of concern for individual projects (0.5 deciviews) at all locations.

Acid Deposition

The deposition of nitrate and sulphate species from air pollution sources may cause changes in water body chemistry and can affect the acid neutralizing capacity (ANC) of high elevation lakes. When compared to similar projects in the region (coal projects and the Hightower MDP) ANC changes are expected to be well below thresholds for all lakes analyzed indicating a neglible contribution to effects on ANC from the project.

Mitigation

To further understanding of levels of emissions from drill rigs in the Piceance Basin, the operator will be required to provide the FS with daily fuel consumption logs for the drill rigs throughout the entire drilling program.

Cumulative Effects

Cumulative air quality effects include effects from the proposed project as well as past, present and reasonably foreseeable emissions sources. The region surrounding the project area (including Delta, Garfield, Gunnison, Mesa and Pitkin Counties) has seen and will continue to see increased air pollution emissions concurrent with increases in air pollution sources such as oil and gas development and population growth.

The Colorado Department of Public Health and Environment identifies oil and gas exploration and development as the dominant air quality concern in the Western Slope region of the State. Other growing emission sources are directly related to population growth such as highway and recreation vehicles. As the industry and county populations continue to expand so, too, will emissions of air pollutants such as PM, NOx, CO, and VOC. The proposed project, by itself, is a nearly immeasurable contributor to air pollution emissions, while it adds to the cumulative effects associated with this regional growth the project does not make a significant contribution to the existing visibility impairment or to changes due to acid deposition.

Cumulatively in western Colorado, as part of the Hightower analysis which this project area was covered, the analyses predicted visibility effects greater than 1.0 deciview from 20 to 161 days in the six Class I areas (Table C11), due chiefly to existing emission sources

Effects to high elevation lakes from all cumulative sources evaluated in a similar project (Hightower MDP) were predicted to cause reductions in acid neutralization capacity ranging from 3 to 85 percent. The LAC for ANC would be exceeded at four of the five wilderness lakes analyzed (Table C12).

It is expected, as compared to other similar projects in this region (coal projects and Hightower MDP), ambient air quality effects are predicted to be lower than allowable PSD increment thresholds. For regulatory purposes, PSD increment consumptions are calculated from baseline dates and include adjustments for source emission increases and decreases that have occurred since the baseline dates. However, for purposes of this air quality assessment, PSD increment consumption comparisons were provided on an informational basis and do not constitute a regulatory increment consumption analysis.

Summary

In summary, the 11-90-9 #3 project would not result in exceeding NAAQS or wilderness lake water quality thresholds. Changes in visibility greater than 0.5 deciviews is not expected to occur because of project emissions.

Under the cumulative effects analysis, adverse air quality effects to Class I/II areas are predicted from current and future emissions sources in comparison to assumed natural visibility background and measured baseline ANC conditions. These effects are primarily due to emissions from power plants but also include emissions from oil and gas exploration and development as well as from a variety of mining and mineral-processing operations.

The results of this analysis underscore the importance of interagency cooperation in mitigating air quality effects from current and future emission sources (e.g. requirement of using Tier II equipment on USFS gas development projects). The Colorado State Air Pollution Control Division (APCD) has the authority and responsibility to manage and control existing air pollution sources. The Forest Service is working with the APCD through the Regional Haze State Implementation Process (SIP) (see http://www.cdphe.state.co.us/ap/regionalhaze.html) to manage and protect air quality in Class I areas.

Table C11 Maximum Cumulative Visibility & Deposition Effects in Class I and Sensitive Class II Areas[1]

Class I or II Area	Max. Change in Deciview (Δdv)	Annual Number of days >1.0 dv	Nitrogen Deposition (kg/ha/yr)	Sulfur Deposition (kg/ha/yr)
Black Canyon of the Gunnison National Park	6.03	26	0.0379	0.0559
Eagle's Nest Wilderness	6.05	78	0.0730	0.0493

Table C11 Maximum Cumulative Visibility & Deposition Effects in Class I and Sensitive Class II Areas[1]

Class I or II Area	Max. Change in Deciview (Δdv)	Annual Number of days >1.0 dv	Nitrogen Deposition (kg/ha/yr)	Sulfur Deposition (kg/ha/yr)
Flat Tops Wilderness	10.21	156	0.1970	0.1210
Maroon-Bells/Snowmass Wilderness	11.59	98	0.0653	0.0464
West Elk Wilderness	5.74	37	0.0359	0.0365
Raggeds Wilderness	11.75	66	0.0522	0.0410

[1] Revised CALPUFF modeling run (Buys, 2008)

Table C12 Cumulative Acid Neutralization Effects in Class I and Class II Areas

Sensitive Lake	Location	Baseline ANC (ueq/l)	ANC Change (ueq/l)	Percent ANC Change
Ned Wilson	Flat Tops WA	38.0	16.438	28.30
Up. Ned Wilson	Flat Tops WA	12.6	18.038	85.14
Moon	Maroon Bells WA	51.5	160.812	9.37
Deep Creek #1	Raggeds WA	44.3	288.960	11.75
S.Golden	West Elk WA	111.0	26.474	3.46

Appendix D
Cumulative Effects

Cumulative effects associated with oil and gas development in the area was analyzed in greater detail in the Uncompahgre Basin Resource Management Plan (RMP) Environmental Impact Statement (BLM, 1988), the 1993 GMUG Oil and Gas Leasing Analysis, the Bull Mountain Pipeline EIS, and the Bull Mountain Unit Draft Environmental Assessment, and the Hightower Master Development Plan (MDP). Those documents are incorporated by references, and the specific cumulative effects details in those documents can be found in their individual environmental analyses. With respect to the cumulative effects of the 11-90-9 #3 well, because the individual disturbances of the project are relatively small in scope, the cumulative effects area is confined to the Little Henderson Creek HUC6. It is expected that any cumulative effects associated with this project are well within the effects disclosed within the documents listed above, and as summarized below.

The following list includes all past, present and reasonably foreseeable actions known to the USFS that may occur within the affected area:

Past, Present, Reasonably Foreseeable Future Actions

To identify and disclose past, present, reasonably foreseeable future BLM related actions, information was modified from recent BLM and Forest Service environmental analysis documents

Past Actions

The primary existing (past) surface disturbances within the general area is associated with coal mining, and oil and gas exploration and development.

Coal Mining

Historic coal mining activities over the past century include the following:

- Hawks Nest Mine;
- Oliver Mine No. 1 and No. 2;
- Bear Mine No. 1, No. 2, and No. 3;
- Edwards Mine;
- U.S.S. Steel Mine;
- Blue Ribbon Mine;
- King Mine;
- Farmers Mine;
- Oxbow Sanborn Creek; and
- Bowie No. 1 Mine (a.k.a. Orchard Valley Mine)

Oil and Gas

Past oil and gas activity within the region has included coal-bed methane wells and conventional gas wells. Active natural gas wells within the cumulative impacts area include:

- 45 active wells exist in the area. 18 are on private surface/private minerals; 12 are split- estate wells (private surface, federal minerals); 15 are on U.S. Forest Service surface; and no wells are on BLM surface.
- 20 wells are producing, 17 are capable of producing but are shut-in, and 8 are temporarily abandoned.
- Total disturbance includes:
    - Well pads - approximately 100 acres.
    - Pipelines - approximately 56 acres.
    - Roads - approximately 100 acres.
    - Facilities – approximately 48.1 acres.
- Total disturbance – 304.1 acres (average disturbance per well (pad, road and pipeline) – 6.0 acres).

Present Actions

Present actions are focused on mining, oil and gas, livestock grazing, recreation, and residential / agricultural development.

Coal Mining

Table 1, Coal Production (see below) contains recent production data for the three currently producing coal mines in the North Fork Valley; they are the West Elk, Bowie No. 2, and Elk Creek Mines:

- The West Elk Mine is a longwall operation located south and east of Somerset and is operated by Mountain Coal Company.
- Bowie No. 2 was opened in 1997 as a room-and-pillar mine but converted to a longwall system in late 1999. Bowie No. 2 hauls its coal to the Bowie No. 2 loadout northeast of Paonia.
- The Elk Creek Mine is a longwall operation north of Somerset, operated by Oxbow, with a loadout immediately north of Somerset.

Table 1 Coal Production - North Fork Valley (NF) - BLM-UFO 1 Yr Averages

Average based on:	Bowie	Elk Creek	West Elk	Totals (NF)
5 Yr	2,808,556	4,378,814	5,721,944	12,909,314
1 Yr	1,873,357	3,495,575	6,499,048	11,867,980
Periods end Sept. 30, 2011				

NOTE: The total yearly production for the North Fork Valley is expected to remain about the same between 12 and 13 million tons.

The North Fork Branch of the Union Pacific Railroad operates exclusively to serve these coal mines. This line branches from the main line in Grand Junction and passes through Delta, Hotchkiss, Paonia, and Somerset.

Oil and Gas Leasing

There are approximately 259,200 total acres of federal oil and gas mineral estate within the cumulative impacts area. Overall, there are 124,078 acres currently leased. This includes 34,165 acres of inventoried roadless areas which were leased prior to implementation of the USFS roadless rule. If these pre-2001 leases expire and are subsequently leased again, they will have surface use restrictions consistent with any roadless rule that may be in place at that time. Approximately 135,122 acres of Federal oil and gas mineral estate remain available for nomination to be leased. Approximately 62,040 of the unleased acres are within inventoried roadless areas, and may be subject to surface use restrictions related to road building if ever nominated for leasing.

Other actions in the area

There are a number of water storage reservoirs and canals around the North Fork Valley to serve agriculture and domestic uses.

Historically, fruit orchards along the valley floor and low mesas have been important to the local Paonia economy. More recently, vineyards have replaced some orchards in the area.

WAPA operates the Curecanti-Rifle 230/345 kV transmission line that parallels Terror Creek. Sheep and cattle are grazed in pastureland around Paonia and also at higher elevations near the coal mining operations during the summer.

Forest treatments and timber sales have been limited in the area. Merchantable timber resource is very limited, and steep slopes and inaccessibility also limit harvest activities.

Residential developments in the area around the communities of Paonia, Hotchkiss, Crawford, and Delta have been growing in population, with many new houses being built. Most of this development has been down-valley from the coal mines and oil and gas developments in broader portions of the North Fork Valley. This development has increased the traffic load and demand for maintenance on State Highway 133.

There is little developed recreation in the area; however, the area is widely used for dispersed recreational activities, such as hunting, four-wheeling, hiking, picnicking, horseback riding, snowmobiling, and sight-seeing.

Reasonably Foreseeable Future Actions

Coal Mining Activity

Underground coal mining is expected to continue in the North Fork Valley. In addition to current coal leases:

- Oxbow Mining, LLC (Elk Creek Mine) has been issued both a 786-acre lease by application with surface disturbance of approximately 5.63 acres and a 157-acre coal lease modification on the GMUG.

- Due to problems underground Oxbow is has also submitted a lease modification of the East Elk Creek lease (COC-70615), requesting to add ~364 acres of USFS lands to their existing lease.
- Mountain Coal Company (West Elk Mine) applied for up to 159 E Seam methane drainage well (MDWs) sites that would support 171 individual MDWs, and use or construction of approximately 26.1 miles of roads within the GMUG. Also, two lease modifications adjacent to each other and to current leases to the south within the GMUG are being processed and are undergoing NEPA analysis. They would add approximately 1,700 acres to the West Elk Mine, of which an estimated 73 acres will be actively disturbed for the remaining life of the mine.
- Oxbow Mining, LLC (Oak Mesa Project – coal exploration license) - a proposal to drill 43 exploration drill holes on private and federal lands into federal subsurface holdings. The entire exploration area covers about 13,873 acres, and temporary surface disturbances from road and pad construction would occur on about 32.86 acres.
- Bowie Resources, LLC (Bowie No. 2 Mine) applied for two lease modifications adjacent to current leases to the north under private and public lands, which would add approximately 502 acres, and temporary surface disturbances from road and pad construction would occur on about 16.6 acres. The NEPA for one of these modifications was approved by BLM UFO in August 2012, and the issuance of one of these modifications is still in process. Bowie has also submitted a coal Lease-by-application (LBA) for approximately ~1,360 acres involving USFS, BLM and private lands north of Paonia. This LBA
- Additional actions including coal lease modifications and new coal lease applications could be expected in the North Fork Valley. These actions may affect how long mining would continue in this area; however, it is likely that mining would continue for another decade, if not more.

Pending Oil and Gas Activity:
15 total permits (APDs) pending (4 on USFS lands, 13 on BLM).
7 shale well permits
3 coal-bed methane wells and
5 coal mine methane wells capturing from coal mines.
Total estimated disturbance based on current APDs – approximately 115 acres of disturbance anticipated (based on 6.8 acres of disturbance per well).

In addition, the USFS is currently developing a proposed for Petrox LLC, involving up to 50 gas wells on 24 drilling locations within the Somerset Unit. This Master Development Plan has not yet been released for scoping.

In addition the BLM recently deferred approximately 20,000 acres of gas leases in the North Fork Valley. These leases may be put back on a lease sale in the future.

It is difficult to forecast future oil and gas development within the cumulative impact assessment region. The area is seeing an increase in development. Activity increases are due to changes in

technology for the drilling and development of the horizontal shale wells. BLM in previous analyses estimated that the area will average 20 new wells per year (assumes at least 2 wells per pad – 10 new pads per year). This estimate would create approximately 68 acres of new disturbance per year from oil and gas development.

SG Interests 150 gas well Master Development Plan

SG Interests I, Ltd (SG) has proposed a master development plan to develop mineral leases within the Bull Mountain Unit located in Gunnison County, Colorado. SG is proposing to drill and produce 150 wells from approximately 46 individual well pads and associated infrastructure. Approximately 50% of the wells would target coalbed methane production and the other 50% would be exploring other potentially productive natural gas zones encountered by drilling into other geologic zones in the area of the Bull Mountain Unit.

Cumulative Effects Discussion – Select Resources

Air

Cumulative air quality impacts are defined as incremental impacts from any one alternative combined with impacts from other existing or proposed air emission sources in the region. These emission sources include existing and future coal mining and exploration, oil and gas exploration and development, livestock grazing, and regional vehicle traffic. The contribution from project source emissions to cumulative ambient air concentrations and AQRVs, including regional haze and atmospheric deposition at the PSD Class I Maroon Bells – Snowmass Wilderness Area, and at the other PSD Class I areas located within the area of influence (West Elk Wilderness, Black Canyon of the Gunnison National Park, Flat Tops Wilderness, and Eagle's Nest Wilderness) would be negligible.

Soils

The cumulative impacts assessment area for soil is considered to be the Little Henderson Creek HUC6 watershed. Cumulative impacts to soils would occur across the area from the reasonably foreseeable combined implementation of the proposed action and the past, present and future actions described above. Based upon the amount of surface disturbance associated with the Proposed Action, the likely incremental cumulative impact of productivity loss and erosion on the existing soil resource would be low. With successful implementation of soil salvaging and reclamation, it is expected that soil productivity and soil erosion losses would be controlled and therefore minimal cumulative impacts would occur. It is likely that planned activities could add to fine sediment delivery to drainage systems, but this increased delivery would be small and primarily short timer during project construction through completion and would not likely be noticeable given the natural background loading of silts that creeks and streams in the area already carry.

Vegetation/Habitat

The cumulative impacts assessment area for vegetation includes the Little Henderson Creek HUC6 watershed. Since 2002, redevelopment of historical well pads and construction of new well pads, roads, and pipelines by SG and Gunnison Energy Corporation have resulted in the direct loss of vegetation

communities, as well as temporary impacts from the installation of pipelines and landowner-required vegetation management projects (such as sagebrush mowing). Cumulative impacts from implementation of the Proposed Action, as would result in production impacts of much less than 0.1% of the watershed's vegetation communities. When combined with existing natural gas impacts, the total long-term impact to vegetation communities in the watershed would still be less than 1%.

Elk populations in this and other areas on the forest are much more likely to be directly influenced through management of hunting seasons by the Division of Wildlife than from habitat changes at minor scales.

Travel management in the cumulative effects area is occurring at this time and has reduced open road and motorized trail densities within the cumulative effects area by approximately 4.8 miles of low-use motorized routes within the past 5 years, greatly offsetting the 0.32 miles of proposed route for this project.

Overall, the potential habitat capability for this watershed is impacted more by roads than by direct loss of habitat. This project does not result in the Forest exceeding the standards and guidelines set for management indicator species in the Forest Plan. It should be noted that forage utilization between wild animals and domestic livestock are factored into this assessment (see Biological Evaluation), and domestic usage does reduce total forage available within the watershed for elk or other ungulates. However, the area is managed for livestock grazing under the Forest Plan with forage utilization factored into grazing rotations and timing to allow for forage retention for elk and other ungulates.

There are other natural gas developments occurring within the larger watershed of the upper North Fork valley. A planned 150-well Bull Mtn MDP on private and BLM lands to the southeast of the proposed action was not quantitatively considered in the cumulative impacts analysis above as it was outside of the watershed in which the proposed action occurs, and was not connected to the proposed action other than that the destination of the proposed over-surface poly pipe leads to this area and that the projects are similar in function. Inclusion of this development in HABCAP modeling would have necessitated including three other HUC6 watersheds into the calculations, and the 82,167-acre resulting analysis area would have diluted impacts of this project to levels that it would not have shown up as significant in HABCAP modeling. The private land gas project, however, would have likely shown more substantial impacts in this model. The end result is that the proposed action is a very minor cumulative impact within either the limited HUC6 analysis area or an even further reduced minor impact within the larger scale area.

Other cumulative impacts to vegetation communities could occur from the reasonably foreseeable continuation of livestock grazing across the watershed. This grazing puts certain pressures on native grasses, forbs, and shrubs, and has likely shifted the dominance of certain species across the area, however while grazing of domestic livestock directly reduces available forage for elk and other ungulates on this landscape, the combined utilization never approaches 100%. Forage is always available for elk

before, during, and after cattle grazing has occurred on the land. Additionally, some increased cover of noxious weeds has likely accompanied persistent grazing pressure.

Aquatics

Cumulative impacts to aquatic wildlife and their habitats in the area include continued spread of whirling disease, degradation of riparian corridors due to domestic livestock grazing, sedimentation of suitable habitats from upland ground-disturbing projects, gravelling/sanding of highways, application of magnesium chloride and other ice-melting chemicals to roads, and continued natural gas exploration and development activities. Stocking of area streams and lakes with non-native salmonids would continue to pose a hybridization and competition threat to greenback cutthroat trout. The presence of brook trout in the Muddy Creek watershed would be a definite threat to long-term greenback cutthroat trout persistence.

Cumulatively, this project would not add to greenback cutthroat trout hybridization threats. The development of roads, pipelines, and pads in the area would cumulatively add to fine-sediment mobilization into area creeks. Water depletions could also negatively impact aquatic habitats. Given that most of the trout-occupied habitats occur within headwaters of area creeks, the continued development of natural gas in the lower elevations of the basin would not be coincidental to most trout habitats. However, some natural gas pads may indeed occur higher in trout occupied basins, which may cumulatively have negative impacts to water quality and habitats through fine-sediment delivery and possibly chemical contaminants.

Water Resources

The cumulative impacts assessment area for water resources is considered to be the Little Henderson Creek HUC6 watershed.

Surface Water -Cumulative impacts to surface water would be limited to the surface water features within the watershed that affected by the Proposed Action and past, present and future actions described above. Potential cumulative impacts to surface water resources from the Proposed Action in combination would include increased turbidity and sedimentation in water courses, short-term runoff, and salt-loading, contamination of surface water courses and ponds by produced water and petroleum, and depletion of surface water flows in nearby streams.

Water use associated with the SUPO would result in an estimated ~21 acre-feet depletion being depleted from the Colorado River basin. Water depletions, depending on the timing, could reduce spawning success, reduce the availability of rearing habitat, and increase overwinter mortality. Water for use during drilling would be purchased from an adjudicated water source. Approximately 1.2 acre-feet (10,000 barrels) of water would be needed for the drilling process on the well, and 150,000 acre-feet. A total of 4 additional wells could be drilled via additional permitting on this location, or an additional ~85 acre-feet of depletion.

The GMUG has a blanket Biological Opinion from USFWS (TAILS 65413-2007-F-0119) which covers this water depletion. This project is consistent with ES/GJ-6-CO-99-F-033-CP062 (TAILS 65413-2007-F-0119) programmatic consultation for *depletions (< 100 acre-feet per year; no single project > 50 acre-feet per year) associated with numerous mineral development and other projects located on the GMUG NF*.

Groundwater -Cumulative impacts to groundwater would be limited to the groundwater aquifers that are affected by the Proposed Action and past, present and future actions described above. Potential cumulative impacts could include contamination of groundwater aquifers with hydraulic fracturing fluids, produced water, drilling mud, or petroleum and include impacts to shallow groundwater aquifers due to changes to the hydrologic function of impacted drainages. Cumulative impacts could also result when drilling/completion operations and infrastructure construction inhibit infiltration of surface water into shallow groundwater aquifers and when produced water is removed from target formations to facilitate the natural gas recovery process.

Due to the depth separation between proposed production wells and existing non-industrial use water wells, non-target aquifers in the area would not be impacted by the cumulative removal of water resulting from natural gas development in the area if proper well drilling procedures and completion techniques are utilized. Additional groundwater removed from targeted aquifers as a result of cumulative natural gas development would not adversely impact the industrial wells permitted in the area. Cumulative impacts to surface and groundwater would be minimized with implementation of applicable BMPs and following State and BLM regulatios for well drilling and completion.

Range

The cumulative impacts assessment area for rangeland management is considered to be the Little Henderson Creek watershed. Cumulative impacts within the area would include the combined implementation of the Proposed Action in combination with the past, present and future actions described above. A cumulative total of less than 5 acres, of grazing vegetation would be lost to development under the Proposed Action. Implementation of the Proposed Action would have negligible impacts on ranching operations or grazing potential within the watershed.

Noise

The cumulative impacts assessment area for noise is considered to be in the vicinity of all project activities and disturbances, both private and public lands. Cumulative impacts of the Proposed Action in combination with the past, present and future actions described above would include the addition of construction, development, and production-related noise sources. These noise sources include, but are not limited to: existing traffic and equipment noise from natural gas development and well maintenance, agricultural activities, and recreational and tourist traffic on SH 133 and CR 265. In some stages of development the area around the well could be considered by some individuals to be “noisy.” This continual (though likely low-level) noise may be disruptive or objectionable to individuals such as recreationists, hunters, and livestock operators and may result in displacement of such activities. Displacement of wildlife in general and sensitive wildlife species may also occur in “busy” or “noisy” areas within the area. Short-term cumulative impacts from noise would be low to moderate during the

construction and development phase, fluctuating with the specific activity. Long-term cumulative impacts would be low, and would also fluctuate with the specific activity.

Visuals

Cumulative impacts of the Proposed Action in combination with the past, present and future actions described above would include the addition of construction, development, and production-related facilities and equipment. The existing environment would likely be altered due to the continuation of existing federal authorizations of ongoing operations of existing wells, as well as the likely development, operation, and maintenance of additional natural gas development in the area.

The additional proposed development of the Proposed Action in combination with the likely development of the No Action Alternative, including the associated access roads, pipelines, and other facilities, as well as the pads, would introduce new forms, lines, colors, and textures not currently native in the landscape. The existing viewshed would begin to have more and more contrast between the existing natural landscape and the introduced man-made features as construction of new facilities takes place. Current Forest Planning documents have identified this area as having a Scenic Integrity Objective of Moderate, which is defined as: *landscapes where the valued landscape character "appears slightly altered." Noticeable deviations must remain visually subordinate to the landscape character being viewed".*

It is expected that gas activities in the area will meet this definition.

Recreation

The cumulative impacts assessment area for recreation is considered to be the Little Henderson Creek HUC6 watershed. Cumulative impacts to recreation would occur from implementation of the Proposed Action in combination with the past, present and future actions described above. These activities, when added to other reasonably foreseeable natural gas and coal mining development activities in the area, would incrementally decrease the overall experience for recreational users. The primary user group impacted would be people viewing seasonal colors, visiting public, and hunters.

Appendix E - Generalized Response to Comments

SG Interests I-11-90-9 #3 Project Proposal

The 30-day public scoping and comment period for the project was initiated by a legal notice posted in the Delta County Independent on July 11, 2012. During the comment period, the Paonia Ranger District received 40 comments in total. These comments varied from letters from individuals to letters from conservation groups. A few letters were also received from state and federal agencies.

Thirty three of the comments received were in opposition to the project proposal, five letters voiced support, and three could be classified as neutral (letters from Colorado Parks and Wildlife, Gunnison County and the Department of Energy).

Many different concerns were raised in the comment letters but for the purposes of this document they have been narrowed down to the following general categories for response. Most of the concerns addressed in the response to comments section below are common to all of the letters.

1) The National Environmental Policy Act (NEPA) analysis for this project is not adequate. A Categorical Exclusion should not be used for this project proposal but rather an Environmental Assessment (EA).

2) The 1989 BLM Resource Management Plan (RMP) and the 1983 Grand Mesa, Uncompahgre and Gunnison National Forest Land Resource Management Plan are "faulty" and "outdated" and do not address the current realities of oil and gas development within their resource areas.

3) Concern about impacts to wildlife, particularly elk. Concern about habitat fragmentation and that project proposal is in an elk winter concentration area as identified by Colorado Parks and Wildlife.

4) The desire for alternative locations to be considered for the gas well and associated infrastructure.

5) Concerns about impacts to surface groundwater and subsurface water during construction, drilling and production of the well.

6) The desire for a wildlife mitigation plan to be created and implemented in the general area because of the potential development on the neighboring Bull Mountain Unit and the potential future gas development on the gas leases on Forest Service leases.

7) Concerns about air, noise and visual pollution.

8) The desire for the Forest Service to delay its decision until the Bull Mountain EIS is complete and to conduct an Environmental Assessment for the 11-90-9 #3 project proposal that weighs the direct, indirect and cumulative impacts.

9) The desire for air and water quality baseline studies to occur as part of the project approval.

10) Concerns about "piece meal" development of gas leases in the general area and the desire for a more comprehensive master development plan.

11) Concerns about recreational impacts, especially impacts to big game hunting.

Response to Comments Section

Comment:

1) National Environmental Policy Act (NEPA) analysis for this project is not adequate. Categorical Exclusion should not be used for this project proposal but rather an Environmental Assessment (EA).

Response: In many of the letters of opposition to this project proposal received from groups and from individuals, it states that the Forest Service should not evaluate this project using a categorical exclusion, but rather should conduct an EA.

The project proposal fits within one of the categorical exclusions contained within Section 390 of the Energy Policy Act of 2005. Specifically the project proposal fits under Category 1 of Section 390. Under current USFS policy, if a proposed project meets all the criteria for any of the five categories under Section 390, the Authorized Officer should apply that categorical exclusion.

The Federal 11-90-9 #3 well fits into Category 1, under Section 390:

> *Individual surface disturbances of less than five (5) acres so long as the total surface disturbance on the lease is not greater than 150 acres and site-specific analysis in a document prepared pursuant to NEPA has been previously completed.*

The entire disturbance footprint of the project is approximately 4.6 acres including the well pad and the access road. The five acre threshold of disturbance for this individual project is not exceeded by this project. Additionally, there is only one other gas well contained within gas lease COC-8905, the Henderson 1R Well. This gas well is located to the east of the proposed 11-90-9 #3 well along the Sheep Park Rd. (NFSR #851) and is less than two acres. At this time there is less than two acres of un-reclaimed disturbance on gas lease COC-8905 related to oil and gas activities, well within the 150 acre threshold described in this categorical exclusion.

The final requirement of this categorical exclusion is that site-specific analysis in a document prepared pursuant to NEPA be completed. The 11-90-9 #3 project proposal also meets this requirement. In 2010, Gunnison Energy submitted a Master Development Plan for 16 gas wells on 4 well pads one of which is adjacent to this location. This Master Development Plan was analyzed pursuant to NEPA and its analysis of direct, indirect and cumulative effects is valid for this project proposal. In addition to the analysis completed for the Gunnison Energy MDP, a thorough analysis of the direct, indirect and cumulative impacts was carried out for the 11-90-9 #3 project proposal. None of the wells analyzed in the previous MDP have been drilled.

In addition, although not required to do so under a Categorical Exclusion, the USFS analyzed several alternative well sites in this analysis (see Appendix B).

Comment:

2) The 1989 BLM Resource Management Plan (RMP) and the 1983 Grand Mesa, Uncompahgre and Gunnison National Forest Land Resource Management Plan are "faulty" and "outdated" and do not address the current realities of oil and gas development within their resource areas.

Response:

In 1991 the GMUG Forest Plan underwent a substantial revision. In 1993, the GMUG National Forest and the BLM cooperated in an Oil and Gas Leasing analysis that amended the Forest Plan. The purpose of this leasing revision was to implement the regulations contained within the Federal Onshore Oil and Gas Leasing Reform Act of 1987 (FOOGLRA) which went into effect for the Forest Service in 1990. These two documents, the 1991 Land Resource Management Plan and the 1993 Oil and Gas Leasing Revision, are the two primary documents providing guidance related to oil and gas development activities. In addition, regulations like those contained with 43 CFR 3100, 36 CFR 228 Subpart E, and the Energy Policy Act of 2005 provide the framework for oil and gas activities on NFS land. During the creation of the Forest Plan and the Oil and Gas Leasing Revision process, the Forest Service designated lands available for oil and gas leasing and prescribed general stipulations to protect surface resources. In addition, specific stipulations were applied to protect surface resources on lands made available for oil and gas leasing.

It is important to note, however, that the activities proposed in this project are on a lease that was issued in 1954, prior to FOOGLRA and the 1993 Forest Plan amendment. Stipulations on oil and gas leases cannot be modified after issuance.

The BLM reviewed the cumulative effects analysis presented in the Uncompahgre Basin Resource Area RMP (BLM 1989) to determine if it is still adequate. The cumulative effects analysis in the 1993 document relied upon information about reasonably foreseeable impacts associated with potential future development of the leases. The 1993 plan assumed a reasonably foreseeable development plan that assumed 47 wells would be drilled on NFS lands. Since 1993 only 6 wells have been drilled on the GMUG, well within the cumulative effects analysis on the Forest Plan level.

In addition, specific cumulative effects associated with this proposal were also discussed (see Appendix C).

In the case of lease COC-8905, the management prescription for the general area is 6B (according to the management prescription contained within the Forest Plan) which is managed primarily for livestock grazing. This management prescription allows for oil and gas development. The proposed project is consistent with the GMUG Forest Plan.

Comment:

3) Concern about impacts to wildlife, particularly elk. Concern about habitat fragmentation and that project proposal is in an elk winter concentration area as identified by Colorado Parks and Wildlife.

Response: Almost every letter from both individuals and groups contained comment s voicing concern about the project proposal being within an area identified as an elk winter concentration area. In addition, comments about habitat fragmentation by Colorado Parks and Wildlife were also raised.

These issues are addressed at length in the Biological Evaluation and Management Indicator Species Assessment prepared by the Paonia District Wildlife Biologist for this project (see project file). A brief synopsis of the contents will be provided here.

Within the Biological Evaluation, the issue of development occurring within an elk winter concentration area was addressed. The scale of analysis for the project proposal was the 5,326 acre HUC6 Watershed (Little Henderson/East Muddy Creek) that the project is proposed in.

Two onsite visits to the project location occurred for this project proposal. The first onsite occurred on October 11, 2011 and the second on April 27, 2012. At the first onsite, representatives from Colorado Parks and Wildlife (CPW) voiced a preference for placing the well pad further to the west, closer to the 851.1A Road (Sheep Park Spur A). Their observation was that the project footprint would be smaller and that by placing the well pad closer to the existing disturbance in the area (roads and other gas infrastructure), that less direct and functional (habitat loss due to avoidance of roads and gas wells) habitat loss would occur to elk habitat. CPW provided research data in their comments that illustrates ungulate (primarily elk) avoidance of road and well sites.

The concerns about habitat fragmentation and functional habitat loss voiced by CPW and reiterated in letters from groups and individuals have been carefully considered. The desire of CPW to locate the pad at the location previously permitted by the Colorado Oil and Gas Conservation Commission in 2003 (See project map in project file) was carefully evaluated. In addition to this alternative location, two other alternate locations were also considered directly to the south of the proposed project area on lease COC-42314 in an effort to choose the optimum location that would meet the needs of the proponent while at the same time reducing resource impacts.

Although the Alternative #1 location preferred by Colorado Parks and Wildlife would in fact reduce the amount of access road to the proposed well location, and would consolidate disturbance in the general area, two issues were identified that make this location undesirable.

During the onsite visit, it was discovered that there is a small stand of mature/over-mature aspen in the pad footprint of the Alternative Location #1 that contains a small purple martin colony. Because of the nature of the topography, removal of this stand of trees would be inevitable. It would be unlikely to configure a drill pad in this location without having the need to remove the trees containing this small breeding colony of purple martins. In addition, the cut and fill profile at this location would be much more severe than at the proposed location further to the east. Because the proposed well pad is projected to be 250’x350’, the well pad would have to be oriented in a roughly east to west fashion at the Alternative #1 location. To the north of the well pad is a tall ridge, and the amount of cut and fill at this location would be substantial in comparison with the proposed location.

In response to the habitat fragmentation issue raised by Colorado Parks and Wildlife allowing the well pad to remain at the proposed location will cause slightly more direct habitat loss (elk summer and winter range) due to a longer access road into the pad. However, when considering the latest modeling estimates (Hebblewhite, 2008), there is no increase in impacted functional habitat acres associated with this proposal (see Appendix B).

The access road into the well pad will not be available for public use and after construction, drilling, and completion operations, will have very limited traffic associated with monitoring.

The two other locations (Alternative 2 and 3) were also considered for the road and pad location (see Appendix B). These two locations are located directly south of the 851 Road (Sheep Park Road).

It was determined by the Paonia Ranger District that all three alternative locations, when disturbance, wildlife, proximity to streams, and resource recovery efficiency were weighed, were not as practical as the original proposed location.

In addition to gas development in this region, another factor related to habitat fragmentation is the closure of non-system routes in the immediate project area. In 2010, the Gunnison National Forest Travel Management Decision went into effect. In the summer of 2012, staff from the Paonia Ranger District closed approximately 4.8 miles of motorized, user-created roads and trails in the immediate project area. The road and trail closures are independent of the project proposal but have a bearing upon the decision to be made. Although some direct and indirect habitat loss will occur as a result of the project proposal, a significant amount of roads and trails have been closed in the general area which will enhance habitat security in the watershed.

Comment:

4) The desire for alternative locations to be considered for the gas well and road.

Response: Most of the letters from individuals and groups expressed the desire that alternative locations be considered for this project to reduce impacts to natural resources, particularly elk. See Appendix B for the discussion on Alternative locations.

Comment:

5) Concerns about impacts to surface groundwater and subsurface water during construction, drilling and production of the well.

Response: Almost all of the comment letters from individuals and groups contained concerns about protections for surface and subsurface water.

There was some concern raised about the proximity of the road and gas well to Little Henderson Creek. The edge of the proposed 11-90-9 #3 well is approximately 600 feet from Little Henderson Creek in a perennial drainage. Best Management Practices (BMPs) used during construction of the well pad and road will minimize the possibility of drill fluids and fluids during production from reaching live water in Little Henderson Creek. Typically the edges of well pads are bermed to prevent fluids and sediments from escaping the pad. Straw bales or wattles are keyed in at the bottom of the fill slope of the pad to capture sediment reduce erosion.

In addition, see Appendix A for Conditions of Approval for hazardous substances and emergency situtations.

Drilling Water and Water Needed for Completion Phase

The APD/SUPO submitted by SG Interests projects the use of 10,000 barrels (1.3 acre-feet) of water during the drilling phase. This project is consistent with ES/GJ-6-CO-99-F-033-CP062 (TAILS 65413-2007-F-0119) programmatic consultation for *depletions (< 100 acre-feet per year; no single project > 50 acre-feet per year) associated with numerous mineral development and other projects located on the GMUG NF* (USFWS April 27, 2007). Since this project is within the Colorado River Basin and also under the current programmatic biological opinion (PBO) for the BOR (PBO USFWS 1999), the applicant is required to sign a Recovery Agreement provided by USFWS as stated in the 1999 PBO. The applicant must sign and return the Recovery Agreement form to the GMUG NF before Section 7 requirements can be met.

To reduce the likelihood of contamination, SG will not be permitted to use a reserve pit during the drilling or completion phase of this well (See Appendix A; Condition of Approval #14). During the drilling phase, water will either be trucked on site or it will be drafted out of Little Henderson Creek (only during time of year allow by Colorado Water Law) and pumped up to the well location. Remaining drill water will be circulated back to the McIntyre Flowback Pits on the Bull Mountain Unit for later use in the completion phase or stored onsite in water trailers for later use or proper disposal.

During the completion phase of the well, SG projects the need for 150,000 (19.3 acre-feet) barrels of water. SG Interests will be using a surface, HDPE poly-pipeline to flow water to the well site during the completion phase. Water from the McIntyre Flowback Pits will be pumped to the well site and circulated and recirculated downhole. Remaining water after the completion phase will be stored in the flowback pits for later use or injected into one of two water disposal wells on the Bull Mountain Unit. By using the surface poly-pipeline during the completion phase of the well, SG will eliminate the need to truck water to the well site. Based on a 130 barrel water truck containing 5,460 gallons, this will eliminate the need for approximately 1154 truck trips to the well pad to provide water during completion operations. This use of a surface poly-pipeline during completion operations will significantly reduce impacts to air quality, will lessen noise impacts, increase public safety along the affected Forest roads, and reduce impacts to visual resources.

Use of the surface polyline and installation of booster pumps along its length does pose some spill prevention concerns. Several conditions of approval were created to address these concerns (see Appendix A, under Hazardous waste)

<u>Water Resources Monitoring Plan</u>
Another aspect of protections for water resources contained in the decision is the Water Resources Monitoring Plan (see Appendix A). This water resource monitoring plan includes a pre and post drilling monitoring of springs and streams around the proposed 11-90-9 #3 well.

Comment:

6) The desire for a wildlife mitigation plan to be created and implemented in the general area because of the potential development on the neighboring Bull Mountain Unit and the potential future gas development on the Forest gas leases.

Response: Most of the letters from individuals and groups, including Colorado Parks and Wildlife expressed the desire that a wildlife mitigation plan be created and implemented in response to this

project proposal in light of the projected development that is being analyzed on the nearby Bull Mountain Unit. SG Interests and CPW have been working towards a wildlife mitigation plan but to date no final plan has been formulated.

Much of the concern for the creation of a mitigation plan is directed at the potential impact that have been proposed on private and BLM lands within the Bull Mountain Unit and on future projects that might take place on federal leases impacting deer and elk populations. This project is not connected to the Bull Mtn Unit MDP and is independent from any other reasonably foreseeable projects known at this time.

For this particular project the Biological Evaluation and the Biological Assessment analyzed the direct, indirect and cumulative impacts to wildlife. With regards to elk, the cumulative impacts analysis determined that the negative effects of this project proposal are of small magnitude and do not result in a Forest-wide decrease in trends or deter from meeting the MIS objectives in the Forest Plan (see Biological Evaluation in project file). At the scale of the project the impacts of the do not appreciably cause any significant direct and indirect impacts to elk habitat.

From a cumulative impacts perspective, current oil and gas development, as well as reasonably foreseeable future development is concentrated off NFS lands. In addition, the vast majority of big game winter concentration areas identified by CPW are off NFS lands.

We encourage CPW and gas operators in the region to continue to work together to work toward finalizing a Wildlife Mitigation Plan. As the majority of current proposals affect non-NFS lands, we do not feel it is appropriate to require such a plan in which the USFS would have little to no jurisdiction. Requiring a mitigation plan, specific to this project, is not needed because of the limited wildlife impacts associated with this project. As consistent with Forest Service policy and direction, we analyze the impacts of decisions and projects on NFS lands, and if appropriate, prescribe conditions of approval or identify mitigations under our jurisdiction. Conditions prescribed for wildlife on this project can be found in Appendix A.

Comments:

7) Concerns about air, noise and visual pollution.

Response: Many of the comment letters contained concerns about air, noise and visual pollution. Air quality was examined for this project and is discussed in Appendix C of the Decision Memo.

One of the mitigation measures to reduce impacts to air quality is the requirement that Tier 2 engines or better be used (see Condition of Approval #8) during drilling. The use of a surface polyline for water will greatly reduce truck traffic during the completion phase. In addition, the operator will be required to provide daily fuel consumption logs to the Forest Service so that air quality impacts can be quantified (See COA # 7) for future projects.

Although the Forest Service has no standards or guidelines specifically related to noise impacts, aspects of the proposed project are designed to reduce noise impacts. As noted in Response #5 above, the use of a surface poly-pipeline during completion operations, instead of hauling water via trucks, will significantly reduce noise impacts.

Gunnison County land use regulations and the COGCC regulations do contain noise abatement standards for commercial and industrial use. COGCC Rule 802, Noise Abatement, gives information on maximum allowable levels of noise generated by oil and gas operations at well sites, production and gas facilities, as well as noise levels permissible during drilling, completion, gas line construction. Noise levels allowed depend on applicable zoning to the site. For residential/agricultural/ rural settings, noise levels of 55 dBA from 7:00 am to 7:00 pm and 50 dBA from 7:00 pm to 7:00 am are allowed for oil and gas operations. During drilling and construction, allowable noise levels cannot exceed 80 dBA. Table 1 shows a comparison table of common noise sources. COGCC Rule 802 gives guidance on how and where to measure sound levels: noise should be measured at 350 feet away from the noise source, when wind velocity does not exceed 5 mph, measured 4 feet above the ground, and averaged over a 15 minute time period. Noise measurements take the existing ambient noise level from all other sources in the surrounding area as the baseline to determine the contribution from the oil or gas facility.

Table 1. Common Noise Levels

Noise Source	Average Noise (dBA)	"Loudness" based on normal conversation (baseline=1)
Normal conversation 5 feet apart	60	1
Ambulance siren at 100 feet	100	16
Single car passing at 25 feet	65	1.5
Average highway noise at 100 feet	60	1
On a typical construction site	85	6
Rural area during day	40	0.25
Rural area at night	35	0.18
Threshold of hearing	20	0.06

Source: EPA (1974), Harris (1991)

Noise related to project activities have been consolidated as much as possible. Booster pumps locations associated with the surface poly line on USFS managed lands have been placed at existing noise sources (Henderson #1R well pad, and the proposed well pad).

With respect to visibility, all well pad alternatives will be able to be seen via NFSR 851. The Proposed Location and Alternative 3 offer the best opportunities for screening, however it is unlikely that construction could take place without some part of the disturbance being visible. Current Forest Planning documents have identified this area as having a Scenic Integrity Objective of Moderate, which is defined as: *landscapes where the valued landscape character "appears slightly altered." Noticeable deviations must remain visually subordinate to the landscape character being viewed".* Gas activities at any of the alternative locations will meet this definition.

Comment:

8) The desire for the Forest Service to delay its decision until the Bull Mountain EIS is complete and to conduct an Environmental Assessment for the 11-90-9 #3 project proposal that weighs the direct, indirect and cumulative impacts.

Response: This comment was one of the most prevalent in all of the comment letters. The rationale for using a categorical exclusion and not an EA has already been discussed (see Comment #1). In the Biological Evaluation, the direct, indirect and cumulative impacts of this project have been evaluated.

The Application for Permit to Drill (APD)/Surface Use Plan of Operations (SUPO) received for this project is an independent proposal from the Master Development Plan being analyzed on the Bull Mountain Unit. Although they are both proposed by the same company, the two projects are not related and are separate; one is occurring independent of the other. The affected lease is not within the Bull Mountain Unit; the Bull Mountain Unit contains proposed development on a mixture of private and Federal (BLM) surface that is not under the jurisdiction of the Forest Service. In the analysis that has been carried out for this project, the direct, indirect and cumulative impacts of the Bull Mountain development have been considered in this project (see Appendix D). In addition any environmental document created for the Bull Mtn proposal will consider the environmental cumulative effects of Forest Service oil and gas development.

Comment:

9) The desire for air and water quality baseline studies to occur as part of the project approval.

Response: This was a fairly common theme in the comment letters. Like the Master Development Plan submitted by Gunnison Energy in 2010, SG Interests will be required to follow a Water Resources Monitoring Plan. This plan includes pre and post-drilling water monitoring of springs, streams, and wells (if available) around the project area. SG Interests has already done some pre-drilling monitoring of water resources around the proposed well with ACZ Laboratories of Steamboat Springs, Colorado (see project file).

SG will not be required to conduct baseline air quality studies but design criteria contained in the Conditions of Approval will mitigate effects to air quality. There is a requirement that Tier 2 engines or better be used (see Condition of Approval #8) during drilling. The use of a surface polyline for water will greatly reduce truck traffic during the completion phase. In addition, the operator will be required to provide daily fuel consumption logs to the Forest Service so that air quality impacts can be quantified (See COA # 7) for future projects.

Comment:

10) Concerns about “piecemeal” development of gas leases on the Forest gas leases and the desire for a more comprehensive master development plan.

Response: It is the preference of the Forest Service for proponents like SG to propose larger scale developments like Master Development Plans. MDPs allow for larger scale and more comprehensive analysis to occur so that impacts to surface resources can be lessened. When an MDP is proposed, the Forest Service can work with the proponent to minimize surface impacts by consolidating surface disturbance and can invest time and energy into efforts like transportation planning and well placement when the scope of the development is better understood. Gas development is a proponent driven process and while the Forest Service encourages the leaseholders to submit larger comprehensive plans, we cannot force them to do so.

Comment:

11) Concerns about impacts to recreation, especially to big game hunting.

Response: Colorado Parks and Wildlife in their comment letter provided information about the importance of big game hunting to the economy of Gunnison County (see Project Record). In addition, the Biological Evaluation and the comments received from Colorado Parks and Wildlife support the fact that as summer range the area of proposed disturbance is not critical habitat. Deer and elk are widely dispersed on summer range and are not commonly seen in the project area during the summer months. The direct habitat loss associated with the well pad and road in the HABCAP analysis carried out in the BE do not indicate a measurable impact to elk habitat from a summer range standpoint.

With respect to winter range, within the Biological Evaluation the issue of development occurring within an elk winter concentration area was addressed. The scale of analysis for the project proposal was the 5,326 acre HUC6 Watershed (Little Henderson/East Muddy Creek) that the project is proposed in.

The entire project area, and surrounding landscape, is considered as summer resident habitat, although the author has not observed elk in this immediate area other than in winter and early spring. Currently, low levels of summer recreational use are known to occur in the area. Legal motorized use is limited to existing roads and trails, which occur throughout the watershed. The road to be constructed for this project is behind a locked gate and would not be open to public motorized use, and would be open to administrative (including gas traffic) use only, with anticipated use levels other than during construction and drilling of one to three trips per day. Project activities may occur into the fall hunting seasons. Disturbance to both local elk populations, and to hunters whose camps are no longer desirable due to project activities and/or traffic, might occur. As a result, changes to elk hunting pressure in both the immediate project vicinity and other portions of GMU 521 are expected. Due to the small scale of the disturbance and the size of the GMU, it is not anticipated that harvest will change measurably across the GMU as a result of this project.

Because elk are very adaptable, and use a wide variety of habitats, the loss of 4.6 acres of shrub/grass/forb habitat is unlikely to have any measurable effects to elk at the population scale, but will reduce forage availability at small scales over long time frames. Summer range is not a limiting factor for elk in the North Fork Gunnison area (K. Madariaga, pers. comm.), and thus alteration of summer habitat is unlikely to cause noticeable population changes. Project activities should not change vulnerability of elk to hunting pressure within the overall area as the project area is fairly exposed and sees little elk use during hunting seasons. The road created during this project will not be open to the public.