

APPENDIX B

**BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE**

**FORTIFICATION CREEK RESOURCE MANAGEMENT PLAN
AMENDMENT**

**PERFORMANCE-BASED STANDARDS:
GOALS, OBJECTIVES, INDICATORS, AND
RECOMMENDATIONS**

March 2011

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1 INTRODUCTION

These performance goals, objectives, indicators, and recommendations were designed to be used in conjunction with the Fortification Creek Resource Management Plan Amendment (FCRMPA). These will be used instead of prescriptive requirements to achieve Bureau of Land Management (BLM) goals and objectives for the Fortification Creek Planning Area (FCPA).

1.1 Elk

Goal:

A viable elk herd utilizing their seasonal ranges during the appropriate seasons is maintained across the FCPA.

Objectives:

1. The population is maintained at 80% (120) or greater as measured from the Wyoming Game and Fish Department (WGFD) population objective (currently 150). Coal Bed Natural Gas (CBNG) will not be the causative factor to a population below this level.
2. Calf production is maintained at least 80% (100:37) of current cow:calf ratio (100:46). The initial ratio is based on a 13 year average.
3. Winter calf survival is at least 80% (100:31) of current cow:calf ratio (100:39). The initial ratio is based on a 7 year average.
4. Summer calf survival is at least 80% (100:23) of current cow: calf ratio (100:29). The initial ratio is based on a 7 year average.
5. Fidelity to yearlong range remains greater than 80% of current level. This means that 64% of collared elk remain within the yearlong range and are utilizing those portions of the FCPA not being actively developed. What is current level? (64% is 80% of 80). Seasonal crucial range fidelity remains greater than 80% of current levels, meaning that collared elk use the appropriate seasonal ranges during the crucial seasons within 80% of the current use level and use pattern.
6. Security habitat is maintained at 80% or greater than baseline levels within the crucial ranges and the yearlong range for each geographic phase.
7. Habitat effectiveness (local – plan of Development [POD]) is maintained at 80% or greater of current levels within the crucial ranges and the yearlong range.

Initial cow:calf ratios are based on minimum of 7 year average, subsequent (monitoring ratios) will be based on a rolling 5 year average. Initial fidelity thresholds will be based on a three year average for crucial winter range fidelity (winters 2008-2009, 2009-2010, and 2010-2011) and yearlong fidelity (spring 2008-spring 2011), and a four year average for parturition range fidelity (2008-2011). Initial local habitat effectiveness will be based on elk use from April 2008 until project authorization.

Monitoring data will be reviewed during site-specific POD analyses to determine compliance with the performance standards. The Monitoring Team (BLM and State of Wyoming) will meet at minimum of once per year to assess trends and determine if any thresholds have been crossed. The thresholds are guides for adaptive management they are not hard thresholds. If a threshold is crossed it will not be automatic that management actions will change. The monitoring team will review all the data, and determine whether a management change is warranted. For example if the winter calf survival ratio falls below the threshold and the monitoring team after reviewing

the data believes the decreased calf survival is related to winter weather and not CBNG development then a management change would likely not be proposed.

Indicators:

- a. Population – WGFD post hunt estimates
- b. Calf production – WGFD post calving helicopter survey
- c. Winter calf survival – WGFD spring helicopter survey
- d. Summer calf survival – WGFD pre hunt helicopter survey
- e. Range fidelity – GPS data analyzed quarterly
- f. Seasonal fidelity – GPS data analyzed quarterly
- g. Security habitat – Viewshed modeling from available roads
- h. Effective habitat – During the operational phase of CBNG wells elk use returns to 80% of current levels

Recommendations:

Consolidate and minimize infrastructure – range fidelity, security habitat, and habitat effectiveness. Example: Operators are encouraged to work together in designing a primary road and infrastructure corridor network.

1. Locate ancillary facilities (water management, compressors, metering stations, etc.) outside crucial ranges – seasonal fidelity.
2. Reduce metering and other production related visitation – security habitat, habitat effectiveness, seasonal fidelity, range fidelity.
3. Close and reclaim redundant or otherwise unnecessary roads – security habitat, habitat effectiveness, seasonal fidelity, range fidelity.
4. Limit operations within crucial seasonal ranges where not stipulated – security habitat, habitat effectiveness, seasonal fidelity. Honor timing limitations not only with construction activities but to the greatest extent practical during production as well.
5. Work with BLM and WGFD to incorporate forage and habitat enhancements into plans of development (PODs) – habitat effectiveness, range fidelity, calf production, and calf survival.
6. Limit security habitat loss – security habitat, effective habitat, seasonal fidelity, range fidelity.

1.2 Reclamation (Soil & Vegetation)

Sources: Wyoming BLM Reclamation Policy, BLM Tech Note 346, Jonah and Atlantic Rim reclamation standards, BLM Washington Office lead Natural Resource Specialist.

Goals:

1. Short term goal: immediately stabilize disturbed areas and provide conditions necessary to achieve the long term goal.
2. Long term goal: facilitate eventual ecosystem reconstruction to maintain a safe and stable landscape and meet the desired outcomes of the land use plan.
3. Vegetative communities within CBNG development mirror those of healthy communities as described in the Ecological Site Description (ESD).

Objectives:

1. Interim reclamation (initiated within 30 days of completing surface disturbing activities):
The objective of interim reclamation is to restore desirable vegetative cover and a portion of the landform sufficient to maintain healthy, biologically active topsoil; control erosion; and minimize habitat, visual, and forage loss during the life of the well or facilities. Interim Reclamation – Includes disturbed areas that may be redisturbed during operations and will be redisturbed at final reclamation to achieve restoration of the original landform and a natural vegetative community.
 - i. The operator will submit a subsequent report by Sundry Notice to BLM once stabilization measures have been implemented.

Indicators:

- a. Erosion control methods shall be in place to mitigate any erosive features, such as rills, gullies, or sheet erosion.
 - b. Disturbed areas not needed for active, long-term production operations or vehicle travel have been recontoured; protected from erosion; and revegetated with a self-sustaining, vigorous, diverse, native (or as otherwise approved) plant community sufficient to minimize visual impacts, provide forage, stabilize soils, and impede the invasion of noxious, invasive, and non-native weeds.
 - c. During initial well pad, production facility, road, pipeline, and utility corridor construction, pre-interim reclamation stormwater management actions will be taken to ensure disturbed areas are quickly stabilized to control surface water flow and to protect both the disturbed and adjacent areas from erosion and siltation.
2. Successful interim reclamation:
 - a. Year 1: The site must be in stable condition as indicated by the Erosion Control Classification System (BLM Tech Note 346).
 - i. The operator has ensured that 100% of the disturbance site is in a stable condition as indicated by the Erosion Control Classification System (BLM Tech Note 346). The site is stable as determined by the soil surface factor (SSF) factor range 1-20. The disturbance area has been seeded with the approved seed mix.
 - b. Year 2: 100% of the disturbance area is stable and vegetation is becoming established with desirable species and trending towards long-term goal(s).
 - c. Year 3: 100% of the disturbance area is stable and re-vegetated to within 80% of the ESD reference site for bare ground.
 - i. Native Grasses: Reclaimed sites must have a minimum of 2 native perennial grass species established in the disturbance area, 1 of which must be a bunch grass species.
 - ii. Native Forbs: The average density or frequency of forbs must be a minimum of 80% of the reference site. Diversity of forbs on a reclaimed site must be equal to or greater than the reference site.
 - iii. Non-Native Weeds: Sites must be free from all species listed on the Wyoming or Federal noxious weed list. All state and federal laws regarding noxious weeds must be followed. Other highly competitive invasive species such as cheatgrass must be controlled.
 - iv. Plant Vigor: Plants must be resilient as evidenced by well-developed root systems, flowers, and seed heads. All sites must exhibit the sustainability of the above desired

attributes after the removal of external influences. A minimum of 1 growing season without external influences (irrigation, mat pads, fences, etc.) may satisfy this requirement.

Successful reclamation criteria must be met prior to the operator proceeding with additional development within the FCPA. For example if development in Phase 1 begins in 2011 and runs through 2013, prior to moving into Phase II the 2011 development areas must meet the Year 3 reclamation requirements, the 2012 development areas must meet the Year 2 reclamation requirements, and the 2013 development areas must meet the Year 1 reclamation requirements.

1. Final reclamation:

- d. Final Reclamation – Includes disturbed areas where the original landform and a natural vegetative community have been restored.

Indicators:

Refer to the Wyoming Relation Policy – Instruction Memorandum No. WY-2009-022 located on the web at:

<http://www.blm.gov/style/medialib/blm/wy/resources/efoia/IMs/2009.Par.54664.File.dat/wy2009-022.pdf>.

1. Reclamation plan:

A reclamation plan shall be developed for all surface disturbing activities and will become part of the proposed action in the NEPA document. The level of detail for the reclamation plan shall reflect: the complexity of the project, the environmental concerns, and the reclamation potential for the site. These plans shall also incorporate any program or regulatory specific requirements for reclamation. The reclamation plan shall address short-term stabilization to facilitate long-term reclamation. The reclamation plan is considered complete when all the reclamation requirements described in the WY Reclamation Policy have been addressed, the techniques to meet the reclamation requirements are described in detail, and the BLM concurs with the reclamation plan.

Reclamation Monitoring and Final Abandonment Approval

Monitoring Intensity

The vision is for industry to monitor each individual Application for Permit to Drill (APD) and right-of-way (ROW) including; well pads, portions of roads, power lines, pipelines, and other disturbances. Monitoring should begin with pre-disturbance surveys before disturbance takes place. Monitoring and reporting will take place annually.

BLM will perform follow-up monitoring to insure quality control and quality assurance to maintain the integrity of the data. Point line transects will be the base monitoring methodology with a minimum of 200 points for each location.

a. Monitoring methods

Methods for monitoring vegetation and ground cover are recognized as standard monitoring and surveying methodologies. The point line or line intercept method is used to measure the amount of ground cover after disturbance. Ground cover is important in controlling surface erosion after a disturbance. Most ground cover on a reclaimed well pad is in the form of

mulch or reestablished vegetation. Monitoring and reporting of surface disturbances will occur annually.

The operator may use any BLM approved monitoring method, however, BLM will utilize the point line transect method for vegetation and soil surface factor (SSF) method for site stability to determine when reclamation standards have been met.

b. Site selection

Site selection must include representative sections (transects) of all areas of the disturbed environment. Transects are configured to include edge effect, pits, and general resource conditions, as much as practicable. Standardization will assure repeatability and allow comparison of data as well as reduce confusion.

c. Linear features

Include roads, power lines, pipe lines, etc. associated with applications for permit to drill (APDs) or rights of way (ROW). Sites selection should be made after speaking with individuals who are familiar with the characteristics of the different land forms, soil types, precipitation zones, and vegetation communities within the length of the linear feature. 0.25 mile monitoring sections must be selected that best represent all of the disturbed areas. For example; variation in slope, aspect, plant communities, soil types, view sheds, and other features.

d. Size and frequency

Monitoring sites will be in standardized segments, measured by tape. Monitoring segments should also be selected for reference conditions as well as for ROW or APD representation. Success and degree of success will be determined by how closely each site matches the defined Ecological Site description (ESD), in the success criteria for each described soil type and precipitation zone.

e. Timing and duration

Monitoring should be conducted during the effective growing season generally from April 1st to July 15th but may go into October with sufficient moisture. Monitoring should occur at approximately the same time each year. Monitoring and reporting of interim reclamation will be required from the time restoration is initiated until success is achieved and agreed to by BLM, then every third year thereafter until signed off as successfully reclaimed at project completion.

f. Field methods

Field methods include both qualitative assessments and quantitative measurements.

Revegetation is an important component of site stabilization and accelerates a return to landscape productivity. Vegetation reduces erosion by roughening the ground surface, slowing drainage, and increasing infiltration and deposition. Plant roots promote slope stability by breaking up soil, increasing shear strength, increase porosity, and encourage infiltration. Vegetation can reduce soil moisture loss, increasing the available storage for the next precipitation event. Revegetation goals are twofold: Short-term erosion prevention and long-term conversion to native plant communities. We have five questions we would like to answer through vegetative monitoring:

- Is there sufficient ground cover to control surface erosion?
- Is there sufficient establishment of desired plant species?

- Are erosion features within standards?
- Has the site been properly re-contoured?
- Are weeds controlled?

g. Well pads and similar shaped disturbances

To monitor well pads run a tape to measure the length and width of a pad or other feature, divide into transects across the shortest width 20 feet apart. Only basal vegetation will be recorded. If foliage is encountered record hit at ground surface (bare ground, litter, grass etc). Pad transects will include 200 points. The basic rule is transects should be no more than two times the distance between points. For example, if you reduce the distance between points on a small pad to a reading every five feet, then transects should be spaced at no more than 10 foot intervals.

Monitoring for successful interim reclamation or final reclamation and abandonment will follow the same monitoring protocols.

h. Linear features

Linear features will be similarly monitored by selecting representative portions consisting of a minimum of one 0.25 mile (1,320') monitoring section for each 5 miles or less of each feature. For sites less than 0.25 mile in length, the entire length will be monitored.

Monitoring will consist of a minimum of four 100 foot transects run from disturbed edge to disturbed edge, with a reading every two feet. Monitoring will continue annually after reclamation is initiated until bond release or commensurate with the life of the project.

Problem areas, for example, weed infestations or bare spots, may require remedial work to bring them into standards.

Pre-disturbance and Annual (post-disturbance) Surveys

a. Noxious and invasive weeds

An Integrated Pest Management Plan (IPMP) will be developed and submitted by each project proponent to the BLM Buffalo Field Office. Weed surveys will be conducted before surface disturbance takes place and annually afterwards. Monitoring will include, identifying noxious and invasive weeds by species and extent.

Pre-treatment of weeds may be necessary to minimize the potential for spread and to minimize treatment costs post-construction. Annual surveys may need to be conducted more than once per year to allow for variation of each species' growing periods (i.e., cool season vs. warm season species).

b. Photographs

Digital photographs give a visual record of conditions over time. Digital photographs will be used to document conditions of vegetation, site stability, erosion, and other features or conditions subject to change over time. Digital photos must be taken from each corner of a well pad with sufficient clarity and focus to monitor general conditions on the pad. More than four photos' can be taken to capture important features. Identify photo location on a field monitoring form to record photos, include direction of photo (compass) and where photo was taken from. Also record what the photo is capturing (i.e., noxious weeds [or lack of], a fence, a good stand of grass, certain forbs or shrubs, etc.) Also be sure the field of view and focus are similar in subsequent photos. BLM will also need photo copies of seed tags.

Photos should be part of the annual reporting for that years planting, if no seed planting takes place then there is no need to include a new copy of the seed tags.

c. Reclamation Success Criteria

The following list contains seed mixes recommended by resource specialists with years of local knowledge. Care and planning must be taken to choose mixes and amounts that are appropriate for the site specific conditions. All sites must be planted with a diverse mix of grasses and forbs and possibly shrubs to be considered successful. The final goal is to restore disturbed sites so that they closely resemble pre-disturbance native plant communities. No single species will account for more than 30% total vegetative composition unless it is evident at higher levels in the adjacent landscape. Vegetation canopy cover and species diversity and type shall approximate the pre-selected reference site. Erosion features shall be equal to or less than the reference site and include restoration of the original land form.

d. Reclamation re-vegetation standards

The following are example Ecological Site Descriptions (ESDs). Wyoming site descriptions currently do not contain percentages. The Buffalo Field Office (BFO) intends to initiate a rigorous, statistically sound, ecological site description sampling program to develop appropriate percentages for Fortification Creek and the Powder River Basin.

Shallow Loamy/Clay Sites – *characterized as a sagebrush/wheatgrass community with 10-14 inches precipitation.* Includes: Dense clay, Impervious clay, Shale, Shallow loam and Loamy ESD's.

Reclamation revegetation standards for this ecological site include the following:

- Grasses 50-70%;
- Forbs 10%;
- Bare ground < 25%;
- No noxious weeds; and
- Less than 5% non-native invasives.
- Shallow soils will tend to be composed of 10-20% woody species, and deeper soils will tend to be composed of 20-30% woody species.
- All vegetation measurements are of basal vegetation on point line transects.

Shallow Sandy Sites – *characterized as a sagebrush/bunchgrass community with 10-14 inches precipitation.* Includes Sandy ESD.

Reclamation revegetation standards for this ecological site include the following:

- Grasses 45-55%;
- Forbs 10-20% %;
- Bare ground < 20%;
- No noxious weeds; and
- Less than 5% non-native invasives.
- Shallow soils will tend to be composed of 10-20% woody species, and deeper soils will tend to be composed of 20-30% woody species.
- All vegetation measurements are of basal vegetation on point line transects.

Loamy/Clay Sites – *characterized as a sagebrush/wheatgrass community with 10-14 inches of precipitation.* Includes: Dense clay, Impervious clay, Shale, Shallow loam and Loamy ESD's.

Reclamation revegetation standards for this ecological site include the following:

- Grasses 60-70%;
- Forbs 10-15%;
- Bare ground < 30%;
- No noxious weeds and
- Less than 5% non-native invasives.
- Shallow soils will tend to be composed of 10-20% woody species, and deeper soils will tend to be composed of 20-30% woody species.
- All vegetation measurements are of basal vegetation on point line transects.

Sandy Sites – characterized as a sagebrush/bunchgrass community with 10-14 inches of precipitation. Includes Sandy ESD

Reclamation revegetation standards for this ecological site include the following:

- Grasses 70%;
- Forbs 10%;
- Woody 20%;
- Bare ground < 40%;
- No noxious weeds; and
- Less than 5% non-native invasives.
- All vegetation measurements are of basal vegetation on point line transects. Sand dunes will tend to have a higher woody component.

Recommendations:

To be pulled from BFO standard and programmatic COAs, BLM BMPs, etc.

1.3 Definitions

Bare ground – Areas of mineral soil with no vegetation or litter.

Basal Area (plants) – The cross-sectional area of the stem or the stems of all plants in a stand. Herbaceous and small woody plants are measured at the near ground level; larger woody plants are measured at breast or other designate height. *Interpreting Indicators of Rangeland Health – Technical Reference 1734-6*

Contamination – The presence of man-made chemicals or other alterations in the natural soil or water environment (pesticides, hazardous substances, petroleum, salts). *Adapted from various sources.*

Erosion Control – To protect soil surface and prevent soil particles from being detached by rainfall, snowmelt, or wind. Erosion control works to keep the soil in place.

Dominant species – No single species will account for more than 30% total vegetative composition unless it is evident at higher levels in the adjacent landscape. Vegetation canopy cover and species diversity and type shall approximate the surrounding undisturbed area.

Ecosystem – Includes all the organisms of an area, their environment, and the linkages or interactions among all of them; all parts of an ecosystem are interrelated. The fundamental unit in ecology, containing both organisms and abiotic environments, each influencing the properties of the other and both necessary for the maintenance of life. *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement (BLM 2007)*

Federal Action – Approval of specific projects, such as construction or management activities located in a defined geographic area. Projects include actions approved by permit or other regulatory decision as well as federal and federally assisted activities. *National Environmental Policy Act (NEPA) [42 U.S.C. 4321 et seq.]*

Forb – non-grassy herbaceous (non-woody) plant.

Grass – Any of a large family gramineae of monocotyledonous, mostly herbaceous plants, with a jointed stem, slender sheathing leaves and flowers borne on spikelet's or bracts.

Gravel – less than 2" at the intermediate axis.

Invasive Species – A species that is not native (or is alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. See BLM Invasive species list. *Executive Order 13112*

Litter – Litter provides a source of organic matter for incorporation into the underlying mineral soil, acts as a source of carbon for organisms carrying out decomposing functions, and insulates the soil from extreme air temperatures. Litter also plays a critical role in watershed protection by promoting water infiltration and protecting the soil from the erosive energy of raindrops and surface runoff. Ground cover has typically been defined as the area of ground covered by vegetation and litter. Litter has been defined by some authorities as dead organic matter lying on the mineral soil; others have included standing dead material and dead fallen organic material. On the basis of these definitions, litter in sagebrush steppe ecosystems includes fallen dead leaves, stems, bark, flowers, and seeds of shrubs, forbs, and grasses; dead cushion plants and moss; detached lichen; animal feces and dead insects; and unidentifiable amorphous woody organic matter (humic litter) lying on the mineral soil surface. Litter seems to be the most prevalent ground cover component in sagebrush steppe ecosystems. Researchers have collected long-term data on vegetation and ground cover characteristics in high-elevation sagebrush steppe in south-central Wyoming. According to these data, litter was consistently the largest ground cover component, averaging 46% over a 14 year measurement period. Data from sagebrush steppe plant communities in North Park, Colorado, also showed litter to be the largest component (>30% of ground cover).

Limited Reclamation Potential Areas (LRP) – There are areas (e.g., alkali flats, badlands, dunes, rocky outcrops) where reclamation may be more difficult than in traditional landscapes. LRP areas are characterized by highly erodible soils, steep slopes, Sites having physical, biological, and/or chemical limitations, low precipitation rates, or areas which have characteristics that make traditional reclamation practices impractical or unfeasible. Because reclamation in LRP areas is more difficult, LRP areas should be avoided. However, if areas of LRP have been previously leased or permitted, additional bonding may be required. Alternatives to development in LRPs should be carefully analyzed using information from the reclamation plan and documented in the NEPA process.

Reclamation Plan – A written document that addresses the reconstruction of disturbed ecosystems by returning the land to a stable and productive condition compatible with the land use plan. This Plan shall address the Goals and Objectives described in the Wyoming Reclamation Policy.

Scenic Quality – The overall impression of a landscape retained after driving or walking through, or flying over an area. The Scenic Quality of an area is rated as Class A (outstanding

visual characteristics), Class B (combination of outstanding and common visual characteristics), and Class C (common visual characteristics). See BLM Handbook H-8410 Visual Resource Inventory and BLM Handbook H-8431 Visual Resource Contrast Rating

Sediment Control – To trap soil particles after they have been dislodged and moved by wind or water. Sediment controls generally rely on filtering or settling soil particles out of water or wind that is transporting them.

Shrub – A woody plant which branches below or near ground level into several main stems, so has no clear trunk. It may be deciduous or evergreen. At the end of the growing season there is no die-back of the axis.

Soil Surface Factor (SSF) – Numerical expression of surface erosion activity caused by wind and water as reflected by soil movement, surface litter, erosion pavement, pedestalling, rills, flows patterns, and gullies. Values vary from 0 for stable erosion condition to 100 for a severe condition. *Technical Note #346, Erosion Condition Classification System*

Surface Disturbing Activities – An action that alters the vegetation, surface/near surface soil resources, and/or surface geologic features, beyond natural site conditions and on a scale that affects other Public Land values. Examples of surface disturbing activities may include: operation of heavy equipment to construct well pads, roads, pits and reservoirs; installation of pipelines and power lines; and the conduct of several types of vegetation treatments (e.g., prescribed fire, etc.). Surface disturbing activities may be either authorized or prohibited. *Wyoming Information Bulletin 2007-029, Guidance for Use of Standardized Surface Use Definitions*

Topsoil – The biologically active, upper part of the soil profile, being the most favorable material for plant growth. *Adapted from U.S.D.A., Natural Resources Conservation Service*

Tree – Perennial, woody plant with a single stem (trunk), normally greater than 4 to 5 meters (13 to 16 feet) in height; under certain environmental conditions, some tree species may develop a multi-stemmed or short growth form (less than 4 meters or 13 feet in height).

Weed – A plant considered undesirable, unattractive, or troublesome, especially one growing where it is not wanted. We are generally interested in noxious and non-native invasive species.

Waste materials – Any discarded or abandoned material that can interfere with successful reclamation, safety, and long term stability of a site (contaminated soil or water, drilling mud, solid waste). Adapted from various sources.