

APPENDIX E: RECLAMATION GUIDANCE

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INTRODUCTION

This appendix was developed to provide a comprehensive source for the pertinent guidance and requirements of the BLM for the reclamation of surface disturbance in the CD-C project area. The documents in this appendix can be used by CD-C Operators to develop reclamation plans for their proposed development that would meet the requirements of the BLM and lead to restoration of disturbed sites on public lands.

The documents in this appendix include:

- **Appendix 36 to the Rawlins RMP.** This document lays out the basic requirements for reclamation of surface disturbance in the RFO. The RMP was published in December 2008 and Appendix 36 has been in use since that time. It provides information needed to develop a reclamation plan and to prepare monitoring reports and explains the criteria for final reclamation success, including: establishment of eighty percent of pre-disturbance ground cover; 90 percent dominant species; no noxious weeds; and erosion features equal to or less than surrounding area.
- **High Desert District Policy for Reclamation of Disturbed Lands.** The district policy formally adopts and implements the Wyoming BLM State Reclamation Policy (IM WY-2012-032). Additionally, it underlines the importance of on-the-ground reclamation success and cautions against requiring more reclamation planning information than is necessary.
- **Wyoming BLM State Reclamation Policy, IM WY-2012-032 and attachments.** This document identifies ten requirements that must be addressed when developing reclamation proposals for all surface-disturbing activities on public lands in Wyoming. They are:
 1. Manage all waste materials.
 2. Ensure subsurface integrity, and eliminate sources of ground and surface water contamination.
 3. Re-establish slope stability, surface stability, and desired topographic diversity.
 4. Reconstruct and stabilize water courses and drainage features.
 5. Maintain the biological, chemical, and physical integrity of the topsoil and subsoil.
 6. Prepare site for revegetation.
 7. Establish desired self-perpetuating native plant community.
 8. Reestablish a complementary visual composition.
 9. Manage invasive plants.
 10. Develop and implement a reclamation monitoring and reporting strategy.
- **Proposed Interim Rollover Objective for the Continental Divide-Creston Natural Gas Project Environmental Impact Statement and Record of Decision (February 25, 2011).** This document was developed by the CD-C Reclamation Work Group, an ad hoc group focused on improving reclamation in the CD-C project area. The document was intended to provide flexibility for industry, while maintaining healthy, desirable vegetation within the project area. The group, including representatives of industry, state agencies, the University of Wyoming, local governments, and the BLM, worked for two years to develop the document. The document provided the framework in which the *BLM Rollover Criteria, Continental Divide–Creston Draft EIS* (description follows) was developed.
- **BLM Rollover Criteria, Continental Divide–Creston Draft EIS.** The criteria described in this document are formally incorporated as an element of *Alternative C: Surface Disturbance Cap—High and Low Density Development Areas*. For the purposes of the CD-C EIS, the standards and guidance contained in the Rawlins RMP Appendix 36 and the Wyoming State Reclamation Policy, IM-WY-2012-032, apply to the Proposed Action and the other action alternatives. However, a specific

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exception is made with regard to *rollover* credits involved with *Alternative C*. *Rollover* credits exist in the context of a cap on the amount of surface disturbance generated by natural gas development. They refer to the process by which acreage that counted against a surface disturbance cap when natural gas facilities were initially constructed could be successfully reclaimed and *rolled over*, meaning counted again as undisturbed acreage. When a natural gas well pad and its associated road and pipeline are constructed, the initial disturbance is much larger than what is needed for the long term. After the well has been completed, the area that was initially disturbed but is no longer needed, perhaps 60 percent of the total, undergoes *interim reclamation*.¹ With a surface disturbance cap in place, this portion of the initial disturbance acreage can be *rolled over* when the BLM determines that it has been successfully reclaimed.

In some cases, for example in the neighboring Atlantic Rim Natural Gas Project, the success criteria applied for rollover credits are the same as the final reclamation standard, in other words, the RMP Appendix 36 performance criteria: establishment of 80 percent of pre-disturbance ground cover; 90 percent dominant species; no noxious weeds; and erosion features equal to or less than surrounding area. For the CD-C Alternative C, however, the RFO has defined *Reclamation Rollover Criteria* as follows:

- The area is re-vegetated with a stable, approved plant community;
- Vegetative cover is sufficient to maintain a healthy, biologically active topsoil;
- Erosion is controlled;
- Habitat, visual and forage loss is minimized; and
- No noxious weeds are present.

There is no requirement that pre-disturbance ground cover or the dominant species match a specified percentage. Once these criteria have been satisfied in the judgment of the RFO, the affected acreage would be *rolled over* and the cap would increased by that amount.

¹ As defined in IM WYD- 03-2011-02, “*interim reclamation* is used to restore vegetation, and scenic and habitat resources while a well continues to produce energy. With interim reclamation, all areas not needed for the production of oil and gas are reclaimed, that is, reshaped, covered with topsoil, and reseeded with native plants. Interim reclamation also refers to the stabilization of soil by revegetation on sites that will likely be further disturbed in the future. This includes sites where recontouring is needed where periodic disturbance may occur due to operation and maintenance activities.” *Interim reclamation* can be contrasted with *final reclamation*, which is “reclamation of an area that is not planned for further disturbance including recontouring, stabilization of soil by revegetation and restoring the ecosystem function originally found at the site.” It normally occurs after a well is plugged and abandoned.

Appendix 36, Rawlins RMP

Reclamation of public land will be required for any surface-disturbing activity. A reclamation plan appropriate in detail and complexity, and tailored to a specific surface-disturbing activity, will be required and made a condition of approval of any action. This appendix details the elements that need to be considered during pre-disturbance authorization of any surface disturbance and the post-disturbance steps required to assure timely and proper recovery of the site.

The reclamation plan will provide a framework to develop project-specific and site-specific reclamation actions and guide land management efforts toward a planned future condition for any surface disturbance. Early coordination between the Bureau of Land Management (BLM) and project proponents is necessary to produce a comprehensive plan. The reclamation plan will serve as a binding agreement between project proponents and BLM for the expected reclamation condition of the disturbed lands and must be periodically reviewed and modified as necessary. The reclamation plan will include sufficient monitoring requirements, reports, and components to ensure the reclamation plan is current.

Although the proponent will usually develop the reclamation plan, appropriate BLM involvement in preplanning, data inventory, and approval is essential to develop the optimum reclamation proposal. Most determinations regarding what is expected should be made before the reclamation plan is approved and implemented. However, any plan can be modified to adjust to changing conditions or to correct for an oversight. An approved reclamation plan and reporting obligations will be required prior to any surface-disturbing activity. A reclamation plan should provide the following:

- A logical sequence of steps for completing the reclamation process
- The specifics of how reclamation standards will be achieved
- An estimate of specific costs of reclamation
- Sufficient information for the development of a basis of inspection and enforcement of reclamation and criteria to be used to evaluate reclamation success and reclamation bond release
- Sufficient information to determine whether the reclamation plan is in conformance with the applicable BLM land-use and activity plans, as appropriate. Further guidance for reclamation can be found in the BLM/Forest Service Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (Gold Book), fourth edition, 2006, at http://www.blm.gov/bmp/gold_percent20book/FinalGoldBook_percent20-percent202006_percent20Edition.pdf.

In preparing and reviewing reclamation plans, BLM and the project proponent must set reasonable, achievable, and measurable reclamation goals that are not inconsistent with the established land-use plans. Achievable goals will ensure reclamation and encourage operators to conduct research on different aspects of reclamation for different environments. These goals should be based on available information and techniques, should offer incentives to both parties, and should, as a result, generate useful information for future use.

The purposes of the reclamation plan are as follows:

- Reclamation plans provide detailed guidelines for the reclamation process and fulfill federal, state, county, and other local agencies requirements. They can be used by regulatory agencies in their oversight roles to ensure that the reclamation measures are implemented, are appropriate for the site, and are environmentally sound.
- Reclamation plans will be used by the project proponent throughout the operational period of the project and subsequent to cessation of surface-disturbing activities. In turn, responsible agencies, including BLM, will use the reclamation plan as a basis to review and evaluate the success of the reclamation program.
- Reclamation plans should provide direction and standards to assist in monitoring and compliance evaluations.

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BLM reclamation goals emphasize eventual ecosystem reconstruction that returns the land to a condition approximate to or better than that which existed before it was disturbed, by re-creating the successional pathway that restores the plant cover and species composition of the site to its pre-disturbance direction and boundaries.

Interim reclamation is an intentional activity to initiate or accelerate the recovery of an ecosystem with respect to its health, integrity, and sustainability, including quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation.

Interim reclamation measures are used to achieve this short-term goal while setting the stage for final recovery. For example, on a well pad where drilling is completed, interim reclamation would include drying and back-filling reserve pits, initial recontouring and redistribution of saved top soil, installing a rocked driveway, installing fencing as needed, and revegetating the area. Interim reclamation guidelines will be addressed on a case-by-case basis, as appropriate.

Final reclamation measures are used to achieve the recovery goal. A disturbed area has recovered—and is restored—when it contains sufficient biotic and abiotic resources to continue its development and interactions without further assistance or subsidy. It will demonstrate resilience to normal ranges of environmental stress and disturbance.

Planning efforts that consider the processes necessary for successful reclamation are important. Pre-disturbance surveys, site stabilization, weed control, and maintenance and health of soils are significant considerations. All forms of revegetation must consider vegetative succession patterns and processes. Annual monitoring and reporting is the best way to track success and implement adaptive management strategies that treat problems.

The ideal starting point for reclamation is to ensure that reclamation planning starts before disturbance and is an integral part of the operational plan. All attempts should be made to develop and implement new ideas and technologies that limit or greatly reduce the amount of land surface disturbance.

Pre-disturbance surveys provide data that allow for proper planning and timely implementation of planned activities. For instance, pre-disturbance site surveys give the operator the information to know what plant communities, composition, structure, and successional pathway to restore to and can influence the amount and type of seed that is ordered and how and where the seed is planted and handled. Pre-disturbance inventories define baseline conditions and should be followed up with annual monitoring.

Among items to be emphasized in achieving these goals are:

- Stabilization of disturbed soils
- Soil stabilization through establishment of a vegetative ground cover on disturbed sites during the first growing season following disturbance
- Restoration of the same native vegetation disturbed or removed or restoration of an alternate vegetative regime in consultation with and approval by BLM's Rawlins Field Office
- Provide vegetation and/or site characteristics to accommodate previous land uses
- Minimal disturbance of the existing environment and avoidance of riparian areas
- Annual monitoring, detection, and control of invasive and noxious weeds beginning the first season of disturbance
- Monitoring and management of reclamation sites to evaluate weed populations, reclamation success, and to plan and report on the program annually
- Positive efforts to resist the spread of weeds, including power washing of machinery and equipment between work sites consistent with the Rawlins Weed Prevention Plan (USDI, BLM 1999b).

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SOIL

Topsoil is the building block of successful reclamation. Soil consists of living organisms that must be properly cared for. Many plants rely on these organisms to facilitate the uptake of nutrients and water, especially in times of stress. To preserve and care for topsoil organisms, there are several strategies that can be employed—stockpiled soil can be immediately planted with a mix of native plant species, inoculated after being respread and planted with early successional species, or stored for short periods of time.

Topsoil should be handled separately from subsoil materials. At all construction sites, if topsoil must be stripped, project proponents must provide for sufficient quantities to be respread to a depth of at least 4 to 6 inches over the disturbed areas during reclamation. In areas where deep soils exist (such as floodplains and drainage channel terraces), at least 12 inches of topsoil should be salvaged. Where soils are shallow or where subsoil is stony, as much topsoil should be salvaged as possible. Care should also be taken to avoid mixing productive soil types with less productive soil types where two or more soil types may occur on a single site.

The salvaged soil can either be stockpiled for later use or used immediately over regraded surfaces that are ready for reclamation. The latter option, sometimes called direct or live haul, is preferable to stockpiling because the soil microbes, bacteria, viable seeds, and plants that can take root are at their most abundant, leading to better revegetation. Stockpiling soil for long periods results in the loss or elimination of these beneficial characteristics, especially when soils are stockpiled more than several feet high diminishing biological activity as a result of lack of oxygen.

Topsoil will be stockpiled separately from subsoil materials to preclude contamination or mixing, and topsoil stockpiles should be signed. When topsoil will be stored for more than 1 year, stockpiles should not exceed 2 feet in depth. They should be seeded with a prescribed seed mixture and covered with mulch to reduce erosion and discourage weed invasion. Runoff should be diverted around topsoil stockpiles to minimize erosion of topsoil materials. In most cases, disturbances will be reclaimed within 1 year. Therefore, it is unlikely that topsoil will be required to be stockpiled for more than 1 year. Salvaged topsoil from roads and project sites will be respread over cut-and-fill surfaces not actively used during the project life.

In some cases, there may be insufficient quantities of topsoil available for salvage to adequately cover the surfaces upon final reclamation and revegetation. In these cases, there is the need to find sui replacement or substitute growth media; this may include using subsoils or strata deeper within the overburden with suitable characteristics for plant growth. Deficiencies in the replacement or substitute soil could be made up by using soil amendments. See <http://www.nps.gov/plants/restore/pubs/intronatplant/planning.htm> for a good overview on the restoration process and soil needs.

SITE PREPARATION

It is important to consider diversity in seedbed preparation to account for various seed sizes and establishment strategies of different species. Consideration should be given for seed-safe sites, water infiltration and collection, shade, and frost protection.

RECONTOURING

Trees, shrubs, and ground cover adjacent to disturbance areas but not cleared from rights-of-way (ROW) require protection from construction damage. Recontouring to preconstruction condition as well as restoration of normal surface drainage are required.

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ROAD RECLAMATION GUIDELINES

Road reclamation guidelines are as follows:

- Determine the desired level of obliteration and reclamation. Determine whether there are alternative short- or long-term uses for roads.
- Determine short- and long-term reclamation objectives and goals. Identify the monitoring methods to determine reclamation success or failure and possible mitigation.
- Reclaim the road; the effort may include ripping and scarifying the surface, removing culverts and other flow structures, recontouring cut-and-fill slopes to provide for complete removal of the road, and total recontouring to the original topographic profile.
- Reclaim vegetation to standards outlined in the section on “criteria for reclamation.”
- Establish mitigation measures to remedy problems identified by monitoring.

WEEDS

One of BLM’s highest priorities is to promote ecosystem health, and one of the larger obstacles to achieving this goal is the rapid expansion of weeds across public lands. Invasive plants can dominate sites and often cause long-term changes to native plant communities. If not eradicated or controlled, noxious weeds will jeopardize the success of reclamation. Invasive weeds can slow reclamation success or halt it altogether. ROW, mineral lease, mining claim, and permit holders are required to monitor and control noxious and invasive weeds on public land as stipulated within their permits and authorizations. Some recommended best management practices (BMP) for weed control are located in Appendix 31, Rawlins Field Office Noxious Weed Prevention Plan (see Proposed RMP/Final EIS).

SEED

On all areas to be reclaimed, seed mixtures are required to be weed free and site-specific, composed of the same native species as were disturbed, or early successional species consisting of pioneer species, including seasonal or annual species (that may only be evident at certain times of the year), that will lead to a similar climax community as that disturbed. Site preparation and species choices must ensure soil stability.

A pre-disturbance species composition list must be developed for each site to ensure proper community composition, function, and structure. This will ensure that the type of vegetative community replaced is compatible with climate and soil types and should make it easier for the project proponent to successfully restore and stabilize specific sites.

Livestock palatability and wildlife habitat needs must be given consideration in seed mix formulation during reclamation within areas of important wildlife habitat (crucial winter range, sage-grouse nesting habitat, etc.); provision shall be made for the replacement of native browse and forb species. BLM guidance for native seed use is the BLM Manual 1745 and Executive Order (E.O.) 13112 (Invasive Species, 64 Code of Federal Regulations [CFR] 6183).

It is helpful to become familiar with the following terms when ordering seed to assist in making informed decisions.

Certified Seed (Blue Tag)

This certification only applies to seed produced through cultivation, not seed collected in the wild. The seed certification system promotes the production and purchase of seed of known genetic identity. Only cultivated, named varieties can be certified. A certification agency inspects field conditions and regulates how the seed is produced, harvested, and cleaned. The seed is subject to a variety of laboratory tests. This

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certification process guarantees the seed has the same genetic potential to perform in the field as the original seed did when it was released for production.

Source Identified Seed (Yellow Tag)

The Association of Official Seed Certifying Agencies (AOSCA) has an approved seed certification class for native seed collection called the “Source Identified Class.” The tag confirms to the purchaser that the location of seed harvest was verified by the certifying agency.

Pure Live Seed

Pure live seed (PLS) is a measure describing the percentage of a quantity of seed that will germinate. It is a way to standardize quality so the purchaser can compare the quality and value of different lots of seed. One lot may be cheaper but may not have as high a PLS as another lot, and therefore may not be a better buy because fewer seeds would actually germinate.

$$\text{PLS} = \text{percent purity} * \text{percent germination rate}/100$$

$$\text{Example: } 90 \text{ percent purity} * 50 \text{ percent germination rate}/100 = 45 \text{ percent PLS}$$

Seed Testing and Labeling

Seed Operators should include a clear label on each bag of seed that shows the results of purity and germination tests and the scientific name of the species. The Association of Official Seed Analysts oversees these tests. Purity of the seed is the percentage of the labeled species by weight. The percentages of other crop, weed, inert material, and the percentage of dormant or hard seed should also be included. The label should also show the percentage of the seed count that will germinate

Site Adapted Custom Seed Collection

Some seed Operators also may offer collection services that involve harvesting seed from sites that the customer specifies. This is a preferred method for many who want to ensure that their seed is from local sources.

Seed Suppliers

Many of the considerations for choosing plant material suppliers also apply to choosing seed suppliers. Seed suppliers should operate in the same geographic ecoregion as the restoration site because that supplier is most likely to have native seed suitable for that area. Companies specialize in native seed collection, processing, and growing, and can have a wealth of knowledge about native plants and seeds. Do not rely on a single supplier for all seed needs.

Standard Seed Mixtures—Rawlins Field Office

Care and planning must be taken to choose mixes and amounts that will benefit under site-specific conditions. Planning and thought must also go into selecting successful planting and site-preparation techniques. All sites must be planted with a diverse mix of grasses, forbs, and shrubs to be considered successful. The project proponent is ultimately responsible for successful restoration of disturbed sites. Alternate seed mixes can be submitted by the project proponent to BLM for review and approval prior to use. The final goal is to restore disturbed sites so that they closely resemble pre-disturbance native plant communities. Some standard seed mixes are available for the Rawlins Field Office and contain only native species. If the use of a non-native species is desired, documentation of the need is required by BLM policy. Non-native species may be considered for erosion and weed control. Seed mixtures consisting of sterile annual cover crops, such as tricale hybrid, can be used. The use of a non-sterile plant species such as wheat as a cover crop is not recommended because of its ability to reseed itself. Follow-

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up seeding or corrective erosion control measures will be required on areas of surface disturbance that fail to meet reclamation success standards within a reasonable time.

Mulch

Use of mulch during reclamation may enhance chances for successful vegetation reestablishment. Mulches can help control wind and water erosion, retain and collect seed, increase and prolong soil water capacity, and add organic compounds to the soil. Mulches are best applied after seeding to ensure proper seed contact with soil. Mulch may include hay, small-grain straw, wood fiber, live mulch, cotton, jute, or synthetic netting. Straw mulch should contain fibers long enough to facilitate crimping and provide the greatest cover. Take care that mulch is not more than 1 inch deep; if too deep a layer is applied, it can retard vegetation establishment.

Any mulch used must be certified free from mold, fungi, or noxious or invasive weed seeds.

LIVE PLANTINGS

Live plants can be planted on disturbed sites and, with proper site preparation, can greatly enhance restoration efforts and shorten time frames. Operators can buy bare root and container stock directly from vendors or can contract seed collection and growth from local growers. Another strategy is to use an excavator to collect clumps of plants from the site and plant them either on reserved topsoil piles and/or on restoration sites during recontouring. These clumps can provide native seed and soil flora as well as collect precipitation and provide shade for newly emerging plants.

Seeding and Planting Methods

There are many types and configurations of rangeland seeders, interseeders, and transplanters. Be sure to use the right tool for the job. The equipment should be set up to segregate seed by size and planting depth. The contractor should know when, where, and under what conditions to plant the appropriate species. Many forbs, shrubs, and some grasses do not compete well as young plants and should be planted with compatible species. Less aggressive, slower growing species should be planted separately from faster growing more aggressive species. Some species require companion species; there are many variables, so care must be taken in seed selection and planting technique.

Most conventional grain drills are inadequate for rangeland seeding. Their seed boxes are generally not individually suspended, and their depth regulators are usually inadequate for native species and generally plant too deep. Adequate equipment and knowledge of site-specific reclamation practices is paramount to the success of seeding objectives. Look for contractors using proven rangeland equipment and methods. For example, they should have a rangeland drill, Truax drill, land imprinter, Amazon no-till drill, broadcast seeder, Brillion-seeder, seeder-scalper, interseeders, surface seeder, hydro-seeder, scarifier, dozer, or other appropriate equipment.

Depending on site-specifics such as soil types and soil moisture, there are a number of ways to properly prepare seedbeds. It is best to prepare the seedbed early in the fall and then plant in late fall or early winter. However, when proper conditions exist, planting can occur through the winter into early spring. Planting at other times of the year will have higher chances for failure. Care should be taken not to work soils that are too wet because compaction and soil crusting can occur.

Seedbed preparation and seeding often occur simultaneously. Therefore, it is critical to choose the proper methods and timing. A good strategy for seed mixes is to leave seedbeds in a rough surface condition, then broadcast seed, followed by light chaining or harrowing. Deep furrow drilling should not be used in dry soils or in loose soils because it tends to slough and leave seeds at uneven depths and often too deep for germination. Deep furrow drilling in tighter soils may be appropriate because it can reduce soil moisture loss and shade new seedlings. Cultipacker seeders, punch drills, pitting, and some compact drills

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may also be a good strategy for loose soil types, particularly if they are able to segregate seed and plant at varying depths.

Planting container or bare-root stock requires specific strategies that have been proven successful. Some methods that can be used include random hand-planting, trenching, inter-seeding, and deep-furrow planting.

It is essential to consider several options for seedbed preparation to account for soil types, pH, structure, variable seed size, planting depths, competition, and the establishment of strategies for different species. Consideration should be given for seed-safe sites, water infiltration and collection, shade, and frost protection.

Planning and Monitoring

For each discrete site where ground disturbing activities are planned, a site-specific reclamation plan shall be prepared, submitted, and approved by BLM before the project proponent disturbs the environment. Guidance and requirements for this plan can be found in program-specific direction (USDI, BLM 1983). A project-wide reclamation plan may be considered if it addresses the individual site disturbances specifically.

With the exception of active work areas, disturbed areas anticipated to be left bare and exposed will be stabilized with at least a 50-percent cover of mulch to prevent soil erosion. Variation of the cover percentage and the use of other stabilizing materials can be proposed and used with BLM approval consistent with the relevant project-specific reclamation plan. For areas anticipated for further disturbance in the near future, use of the seed mixtures detailed in Temporary Seed Mixtures may be acceptable in the interim.

First Growing Season

Reclamation actions will be implemented before the first growing season following disturbance with the goal of returning the land to a condition approximate to or more productive than that which existed before disturbance or to a stable and productive condition compatible with that described in the land use plan. Consistent with the reclamation plan, the operator will ensure the following during the first growing season.

Prior to the beginning of the growing season—

- Stabilize disturbed site soils until they are revegetated with no obstacles to germination and growth of seed
- Properly prepare the site by—
 - Recontouring for permanent reclamation
 - Completing soil preparation activities, such as ripping, straw crimping/seedbed preparation for planting, including drilling and broadcast methods
 - Planting the approved seedling/seed mixtures using site-specific methods for successful revegetation using regionally, and/or site-adapted genotypes
 - Ensuring that weed treatments are compatible with seed mixtures.

During the first growing season—

- Monitor germination and growth of plants in the area being reclaimed
- Detect and control weeds in all areas—not just reclaimed areas
- Use adaptive management to correct establishment and growth problems
- Put up temporary fencing to avoid adverse effects to reclamation

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- Build snow fencing, if requested, to increase effective precipitation and regenerate vegetation.

Following each growing season—

- Review and complete a site-specific vegetation monitoring report for areas being reclaimed (Table A36-1)
- Prepare a written, site-specific prescription for actions to be implemented, including—
 - Reseeding of areas not attaining reclamation success
 - Soil stabilization
 - Weed control needs
 - Mulching/fertilization or other cultural practices prescribed for the following season.

If the treatment area is found, through site-specific monitoring data, to be successfully reclaimed, monitoring to confirm reclamation success will continue for at least five seasons. The site will also comply with additional management needs, including control of weed infestations.

If the reclamation area is not successfully reclaimed or otherwise requires further management activities to establish vegetation, the actions prescribed will be implemented as planned and further monitoring will occur as detailed beginning with the first action listed above.

PROJECT PROPONENT RECLAMATION MONITORING REPORTS

The project proponent will provide BLM with an annual report before December 1 for all sites disturbed. The report will include—

- Copies of the completed individual site review forms or a BLM-approved electronic report
- A summary of monitoring data and results, including—
 - Individual site reclamation monitoring reporting data (Table A36-1)
 - Identification of sites successfully reclaimed by reclamation years (starting with the first growing season)
 - Identification of sites needing additional work or more reclamation activities by reclamation year
 - Sites proposed for the end of monitoring (i.e., sites that were successfully reclaimed)
- BLM useable shape file(s) or geographic information system (GIS) layer(s) that details location, name, type, and extent of—
 - New disturbances
 - Unreclaimed disturbance
 - New reclamation
 - Failed or unsuccessful reclamation
 - Locations of noxious/invasive weed infestation
 - Further vegetation treatments planned (e.g., mulching, matting, and weed control).

On these shape files or GIS layers, *location* shall be given as the legal location and geo-referenced location of the site; *name*, as appears on the BLM Application for Permit to Drill (APD), lease, or other BLM file name for the site; and *extent*, as the amount of area and location of the item.

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CRITERIA FOR RECLAMATION SUCCESS

Criteria based on pre-disturbance surveys or surveys of adjacent undisturbed natural ground cover and species composition² or—

- Eighty percent of pre-disturbance ground cover
- Ninety percent dominant species
- No noxious weeds
- Erosion features equal to or less than surrounding area.

Monitoring results must be from a standardized cover/species protocol finalized by BLM.

Table A36-1. Reclamation Monitoring Reporting Data

| | |
|-------------|---|
| General | WYW# (Oil and Gas Lease or ROW) |
| | Project Name |
| | Project Type (Well, Access Road, Pipeline, Facility, etc.) |
| | Qtr/Qtr Sec, T, R, County, State |
| Disturbance | Disturbance Dates |
| | Start-End |
| Reclamation | Reclamation Type (Interim/Final) |
| | Earthwork Contractor Name |
| | Earthwork & Topsoil Completion Date |
| | Soil Preparation Ripping Depth |
| | Area (Acres or Square Feet) |
| Seeding | Seeding Contractor Name |
| | Seeding Date |
| | Seedbed Preparation Methods (Disc, Harrow, Depths) |
| | Seeding Method (Drill, Broadcast, Depths) |
| | Copy of Seed Tag (Species percent, Purity percent, Germination percent) |
| | Actual Seeding Rate (Lbs/Acre) |
| | Area Seeded (Acres or Square Feet) |
| Other | Soil Amendments Used (Describe) |
| | Mulching/Erosion Netting/Tackifier |
| | Fenced Location |
| | Snow Fencing |
| Weeds | Type(s) of Weed Treated |
| | Weed Contractor Name |
| | Contractor License # |
| | Weed Treatment Date |
| | Weed Treatment Type (Chemical, Mechanical) |
| | Chemicals Used and Rates Applied |
| | Area Treated (Acres or Square Feet) (GIS Extent and Location) |

² The vegetation will consist of species included in the seed mix and/or occurring in the surrounding natural vegetation or as deemed desirable by BLM in review and approval of the reclamation plan. No single species will account for more than 30 percent total vegetative composition unless it is evident at higher levels in the adjacent landscape. Vegetation canopy cover production and species diversity shall approximate the surrounding undisturbed area

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Table A36-1. Reclamation Monitoring Reporting Data, *continued*

| | |
|--------------------------------|---|
| Inspection | Inspector's Name, Company, ID |
| | Inspection Date |
| | Time After Seeding |
| | Seedlings/Square Feet Growing |
| | percent and Extent of Bare Soil |
| | percent Ground Cover (Describe) |
| | percent Desirable Species (Describe) |
| | percent Noxious/Invasive Weeds (Describe) |
| | Erosion Features Present? (Describe) |
| | Evidence of Livestock Grazing (Describe) |
| | Reclamation Successful (Yes/No) |
| Reporting | Completed Spreadsheet or Database |
| | GIS Layer with Attribute Table with Site Data as Detailed |
| | Detail Disturbance Extent and Location |
| Monitoring | Permanent Reference Point |
| | Reference Photos |
| | Close-up Photos |
| Future Management Prescription | Reseeding |
| | Weed Control Needed |
| | Erosion Control Needed |
| | Grazing/Predation Issues |
| | Other Cultural or Mechanical Issues |

APPENDIX E—RECLAMATION GUIDANCE



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

High Desert District
280 Highway 191 North
Rock Springs, Wyoming 82901



2800, 3100,
3200, 3400,
3500, 3600,
3700, 3800 (WYD00)

May 30, 2012

Instruction Memorandum No. WYD 2012-005
Expires: 09/30/2016

To: Field Managers, High Desert District
From: District Manager, High Desert 
Subject: High Desert District Policy for Reclamation of Disturbed Lands

Program Area: All Surface Disturbing Activities.

Purpose: To affirm and adopt the Wyoming Reclamation Policy as codified in Instruction Memorandum WY-2012-032, dated March 27, 2012.

Policy/Action: In order to ensure a consistent and science-based approach to reclamation, the High Desert District (HDD) is adopting and implementing Instruction Memorandum (IM) WY-2012-032 with its ten reclamation requirements as the minimum standards that must be addressed when developing reclamation proposals for all surface disturbing activities occurring within the HDD. Addressing these ten requirements will help achieve both short and long-term reclamation success for site stabilization and eventual ecosystem reconstruction, as well as promoting reclamation planning and implementation consistency within and across the Field Office boundaries.

IM WY-2012-032 is supported with more detailed guidance such as a statewide monitoring and reporting strategy, and sample templates, and other technical guidance posted on the Wyoming Reclamation web site (<http://www.blm.gov/wy/st/eniprograms/reclamation.html>).

Timeframe: This IM is effective immediately.

Budget Impact: None

Background: Successful reclamation efforts are critical in maintaining an effective multiple use land management program. Nearly all authorizations for surface disturbing actions are based upon the assumption that an area can and ultimately will be successfully reclaimed. Those seeking approval to conduct surface disturbing activities on Public Lands must include

APPENDIX E—RECLAMATION GUIDANCE

reclamation planning as part of their permit process and the BLM must make this requirement clear early in the permitting process. This IM applies to all BLM authorized surface disturbing actions occurring within the High Desert District including those initiated by the BLM.

While development of a reclamation plan is a crucial component to achieving a successful reclamation project, it can also become an overwhelming and overly-burdensome process for operators, lessees, permit holders, and grant holders, as well as for BLM. It is imperative for us to remember that the overriding objective is to achieve successful restoration/reclamation of the disturbed area. It is far more desirable to have our external customers (lessees, operators, and grant holders, etc.), as well as BLM concentrate the bulk of their and our reclamation dollars on the physical on-the-ground reclamation components of the project, rather than on the development of the plan. To that end it is imperative that we require the reclamation plans to include no more than the minimum level of predisturbance site data and project component description than is essential to assure the plan will meet the reclamation objective for the site. In reiteration, do not require operators, lessees, and/or grant holders to gather and provide more information than is necessary to verify that their reclamation plan will accomplish BLM's interim and final reclamation objectives for the site. Remember that all BLM initiated surface disturbance activities occurring within the District are also fully bound by this policy; therefore our internal reclamation plans and pre-disturbance data gathering requirements must be every bit as detailed as those we are requiring from our external customers.

A "hand-in-hand" component with reclamation planning is post-reclamation monitoring. Without effective monitoring we cannot document whether the reclamation project is successful or not, whether it meets the planned objective or not, nor will we have a starting point from which to initiate corrective measures. Effective monitoring will involve both the operators and BLM. Refer to Section 10 of the Wyoming Reclamation Policy.

Existing field office reclamation policies must be reviewed and modified as necessary to insure that they comply with requirements of this IM and with the BLM Wyoming Reclamation Policy WY-2012-032).

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United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Wyoming State Office
P.O. Box 1828
Cheyenne, Wyoming 82009-1828



In reply refer to:
3042 (921Gamper) P

March 27, 2012

EMS TRANSMISSION: 4/2/2012

Instruction Memorandum No. WY-2012-032

Expires: 9/30/2013

To: District Managers and Deputy State Directors
From: Associate State Director
Subject: Wyoming Bureau of Land Management (BLM) Reclamation Policy

Program Areas: All Surface Disturbing Activities.

Purpose: Implement the Wyoming Reclamation Policy

Policy/Action: In order to ensure a consistent and science-based approach to reclamation, this Instruction Memorandum (IM) identifies ten reclamation requirements (see Attachments) that must be addressed when developing reclamation proposals for all surface disturbing activities. Addressing these ten requirements will help achieve both short and long-term reclamation success for site stabilization and eventual ecosystem reconstruction. The Wyoming Reclamation Policy was previously issued under IM No. WY-2009-022 which expired on September 30, 2010. This IM replaces IM No. WY-2009-022.

Background: Successful reclamation efforts are critical in maintaining an effective multiple-use land management program. Nearly all authorizations for surface disturbing actions are based upon the assumption that an area can and ultimately will be successfully reclaimed. Those seeking approval to conduct surface disturbing activities on Public Lands must include reclamation planning as part of their permit process and the BLM must make this requirement clear early in the permitting process. This IM applies to all BLM authorized actions including those initiated by the BLM.

Timeframe: Effective immediately.

Budget Impact: Savings to Project funds in the long-term.

Manual/Handbook Sections Affected: This IM will be supported with more detailed guidance including new reclamation bond standards and a statewide monitoring and reporting strategy.

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Specific reclamation information, sample templates for both reclamation and weed management plans, and other technical guidance is posted on the Wyoming Reclamation web site (<http://www.blm.gov/wy/st/en/programs/reclamation.html>).

Coordination: The coordination and review of the Wyoming Reclamation Policy has been completed with the WY BLM Reclamation Team: Brenda Neuman, Mining Engineer, WSO; Ken Henke, Natural Resource Specialist, WSO; Adrienne Pilmanis, Botanist, WSO; Travis Bargsten, Physical Scientist, WSO; and Merry Gamper, Physical Scientist, WSO Lead. Other non-Wyoming BLM specialists, WO-310, the Wyoming Governor’s Office (for review by all appropriate State Agencies), the University of Wyoming, some local Governments, and numerous interested reclamation professionals in private industry statewide.

Contact: Merry Gamper at 307-775-6272, and by e-mail at MGamper@BLM.gov.

| | |
|--------------------------|-------------------|
| Signed By: | Authenticated By: |
| Ruth Welch | Sherry Dixon |
| Associate State Director | Secretary |

2 Attachments

- 1 - Wyoming BLM Reclamation Policy (6 pp)
- 2 - Wyoming BLM Oil and Gas Reclamation Plan Template (4 pp)

Distribution

| | |
|---------------------------------|--------------|
| Director (200), Rm. 5644, MIB 1 | 1 (w/o atch) |
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| CF | 1 (w/atch) |

APPENDIX E—RECLAMATION GUIDANCE

Wyoming Reclamation Policy

The Wyoming Reclamation Policy is guidance for the modification, preparation and/or review of all reclamation plans. It applies to all Federal actions authorized, conducted, or funded by the BLM that disturb vegetation and/or the mineral/soil resources. This policy is intended to support all BLM program objectives.

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, the reclamation potential for the site, and the revegetation strategy. 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 below have been addressed, the techniques to meet the reclamation requirements are described in detail, and the BLM concurs with the reclamation plan.

Many landscapes can be reclaimed using established conventional reclamation methods. However, some areas have unique characteristics that make achieving all the reclamation requirements described in this policy unrealistic. Innovative techniques beyond conventional practices must be considered and applied to reclaim these more challenging areas. Areas posing the most extreme reclamation challenges will be identified as having Limited Reclamation Potential (LRP). These areas are often characterized by highly sensitive and/or erosive soils, highly sensitive vegetation types, soils with severe physical or chemical limitations, extremely steep slopes, etc. These LRP areas may require site-specific reclamation measures not specifically addressed in the Wyoming Reclamation Policy. Each Field Office shall develop a unique set of reclamation success requirements for those areas within the framework of the attached Policy. The additional difficulty of reclaiming these LRP areas should be considered in the Resource Management Plan and evaluated when planning surface-disturbing activities. During the NEPA process, alternatives to approving development activities in LRP areas should be carefully analyzed. Alternatives considered should include: avoidance and/or unconventional site specific reclamation requirements. Resource development activities approved in these areas may require additional bonding.

A. RECLAMATION 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 native plant community and ecosystem reconstruction to maintain a safe and stable landscape and meet the desired outcomes of the land use plan.

B. RECLAMATION REQUIREMENTS

The following Reclamation Requirements apply to all surface disturbing activities, including BLM initiated activities, and must be addressed in each reclamation plan. These requirements also must be met prior to release of the bond and/or the reclamation liability. Where these Reclamation Requirements differ from other applicable Federal laws, rules, and regulations, those requirements supersede this policy. State and/or local statutes or regulations may also apply.

1. **Manage all waste materials:**

- a. Segregate, treat, and/or bio-remediate contaminated soil material.
- b. Bury only authorized waste materials on site. Buried material must be covered with a minimum of three feet of suitable material or meet other program standards.

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- c. Ensure all waste materials moved off-site are transported to an authorized disposal facility.
2. **Ensure subsurface integrity, and eliminate sources of ground and surface water contamination.**
 - a. Properly plug all drill holes and other subsurface openings (mine shafts, adits etc.).
 - b. Stabilize, properly back fill, cap, and/or restrict from entry all open shafts, underground workings, and other openings.
 - c. Control sources of contamination and implement best management practices to protect surface and ground water quality.
3. **Re-establish slope stability, surface stability, and desired topographic diversity.**
 - a. Reconstruct the landscape to the approximate original contour or consistent with the land use plan.
 - b. Maximize geomorphic stability and topographic diversity of the reclaimed topography.
 - c. Eliminate highwalls, cut slopes, and/or topographic depressions on site, unless otherwise approved.
 - d. Minimize sheet and rill erosion on/or adjacent to the reclaimed area. There shall be no evidence of mass wasting, head cutting, large rills or gullies, down cutting in drainages, or overall slope instability on/or adjacent to the reclaimed area.
4. **Reconstruct and stabilize water courses and drainage features.**
 - a. Reconstruct drainage basins and reclaim impoundments to maintain the drainage pattern, profile, and dimension to approximate the natural features found in nearby naturally functioning basins.
 - b. Reconstruct and stabilize stream channels, drainages, and impoundments to exhibit similar hydrologic characteristics found in stable naturally functioning systems.
5. **Maintain the biological, chemical, and physical integrity of the topsoil and subsoil** (where appropriate).
 - a. Identify, delineate, and segregate all salvaged topsoil and subsoil based on a site specific soil evaluation, including depth, chemical, and physical characteristics.
 - b. Protect all stored soil material from erosion, degradation, and contamination.
 - c. Incorporate stored soil material into the disturbed landscape.
 - d. Soil storage piles to be stored beyond one growing season, should be seeded with appropriate vegetation (native or sterile non-native species).
 - e. Identify stockpiles with appropriate signage.
6. **Prepare site for revegetation.**
 - a. Redistribute soil materials in a manner similar to the original vertical profile.
 - b. Reduce compaction to an appropriate depth (generally below the root zone) prior to redistribution of topsoil, to accommodate desired plant species.
 - c. Provide suitable surface and subsurface physical, chemical, and biological properties to support the long term establishment and viability of the desired plant community.

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- d. Protect seed and seedling establishment (e.g. erosion control matting, mulching, hydro-seeding, surface roughening, fencing, etc.)
- 7. Establish desired self-perpetuating native plant community.**
- a. Establish species composition, diversity, structure, and total ground cover appropriate for the desired plant community.
 - b. Enhance critical resource values (e.g. wildlife, range, recreation, biodiversity, etc.), where appropriate, by augmenting or accelerating restoration of plant community composition, diversity, and/or structure.
 - c. Select genetically appropriate and locally adapted native plant materials (e.g. locally sourced or cultivars recommended for seed zone) based on the site characteristics and ecological setting.
 - d. Use locally sourced and/or collected seeds to the extent possible (local collection and logistics should be included in the Reclamation Plan).
 - e. Select non-native plants only as an approved short term and non-persistent (i.e. sterile) alternative to native plant materials. Ensure the non-natives will not hybridize, displace, or offer long-term competition to the endemic plants, and are designed to aid in the re-establishment of native plant communities.
- 8. Reestablish a complementary visual composition**
- a. Ensure the reclaimed landscape features blend into the adjacent area and conform to the land use plan decisions.
 - b. Ensure the reclaimed landscape does not result in a long term change to the scenic quality of the area.
- 9. Manage Invasive Plants**
- a. Assess for invasive plants before initiating surface disturbing activities.
 - b. Develop an invasive plant management plan.
 - c. Control invasive plants utilizing an integrated pest management approach.
 - d. Monitor invasive plant treatments.
- 10. Develop and implement a reclamation monitoring and reporting strategy.**
- a. Conduct compliance and effectiveness monitoring in accordance with a BLM (or other surface management agency) approved monitoring protocol.
 - b. Evaluate monitoring data for compliance with the reclamation plan.
 - c. Document and report monitoring data and recommend revised reclamation strategies.
 - d. Implement revised reclamation strategies as needed.
 - e. Repeat the process of monitoring, evaluating, documenting/reporting, and implementing, until reclamation goals are achieved.

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GLOSSARY

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

Desired Outcome: Specific goal/objectives and allowed uses outlined in land use plans. Desired outcomes should be identified for and pertain to resources (such as natural, biological, and cultural), resource uses, (such as energy and livestock grazing), and other factors (such as social and economic conditions).

BLM Handbook H-1601-1

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.]

Invasive Plant - 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. Plants listed on the State of Wyoming, Designated Noxious Weed List, would be included under this definition.

Executive Order 13112, Invasive Species (1999)

Limited Reclamation Potential (LRP) - Areas possessing unique landscape characteristics (e.g., sensitive geologic formations, extremely limiting soil conditions, biological soil crusts, badlands, rock-outcrops, etc.) often make reclamation success impractical and/or unrealistic due to physical, biological, and/or chemical challenges. When disturbed, these areas may require unconventional reclamation strategies to address the ten requirements established by this Policy.

Adapted from various sources

Locally-sourced native plant materials - seeds, seedlings, transplants, and/or inocula obtained and/or increased from collection at the project location or from nearby similar sites.

Adapted from various sources including the Integrated Vegetation Management Handbook 1740-2, Ch. 8, and Johnson et al 2010 "What Are The Best Seed Sources For Ecosystem Restoration on BLM and USFS Lands?", Native Plants, 11:2:117-131

Reclamation Plan – The Reclamation Plan is 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. The Plan must address all ten requirements included in this Policy.

Adapted from various sources

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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*.

Soil – A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Glossary of Soil Science Terms

Subsoil – Technically, the subsoil includes the B horizon. This is roughly, the part of the solum below the organic topsoil and above the rocky parent material of the C horizon. When suitable, the subsoil may be salvaged to supplement the topsoil for plant establishment.

Adapted from various sources

Soil Material – Includes the topsoil and/or the topsoil and a portion of the subsoil salvaged and separated to be used to provide a growth medium for plant establishment.

Adapted from various sources

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

Surface Management Agency – Any Federal or State agency having jurisdiction over the surface estate. *Adapted from Onshore Oil and Gas Order No. 1*

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

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

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**Proposed Interim Rollover Objective for the
Continental Divide-Creston Natural Gas Project
Environmental Impact Statement and Record of Decision**

February 25, 2011

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PROPOSED INTERIM ROLLOVER OBJECTIVE FOR THE CONTINENTAL DIVIDE-CRESTON NATURAL GAS PROJECT ENVIRONMENTAL IMPACT STATEMENT AND RECORD OF DECISION

There were numerous industry/state agency conversations concerning some type of phased or consolidated development for the Continental Divide-Creston (CD-C) Environmental Impact Statement (EIS). Unfortunately the complexity of the lease pattern and the number of leases made this effort extremely challenging. Conversations led to trying to create language for authorizations, waivers, modifications and exceptions to the Bureau of Land Management (BLM) Rawlins Resource Management Plan (RMP) to provide rollover criteria that would contain more flexibility for industry, while maintaining healthy, desirable vegetation within the field.

An ad hoc group came together to see if such an opportunity for additional rollover criteria might exist. The following outlines the framework for the discussion:

1. Provide a scientifically sound framework to minimize initial disturbance and return disturbed areas as quickly and effectively as possible to an ecologically stable or to pre-disturbance condition(s).
2. Identify important interim reclamation practices that are required to ensure initial and continuing interim rollover objectives (IRO).

The group is recommending that the rollover criteria as outlined below be considered as an alternative to the current RMP rollover criteria, provided that all the pre and post disturbance activities as outlined in Sections A through D are implemented.

Proposed IRO reclamation rollover criteria

The current Rawlins RMP Criteria for Reclamation Success are based in part on pre-disturbance surveys or surveys of adjacent undisturbed natural ground cover and species composition or eighty percent of pre-disturbance ground cover and ninety percent dominant species.

Notwithstanding the provisions of the RMP, it is our recommendation to provide an alternative to the above language and have revegetation cover be 70 percent of reference area cover to meet interim reclamation criteria. All of this 70 percent must be desirable perennial species as represented by the seed mix or background species. Items A, B, C, and D would also need to be completed as part of the interim reclamation criteria.

The group understands that the BLM will require a comprehensive reclamation and weed management plan within the CD-C project boundary as well as site-specific reclamation plans. It is understood that many of the items we are recommending may appear duplicative to the existing Wyoming BLM Reclamation Instructional Memorandum or other Field Office reclamation policy. As part of the more flexible rollover criteria outlined below, we recommend that many of these duplicative practices should be required as part of the rollover criteria and not be optional.

A. PRE-PLANNING AND INVENTORY

Pre-disturbance inventories are used for two main purposes. The first purpose is to use site-specific information (soil inventory and species identification) to develop a site-specific reclamation plan. The second purpose is to identify any issues, such as saline soils, steep topography, or invasive species that will impact successful interim and/or final reclamation. Below are the elements that should be required for a more flexible rollover criteria.

1. Identify significant landscape features and climate issues

- a. Climate and physical characteristics of the site are important factors to consider in development of a reclamation plan, particularly in identifying possible problems. For

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example, a site on a south-facing slope may indicate that more drought tolerant plants should be selected than if the site is on a north-facing slope. Topography (slope and aspect), climate (including postulated microclimate), and parent materials (geological substrates) are additional considerations in site selection and reclamation plan development.

- b. Steep topography: Steep slopes greater than 25 percent would often result in site instability and should be avoided.
- c. Poor or erodible parent materials, or a rocky surface, or marine shales, clay/siltstone, or selenium-bearing geological substrates at the surface may result in difficult reclamation conditions. Identification of these areas might indicate the need for additional site planning.

2. Conduct a suitable soil inventory

- a. Soil characteristics strongly influence reclamation efforts. Fundamental characterization of soils ahead of disturbance can identify potential problems, so they can be addressed during disturbance, soil stockpiling and reclamation.
- b. The phrase “suitable soil” is used herein mainly because of confusion over the definition of topsoil. Soil depth, pH, electrical conductivity, texture, surface features (e.g. barren, rocky, crusty, plant litter), and organic matter content are characteristics that may be used to determine if a soil is suitable. Other information may be needed. See “Successful restoration of severely disturbed lands: Overview of critical components,” B-1202, (and available for free at <http://ces.uwyo.edu/PUBS/B1202.pdf>).
- c. Soil characteristics that may signal reclamation problems include: pH, electrical conductivity, soil texture, surface/subsurface features, sodium adsorption ratio, and soil compaction. These are detailed below and will be addressed by the Operator in the site-specific reclamation plan in the APD (application to drill) approved by the BLM:
 - i. Soils with pH 8.4 and higher.
 - ii. Depth: No suitable soil available or very shallow, less than 75 mm (3 inches).
 - iii. Soil solutions with an electrical conductivity greater than eight (8) dS/m.
 - iv. Sodium Adsorption Ratio (SAR) of 13 or higher when pH is greater than 8.4 and EC is greater than 4.0ds/m.
 - v. Soils having textures of clay, sand or loamy sand.
 - vi. Surface and subsurface soil in and through the root zone dominated by coarse material greater than 2 mm in diameter and greater than 40 percent in the soil profile.

3. Conduct a vegetation inventory

- a. Gathering vegetation data before a site has been cleared for drilling documents pre-disturbance site conditions and in turn guides reclamation decisions. Seed mixes should be based on desired vegetation that has historically grown on-site and return of cover should be gauged by comparison with actual pre-disturbance site conditions and/or reference areas.
- b. The following vegetation characteristics can signal a high probability of reclamation problems:
 - i. The presence of Halophytes: e.g. Saltbush
 - ii. The presence of Alkali Halophytes: e.g. Greasewood, Halogeton

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- iii. The presence of noxious or invasive species: e.g. Cheatgrass, Russian thistle, Russian knapweed, Alyssum, Canadian thistle.
- c. The methodologies to be used to determine the information for the vegetation inventory are as follows:

BLM guidelines for vegetation sampling: Sampling Vegetation Attributes, Interagency Technical Reference (1996) Revised in 1997 and 1999. BLM/RS/ST-96/002+1730. 171 pages. URL for Sampling Vegetation Attributes: <http://www.blm.gov/nstc/library/pdf/samplveg.pdf>. All BLM technical references: <http://www.blm.gov/nstc/library/techref.htm>.

4. Select a reference site

- a. A reference site is a land unit which is representative, in terms of physiography, soils, vegetation and land use history, of an area to be disturbed. Reclaimed sites are compared to reference sites to determine successful interim and final reclamation.
- b. In Wyoming, a site may be composed of multiple ecological communities (e.g. dunes, alkali flats, and sagebrush). Ecological variation at a given site can make it difficult to evaluate which adjacent area should serve as a reference. A reference site should be chosen based upon the pre-disturbance assessment and the identified dominant community on the site. This measure ensures that initial efforts to establish vegetation are consistent with species that naturally occur at that location. A reference site located adjacent to the site to be disturbed, with similar soils, vegetation, and aspect of the site to be disturbed should be chosen.

B. DEVELOP A SITE-SPECIFIC INVASIVE/NOXIOUS (INVASIVE) PLANT MANAGEMENT PLAN FOR CONSTRUCTION AND RECLAMATION ACTIVITIES:

Disturbed sites can provide ideal opportunities for invasive plant species to propagate. An integrated site-specific invasive plant management plan should be developed. The plan should include:

1. Assessment activities for invasive plant species before initiating surface disturbing activities (pre-disturbance), during disturbance (annual monitoring), during interim and final reclamation, and after reclamation is completed.
2. Describe treatments to control invasive plants.
3. Monitor invasive plant species at least annually to evaluate success of invasive plant control treatments and determine if continued invasive plant control is necessary.

C. DEVELOP A SITE-SPECIFIC RECLAMATION PLAN:

Reclamation planning provides a detailed strategy for returning a disturbed site back to a functioning pre-disturbance condition. The site-specific reclamation plan will be made part of the APD by the Operator and BLM and includes the following:

1. **Identify and address any vegetation, climate, landscape or soil issues found in the pre-disturbance inventory.**
2. **Site preparation, storm water, surface stability, and soil management for interim reclamation.**

Site preparation activities ready a site for revegetation activities and in general include replacement of stockpiled suitable and unsuitable soils, reestablishing a stable subsurface environment, recontouring (reconstruction of landscape), incorporation of soil amendments

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and primary tillage/ripping to relieve soil compaction prior to spreading suitable soil and secondary tillage.

- a. Proper soil management prevents loss from erosion and preserves its ability to support a productive plant community, the soil biota and their habitat as well as its physical and chemical properties.
- b. The Storm Water Pollution Prevention Plan (SWPPP) as required by Department of Environmental Quality (DEQ) should be followed.
- c. Surface Stability: The following describes considerations for how the Operator could achieve surface stability:
 - i. Redistribute soil materials in a manner to optimize revegetation potential.
 - ii. Relieve compaction of the redistributed soil (suitable and unsuitable) to an appropriate depth just prior to seeding to accommodate desired plant species germination and sustained growth.
 - iii. Preparation of the seedbed includes but not limited to:
 - a. Seedbed preparation methods should establish surface conditions to enhance development of diverse, stable, and self-generating vegetation. The methods selected should optimize surface stability and surface roughness using techniques such as furrowing on the contour or surface pitting.
 - b. Re-establish slope stability and surface stability.
 - c. Reconstruct the landscape to the approximate original contour or a contour consistent with the land use plan.
 - d. Maximize geomorphic stability and topographic diversity of the reclaimed topography.
 - e. Eliminate high walls, cut slopes, and/or topographic depressions on site, unless otherwise approved.
 - f. Reconstruct drainage basins and reclaim impoundments to maintain the drainage pattern, profile, and dimension to approximate the natural features found in nearby naturally functioning basins.
 - g. Reconstruct and stabilize stream channels, drainages, and impoundments to exhibit similar hydrologic characteristics found in stable naturally functioning systems.
 - h. Minimize wind, sheet and rill erosion on/or adjacent to the reclaimed area.
 - i. There should be no evidence of mass wasting, head cutting, large rills or gullies, down cutting in drainages, or overall slope instability on/or adjacent to the reclaimed area. Site selection is the favorable method to avoid these issues.
 - j. Protect seed and seedling establishment (e.g. erosion control matting, mulching, hydro-seeding, surface roughening, fencing, etc.)

3. Describe soil amendments

- a. Soil amendment(s) may be used in reclamation if the soil is lacking the necessary chemical, biological, physical and /or organic materials to support sustaining growth of suitable plant materials.

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- b. The Operator should state what applying soil amendments is intended to accomplish. Soil amendment plans should be provided, including what amendments will be applied, method of application, and timing relative to other reclamation activities (i.e. stockpiling, seeding, ripping).
- c. Soil amendments should be selected based on the undisturbed and/or existing soil characteristics (see A. 2. c. iii) and scientific recommendations so as to provide the most cost efficient and best assurances for successful reclamation.
- d. Soil amendments include but are not limited to the following: Certified weed free grass, hay, wood chips or other certified weed free cellulosic materials, gypsum, elemental sulfur, and fertilizers.

4. Describe seeding methods

- a. Different plant species may require different conditions (e.g. seeding depth, seed scarification, mixing, and timing) for optimal germination success. Seeding methods should match germination characteristics of species in the seed mix and consider timing of planting to maximize germination and establishment of all reclamation species.
- b. The Operator will describe when seeding will occur and specify the methods they will use for seeding, including differential handling for different species (e.g. broadcast, drilling, imprinting), and seeding depth in the site-specific reclamation plan of the APD. Reseeding may need to occur if invasive and/or noxious weeds prevent establishment of the species in the seed mix. See Appendix A for references.

5. Seed mixes

- a. Providing multifunctional and sustainable seed mixes for interim and final reclamation is driven by a desire to increase potential for successful and timely revegetation and site stability. Plant diversity and habitat functionality are directly impacted by the seed choices applied to an area slated to be reclaimed or restored. To maintain as much stability and ecological function, this section makes recommendations to specifically aid an operator's selection process. Please see Appendix A for references.
 - i. Select appropriate native plant materials based on the pre-disturbance plant community composition, site characteristics, and/or ecological site description. Seeds may be obtained from commercial sources of certified weed free seed mixes. Alternatively, local collections may be used provided they are collected in an area without invasive species. Reclamation should succeed using native species if soils are properly managed, precipitation is near average for the region, seed mixes are carefully selected and seeded areas protected from grazing.
 - ii. Perennial naturalized species may be used when attempts to reclaim using native plants have not succeeded for a minimum of two full growing seasons.
 - iii. Based upon site-specific conditions, a decision may be made to use naturalized species sooner than identified above and will be used in only unique conditions defined in the site-specific reclamation plan in the APD.

6. Describe if and how irrigation techniques will be used in the reclamation plan.

- a. Revegetation success is highly dependent on timing and amounts of precipitation. However, variable weather in Wyoming can limit or delay successful germination and establishment of plants. Irrigation can supplement natural precipitation to insure success of newly seeded sites during the initial growth period of the plant. Irrigation practices should

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be used carefully and conservatively. Irrigation can be cost prohibitive and should not be a requirement for reclamation but used as a tool to enhance vegetation establishment.

- b. Both soil and water samples should be tested before application and water source should meet appropriate limits for SAR and EC. Special consideration of soil chemistry and amendments will be a determining factor for the use of the source water.
- c. Water must be utilized from permitted sources (State Engineer's Office) and from sources permitted for irrigation. Produced water, (e.g. coal bed natural gas wells) must adhere to discharge permit requirements.

7. Describe best management practices

- a. Best Management Practices (BMPs) are techniques that can be applied to surface disturbance and reclamation actions to aid in reclamation success. Identify the appropriate BMPs during planning and they can guide the surface disturbance and reclamation process. Additionally, documenting BMPs provides opportunities to evaluate success, so BMPs can be modified for future use in similar conditions. Please see Appendix A for recommended BLM and other Best Management Practices.

8. Description of monitoring and reporting protocols for interim reclamation objective.

The purpose of the Interim Reclamation Objective (IRO) is to reconstruct and revegetate the portion of the disturbed land unused for long term production and establish the vegetation cover sufficient to maintain a healthy, biologically active topsoil; control erosion; and minimize habitat, visual and forage loss during the life of the well and/or facilities.

The long-term Final Reclamation Objective (FRO) is to return the land to a condition that which existed prior to disturbance with allowances for an improved and/or stable ecological condition, if possible.

- a. Site monitoring is conducted to observe and keep track of environmental conditions on the reclaimed site. Specifically, monitoring is done to document development of the reseeded plant community, identification of problem species, soil stability and assess ecosystem function. Continued characterization after disturbance and during interim reclamation is appropriate for monitoring site maturation and stability, particularly when problematic soil conditions or invasive weeds are identified.
- b. Vegetation monitoring and disturbed site evaluation for any component of the reclamation plan applicable to the APD takes place at intervals agreed to by the BLM and the Operator. Generally the intervals for monitoring and reporting will be set annually unless otherwise agreed to as a condition to the reclamation plan. Achievement of the IRO by the Operator may reduce the time of mandatory monitoring and reporting. These changes to monitoring and reporting will be added to the reclamation plan by the BLM. Once the disturbed site achieves the approved IRO, the site will still be subject to all applicable requirements of the reclamation plan until the FRO is achieved by the Operator and approved by the BLM.
- c. Monitoring should be designed and implemented by the Operator to document continuing successful reclamation rollover using methodologies approved by BLM.
 - i. Once the IRO is achieved and reclamation rollover granted by BLM, the Operator will continue to monitor the condition of the reclamation, document that the revegetation continues to meet IRO.
 - ii. During monitoring, the Operator will identify potential problems and recommend appropriate mitigation measures that can be implemented through BLM's adaptive management process.

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- d. The required elements of monitoring to assess IRO and FRO will be identified and addressed by the Operator in the site-specific reclamation plan. Please see Appendix A for additional information.

D. INDICATORS FOR SUCCESSFUL ACHIEVEMENT FOR THE IRO RESULTING IN RECLAMATION ROLLOVER

1. **Beginning Monitoring.** Monitoring should begin in the first growing season. Rollover evaluation is possible after a minimum of two full growing seasons.
2. **Irrigation and monitoring.** If irrigation is used initially, then the reclamation may be evaluated for interim reclamation success two (2) full growing seasons (or the third growing season) after irrigation ceases to assure that the vegetation can survive without supplemental water.
3. **Monitoring results must be from a standardized cover/species protocol approved by BLM.**
4. **Invasive Plants.** No invasive weeds will be allowed. Invasive species cover no greater than adjacent invasive species cover will be allowed. All other undesirable perennial or annual plants as defined in the site-specific APD should be controlled or eradicated on the disturbed area.
5. **Undesirable/annual plants.** For purposes of successful IRO achievement, the amount of invasive plant species should comply with the site-specific reclamation plan.
6. **Vegetation trend.** If the vegetation trend towards the IRO achievement is not positive within 3 full growing seasons without irrigation or 2 years after irrigation (third growing season) ceases, the BLM and Operator will determine the needs for the disturbed site.
7. **Erosion.** Erosion indicators should be equal to or less than the adjacent reference area.

E. RECLAMATION MONITORING REPORTING DATA RECOMMENDED TO BE OBTAINED AND FILED BY THE OPERATOR (ADAPTED FROM APPENDIX 36 OF THE RAWLINS RMP)

General

WYW# (Oil and Gas Lease or Right-of-Way (ROW))

Project Name:

Project Type (e.g. Well, Access Road, Pipeline, Facility, Wind)

Qtr/Qtr Sec, T, R, County, State (or Lat/Long)

Pre-Disturbance

Location of reference area

Date of reference area inventory/monitoring

Date of pre-disturbance inventory of disturbed site

Name of contractor conducting reference and pre-disturbance inventory/monitoring

Disturbance

Disturbance Dates

Start –End dates of monitoring

Reclamation Type (Interim/Final)

Name of contractor

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Reclamation

Earthwork Contractor Name
Earthwork Completion Date
Soil Preparation method and Depth (prior to re-spreading suitable soil)
Soil Amendments Used (Describe)
Area (Acres or Square Feet)
Seeding Contractor Name
Seeding Date
Seedbed/Compaction Release Preparation Methods (Describe -Rip, Disc, Harrow, Parabolic) and Depths
Seeding Method (Drill, Broadcast, Imprint, Depths)
Copy of Seed Tag (Species percent, Purity percent, Germination percent)
Actual Seeding Rate (Pure live seed (PLS) Lbs/Acre of each species)
Area Seeded (Acres or Square Feet)

Noxious/Invasive Plants

Species Treated
Contractor Name
Contractor License #
Treatment Date
Treatment Type (Chemical, Mechanical)
Chemicals Used and Rates Applied
Area Treated (Acres or Square Feet) (GIS Extent and Location)

Monitoring

Inspector's Name and affiliation
Inspection Date
Time after Seeding (which Growing season)
Seedlings/Square Feet or Linear Foot Growing
Percent and Extent of Bare Soil (Describe)
Percent Ground Cover (Describe)
Percent Desirable Species (Describe)
Percent Noxious/Invasive Weeds (Describe)
Describe erosion indicators
Evidence of Livestock Grazing (Describe)
IRO objectives met (Yes/No)
Reference Photos
Close-Up Photos
On-site Photos
Reseeding yes/no, If yes all the above reporting requirements to be filled out.

Reporting

Completed Spreadsheet or Database as defined by BLM
GIS Layer with Attribute Table with Site Data as Detailed
Detail Disturbance Extent and Location
Permanent Photo Reference Point –Describe
Conclusions/Summary

- Weed Control Needed - yes/no and explanation
- Erosion control Needed - yes/no and explanation

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- Grazing/Predation Issues - yes/no and explanation
- Other Cultural or Mechanical Needs - yes/no and explanation

Other

Mulching/Erosion Netting/Tackifier used – yes/no and describe

Fenced Location yes/no

Snow Fencing yes/no

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APPENDIX A

This appendix is designed to provide a very general description of stockpiling suitable soil, irrigation of reclamation sites and monitoring vegetation and soils after reclamation. These are not hard and fast prescriptions but rather they are best management practices that might best be considered as an outline of issues to be considered during reclamation efforts.

A. Suggestions on Stockpiling Suitable and Unsuitable Soils to Maintain Soil Quality

Stockpiled suitable soil should not be piled too deeply or too shallowly. Areas of the site to be covered by stockpiles of unsuitable soils will be stripped of suitable soil prior to their use. The taller or deeper the piles, the more soil is subjected to increasing pressure resulting in compaction. Soil buried deep in the pile also has little exposure to oxygen resulting in anaerobiosis; deeply buried soil also has no organic matter input. Both of these reduce soil quality.

Shallow or small suitable soil stockpiles have large footprints on the land surface with the disadvantage of covering greater areas of undisturbed soil which will, in turn, require revegetation, resulting in a greater overall amount of disturbed soil. Smaller or shallow stockpiles also have a greater surface area per volume of soil stored. This increases exposure of the stockpiled soil to wind and water erosion. The surface of soil stockpiles should always be vegetated to minimize erosion losses.

1. Salvaged stockpiles of suitable soil should normally be no deeper than 4 meters (13 ft) and should be less where possible.
2. Stockpile slopes should not exceed 3:1 angles (20 percent slopes) to allow for seeding and to minimize erosion.
3. Suitable soil stockpiles should be located in areas well enough protected to prevent their disturbance and contamination by well pad activities. They should not be placed in streambeds or ephemeral drainages where they may be washed away. They should be protected from wind erosion. Suitable soil should be put on areas that were not skinned. Unsuitable soil should be put on areas that were 'skinned'.
4. Consider a perimeter ditch/berm/fencing or other techniques around the stockpile for topsoil conservation and sediment control.
5. All suitable soil stockpiles should be seeded with appropriate vegetation (native locally sourced is preferred) to provide cover and protect them from water and wind erosion. Before seeding, the stockpile may be scarified along contours to minimize wind and water erosion.
6. If soil horizons or layers are to be stratified during soil salvage (stripping) operations, soil maps should be made of the well pad area to identify depths of soil horizons and surface slope. The pad area to be cleared of soils should then be divided into strips the size of the blades or equipment being used for soil removal. The depth of soil removal from each swath should be clearly marked so that equipment operators are removing a uniform layer from each strip. After the suitable soil is removed from the area in this manner, the subsoil can then be removed in the same fashion, strip by strip, each strip at a uniform depth.

B. Suggestions on Supplemental Irrigation

Supplemental irrigation should be scientifically calculated and applied in the initial four to six week period of growth of the seedling plants and then ended. Such determination could be the application of an amount of irrigation water equivalent to the average or average plus 25 percent of the precipitation expected during a given interval.

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C. Suggestions on Vegetation and Soil Monitoring

Examples of monitoring components are listed below:

1. Reference: <http://agriculture.wy.gov/images/stories/pdf/forms/natres/rangelandmonitoring.pdf>
2. Operators should use the same locations and methods used at baseline for repeat photography. Additional locations may be selected to document progress of reclaimed area to demonstrate interim and final reclamation success, and to monitor any identified problems such as erosion. The site should be photographed once every year normally during the same time period, from the same locations and direction so that photographs are repeated through time. Photographs should be taken during the growing season.
3. Weed assessment: Disturbed and reclaimed areas should be evaluated for noxious and invasive plants at least annually. Weed control should be promptly implemented by the Operator once weed species and infestations are identified. Weed control applied at planned chemical rates at times the weed is emerging can have positive impacts in minimizing weed growth through-out the year as well as promoting the growth of grass species. The timing of the control should be determined by the growth habits of the weed species and when they are most effectively assessed. If weeds persist, reseeding the site could be considered as well as the species of grass, forb or shrub.
4. Erosion control/soil stability: The reclaimed area should be evaluated for any signs of erosion problems annually and when the site is subject to erosional events. Identified erosion features should be monitored using repeat photography. Absence of erosion features is a positive indication that the soil is stabilizing.
5. Cover and composition data should be used to document that the plant community continues to trend toward the requirements to achieve interim and final reclamation targets. The data should be used to evaluate if species composition and cover are increasing. These factors should be considered relative to the number of species in the seed mix, the selected reference area, and offsite responses to seasonal growing conditions.
6. Plant community cover and composition measurements: The Operator should start collecting cover and composition data beginning in the first (1st) growing season after disturbance. Data should be collected using repeatable methods approved by the appropriate regulatory authority (BLM) and should be the same methods that were used to describe vegetation for baseline (or reference areas). The same methods should be used each time the vegetation is monitored.
7. Soils should be monitored if reclamation problems suggest that soils might be the problem. Such problems include but are not limited to salt crusts, clay crusts, wind and/or water erosion and rapid changes in pH (up or down). Recommended soil monitoring would include sampling soils and analysis of soil characteristics as described in the main body of Part A, 2 ii. Suitable soil inventory.

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D. Web Links

Government Documents

2006 Gold Book:

http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html

BLM engineering drawings, roads & fences: <http://www.blm.gov/nstc/eng/draw.html>

BLM Integrated Vegetation Handbook, 1740-2 is at page:

http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/blm_handbooks.html

BLM VRM: http://www.blm.gov/wo/st/en/prog/Recreation/recreation_national/RMS.html

BLM New Onshore Order #1, May 7-07:

http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/Onshore_Order_no1.html

BLM NSTC: <http://www.blm.gov/nstc/>

EPA: <http://www.epa.gov/owow/nps/> and <http://www.blm.gov/bmp/>

USDA Monitoring Manual for Grasslands, Shrublands and Savanna Ecosystems (quantitative Protocols):

http://usda-ars.nmsu.edu/monit_assess/monmanual_main.php

Wyoming BLM requirements: http://www.blm.gov/wy/st/en/programs/energy/Oil_and_Gas.html

Wyoming Climate Atlas: http://www.wrds.uwyo.edu/sco/climate_office.html

WY DEQ: <http://deq.state.wy.us/wqd/watershed/nps/npspg.htm>

NRCS fotog: <http://efotg.nrcs.usda.gov/treemenuFS.aspx>

Journals

American Society of Mining and Reclamation: <http://www.asmr.us/>

Global Restoration Network: www.globalrestorationnetwork.org

Journal Range Management archives: <http://jrm.library.arizona.edu/jrm/>

National Roadside Vegetation Management Association: <http://www.nrvma.org>

Society for Ecological Restoration (SER): <http://www.ser.org/>

USFS Rocky Mountain Research Station publications: <http://www.treearch.fs.fed.us/pubs/rmrs/>

Wyoming Native Plant Society: http://uwadmnweb.uwyo.edu/wyndd/wnps/plant_id.htm

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MAPS/GIS

Topo & aerial photos: <http://www.usgs.gov/pubprod/aerial.html>

NRCS National Water and Climate Center: <http://www.wcc.nrcs.usda.gov/wcc.html>

Water Erosion Prediction project: <http://octagon.nserl.purdue.edu/weppV1/>

Wyoming Geographic Information Science Center: <http://www.wygisc.uwyo.edu/>

Mycorrhizae (Biological Soil Crusts)

<http://mycorrhiza.ag.utk.edu/default.html>

<http://invam.caf.wvu.edu/index.html>

<http://www.ars.usda.gov/is/pr/2003/030205.htm>

<http://soilcrust.org>

OIL/GAS

Completion and workover wastes: <http://www.epa.gov/wastes/nonhaz/industrial/special/oil/wc.pdf>

Dust suppression: http://www.oznet.ksu.edu/Stevenson/Dust_percent20Manual_percent20percent20102704.pdf

Hydraulic Fracturing (Fracking or Frac Job):

http://test.earthworksaction.org/index.php/issues/detail/hydraulic_fracturing_101

http://www.epa.gov/hfstudy/HF_Study_Plan_110211_FINAL_508.pdf

National LTAP & TTAP Rural Roads: <http://www.ltap.org/>

Oil & Gas Production wastes: <http://www.epa.gov/wastes/nonhaz/industrial/special/oil/>

Power lines: <http://www.aplic.org/>

Produced water: <http://www.iogcc.state.ok.us/Websites/iogcc/producedwater/popup.htm>

The T²/LTAP Center University of Wyoming: <http://wwweng.uwyo.edu/wyt2/>

Western Governors CBM BMPs: <http://www.westgov.org/wga/initiatives/coalbed/CoalBedMethane.pdf>

Wyoming Oil and Gas Commission requirements: <http://wogcc.state.wy.us/>

Restoration Handbooks

Bags Quiet Presence NRCS: http://www.wy.nrcs.usda.gov/Plant/tech_notices.html

Dryland pastures: <http://msuextension.org/publications/AgandNaturalResources/EB0019.pdf>

Handbook of Western Reclamation Techniques:

<http://www.techtransfer.osmre.gov/NTTMainSite/Library/hbmanual/westrecl/front-matter.pdf>

Restoring Western Ranges and Wild lands: http://www.fs.fed.us/rm/pubs/rmrs_gtr136_3.pdf

Solid Minerals reclamation handbook: <http://www.blm.gov/nhp/efoia/wo/fy01/ib2001-081attach.pdf>

Scientific Literature

An Introduction to using native plants in Restoration:

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/plants/techpub>

Geology and Plant life:

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/plants/techpub>

Managing Arid and semi-arid watersheds: <http://www.wy.blm.gov/botany/wyspecies.htm>

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http://water.epa.gov/lawsregs/lawsguidance/cwa/wetlands/laws_index.cfm

Revegetation Abstracts:

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/plants/techpub>

Sagebrush: <http://sagemap.wr.usgs.gov/SagebrushAssessment.aspx>

Salt tolerant plants: <http://www.ussl.ars.usda.gov/pls/caliche/Halophyte.query>

USDA Plant database: <http://plants.usda.gov/>

Wyoming Natural Diversity Database: <http://uwadmnweb.uwyo.edu/wyndd/>

Wyoming Plant Materials Technical notes:

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/plants/techpub>

Wyoming Reclamation and Restoration Center: <http://uwadmnweb.uwyo.edu/WRRC/>

Educational Opportunities and Workshops

Wyoming Reclamation and Restoration Center: <http://uwadmnweb.uwyo.edu/WRRC/>

Seed sources

Guidebook to Great Basin seeds:

http://www.blm.gov/id/st/en/info/publications/technical_bulletins/TB05-4.html

Native Plant Propagation Protocols: <http://nativeplants.for.uidaho.edu/network/>

Native Seed Network: <http://www.nativeseednetwork.org/index>

Oregon state Seed Lab: quality testing of native seed: <http://seedlab.oregonstate.edu/u>

Seed testing protocols: <http://www.aosaseed.com/publications.htm>

Wyoming State Seed Lab: <http://uwacadweb.uwyo.edu/seedlab/default.htm>

Soil

Glossary of Soil Science Terms: <http://soils.usda.gov/technical/>

NCSS Web Soil Survey:

<http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/plantsanimals/plants/techpub>

<http://www.nrcs.usda.gov/>

<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>

NRCS Soil Quality Publications: <http://soils.usda.gov/technical/>

Soil series name search: <http://soils.usda.gov/technical/classification/>

Weeds

Halogeton: <http://www.ars.usda.gov/Services/docs.htm?docid=9937>

Weed Science Society of America: <http://www.wssa.net>

TNC Invasive species (weeds): <http://tncinvasives.ucdavis.edu/>

Wildlife

Important Wildlife Habitats: <http://wgfd.wyo.gov/web2011/wildlife-1000426.aspx>

Sage grouse range wide forum links: <http://sagegrouse.ecr.gov/?link=110>

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Recommendations for Development of Oil and Gas Resources within Crucial and Important Habitats:

[http://wgfd.wyo.gov/web2011/Departments/Wildlife/pdfs/HABITAT_OILGASRECOMMENDATIO
NS0000333.pdf](http://wgfd.wyo.gov/web2011/Departments/Wildlife/pdfs/HABITAT_OILGASRECOMMENDATIO
NS0000333.pdf)

E. List of Participants

This document has been two years in the making and meetings included training sessions and visits to field sites in the general vicinity of the CD-C. The contributors of this document were members of an *ad hoc* committee that varied in size from meeting to meeting. This ad hoc group was created through the efforts of the Governor Freudenthal’s Planning Office. Some of the participants were advisory only (AO) but others were involved in the writing, review and synthesis (WRS) of the final project. One member of the committee acted as the Chair.

Considerable review, both formal and informal, of this document was provided by the committee and an intensive external review was provided by an anonymous consultant.

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**BLM Rollover Criteria
Continental Divide-Creston Environmental Impact Statement**

INTRODUCTION

It is reasonable to anticipate that successful reclamation activities within the Continental Divide-Creston project area will be difficult. This can be observed by reviewing **Map 3.3-5** which shows an estimated 75 percent of the area with “poor” reclamation potential. Reclamation potential of soils in the CD-C project area is limited by saline/sodic soil conditions and either clayey or sandy soil textures (**Table 3.3-1**). In addition to these soil limitations, low annual precipitation of 6 – 10 inches in conjunction with erosion by wind and water will make successful reclamation difficult to attain quickly. Periodic droughts and extreme climatic conditions further complicate successful reclamation.

RECLAMATION PERFORMANCE MONITORING

Monitoring should include both qualitative data collection techniques and quantitative data collection. Qualitative evaluation of the interim reclamation can include the evaluation of soil movement (rills, sheet flow, petal-stilling, etc.), vegetative components (presence/absence of species, estimation of population and the population’s condition) as well as visual contrast. The quantitative data collection should include both aerial and basal cover. The data should note the species during the evaluation. It is important to use the same methods for qualitative and quantitative data collection during each site evaluation to show a trend and display that the Interim Rollover Objective (IRO) has been met.

DISTINCTION BETWEEN INTERIM AND FINAL RECLAMATION

Two types of reclamation will occur within the CD-C area. Final reclamation occurs when all facilities are removed (e.g. plugged and abandoned, the site is re-contoured back to its original topography, and adequate native vegetation communities similar to those originally disturbed are established including, in part, weed control and stable soils). When completed and accepted the company’s bond is released and the site returns to BLM control. High desert sites, such as those found at CD-C, are slow to return to their original vegetative states, often requiring decades of time even with successful reclamation.

Interim reclamation occurs within the next growing season on any disturbance not needing to be continuously disturbed by ongoing operational activities. The existing pipelines, roadsides, and portions of well pads not needed for operations are examples of short-term disturbance which requires interim reclamation. Areas with interim reclamation may be disturbed again by new construction or operational activities that may occur. Those areas will be reclaimed after any disturbance to maintain interim reclamation. Areas of a well pad might also remain undisturbed until final reclamation is achieved. Circumstances will vary site by site over the course of the project.

PURPOSE OF A DISTURBANCE CAP

A disturbance cap is a limit on the extent of surface disturbance that can occur within a given area. A disturbance cap that has potential to limit development activities within an area creates a direct incentive for developers to conduct successful reclamation on disturbed lands. Once the disturbance cap is reached further development is constrained until the disturbance acreage is reduced as a result of attaining the IRO.

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ROLLOVER CONCEPT

Surface disturbance that has been reclaimed to the IRO standard will be classified as successful interim reclamation and this acreage can then be deducted from the number of acres counted as surface disturbance (or rolled over) for the area, and further disturbance could occur under the disturbance cap. The conditions under which interim reclamation can be considered acceptable for “rollover” are crucial for managing disturbance and the effects thereof on the natural resources BLM manages.

OBJECTIVES FOR INTERIM RECLAMATION

Work conducted in part by the State of Wyoming, local Conservation Districts, the University of Wyoming, participating leaseholders, oil and gas developers, and the BLM led to the development of several objectives for interim reclamation. It was agreed that the purpose of the IRO is to identify when reconstruction and re-vegetation activities on disturbed lands is adequate for rollover credit for the companies. Rollover credit could not be applied to the portion of the disturbed surface used for long-term production and continuous disturbance.

The IRO is to establish vegetation cover sufficient to maintain a healthy, biologically active topsoil; control erosion; and minimize habitat, visual, and forage loss during the life of the disturbed area. In addition, it was determined that the elimination of noxious weeds and the control of invasive non-native weeds must have occurred for successful attainment of IRO.

RECLAMATION ROLLOVER CRITERIA

The reclamation success standards listed below are the measures that would be used to evaluate whether the interim reclamation is successful:

- The area is revegetated with a stable, approved plant community.
- Vegetative cover is sufficient to maintain a healthy, biologically active topsoil.
- Erosion is controlled.
- Habitat, visual, and forage loss is minimized.
- No noxious weeds are present.

ACCOUNTING FOR DISTURBANCE TRACKING

Once a proposal for surface disturbance is approved and constructed the company will record the as-built disturbance using a GPS system compatible with the BLM’s system. The extent of all disturbance from the approved proposal will be determined. The company will maintain a record of the extent of disturbance, generally by aliquot section, Township and Range, or by lease as applicable.

When further disturbance within an area is proposed the company will submit its existing disturbance records for the area in question to the BLM along with the rest of its plan of development. The BLM will review the existing extent of disturbance.

If the disturbance extent meets or exceeds the applicable disturbance extent cap then the BLM will request from the Company why further disturbance should be approved. Based on the response from the company the BLM will consider the proposal in the site-specific NEPA document for the proposal tiered to the CD-C Record of Decision (ROD).

If the new disturbance extent proposed does not meet or exceed the disturbance cap for the area in question the BLM will evaluate the proposal with a site-specific NEPA document and determine what, if any, disturbance will be approved. Once construction activities are completed the company will supply

APPENDIX E—RECLAMATION GUIDANCE

the BLM with the new as-built surface disturbance extent as provided above. The new disturbance information will be added to the existing data to determine the current disturbance figure.

Reclamation of the disturbed surface by the companies will be monitored by the companies at least annually as provided in the reclamation monitoring provisions of the Reclamation Plan. When the company feels disturbed sites have attained the IRO described above, the company may propose to the BLM to withdraw the acreage meeting the IRO from the surface disturbance acreage estimate. The BLM will reduce the disturbance figure when it is determined by the BLM that the IRO has been met, from data supplied by the company. The BLM may consult with cooperating agencies in its assessment of the data but the BLM is the final decision-maker on whether the IRO has been attained.

In the event areas meeting the IRO that have been removed from the disturbance are in turn re-disturbed, the acreage re-disturbed will be added back into the surface disturbance acreage estimate.