
APPENDIX 36—RECLAMATION PLAN

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 predisturbance authorization of any surface disturbance and the postdisturbance 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 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 the 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 as to 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 if 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%20book/FinalGoldBook%20-%202006%20Edition.pdf>.

In preparing and reviewing reclamation plans, the 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 the 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.

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 predisturbance 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, a rocked driveway installed, fencing installed as needed, and the area revegetated. Interim reclamation guidelines would 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. Predisturbance 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.

Predisturbance surveys provide data that allow for proper planning and timely implementation of planned activities. For instance, predisturbance 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. Predisturbance 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 the 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, 1999a).

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 over stockpiling since 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 where soils are stockpiled more than several feet high and biological activity is diminished from 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 one year, stockpiles should not exceed two 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. There then is the need to find suitable 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) would require protection from construction damage. Recontouring to preconstruction condition as well as restoration of normal surface drainage would be required.

ROAD RECLAMATION GUIDELINES

Road reclamation guidelines are as follows:

- Determine the desired level of obliteration and reclamation. Determine if 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 road; 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 the 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.

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 predisturbance 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 (USDI-BLM, 1992), 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 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 (PLS)

Pure live seed 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 deal financially because fewer seeds would actually germinate.

PLS = % purity * %germination rate/100

Example: 90% purity * 50% germination rate/100 = 45% PLS

Seed Testing and Labeling

Seed companies 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 companies also may offer collection services where they will harvest seed from sites the customer specifies. This is a preferred method for many that 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, as 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 the BLM for review and approval prior to use. The final goal is to restore disturbed sites so that they closely resemble predisturbance 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-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 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; 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, 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, as compaction and soil crusting can occur.

Seedbed preparation and seeding often occur simultaneously. Therefore, it is critical to choose the proper methods and timing. Seedbeds left in a rough surface condition, then broadcast seeded followed by light churning or harrowing may be a good strategy for seed mixes. Deep furrow drilling should not be used in dry soils or in loose soils, as 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, as it can reduce soil moisture loss and shade new seedlings. Cultipacker seeders, punch drills, pitting, and some compact drills 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, various 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 the BLM before the project proponent disturbs the environment. Guidance and requirements for this plan can be found in program-specific direction (USDI-BLM, 1983b). A projectwide 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 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 and
- 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
- 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 weed infestations/control.

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 Item 1 above.

PROJECT PROPONENT RECLAMATION MONITORING REPORTS

The project proponent will provide the 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.

CRITERIA FOR RECLAMATION SUCCESS

Criteria based on predisturbance surveys or surveys of adjacent undisturbed natural ground cover and species composition¹ or—

- 80 percent of predisturbance ground cover
- 90 percent dominate 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 %, Purity %, Germination %)
	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

¹ 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.

	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)
Inspection	Inspector's Name, Company, ID
	Inspection Date
	Time After Seeding
	Seedlings/Square Feet Growing
	% and Extent of Bare Soil
	% Ground Cover (Describe)
	% Desirable Species (Describe)
	% 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 Needs

