

Appendix D

South Dakota Field Office Reclamation Guidelines

Introduction

Reclamation would be required for surface disturbing activities (BLM surface only) that disturb vegetation and/or mineral/soil resources. The reclamation of a site aims to set the perpetual course for the planned future condition of a site, including eventual ecosystem restoration by natural processes. Prior to a surface disturbing activity the site would be evaluated on a case-by-case basis, including an on-site assessment if necessary, and mitigation measures would be enacted where appropriate. Reclamation plans would be site-specific, project-specific, and incorporate the project’s complexity, environmental concerns, and reclamation potential. This appendix gives guidance for appropriate reclamation planning prior to authorization and following surface disturbance.

The reclamation plan would serve as a binding agreement between the BLM and project proponent(s); it would be included in the proposed action of the NEPA document. Plans would incorporate program or regulatory specific requirements for reclamation. Preparation and review of plans would be based on available information and techniques. Goals and objectives within the reclamation plan would be consistent with the land use plan and be reasonable, ecologically achievable, and measurable. The plan is considered complete when all the requirements described below have been addressed, the techniques to meet the requirements are described in detail, and the BLM approves the plan. This agreement must be periodically reviewed (including monitoring and reporting) and adapted as needed as conditions change or new information or technology becomes available. Reclamation is considered successful when all the requirements described below have been addressed on-site and the BLM approves the site following an on-site inspection.

Most 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 appendix unrealistic, for example: sensitive soils, sensitive vegetation types, soils with severe physical or chemical limitations, steep slopes, etc. These limited reclamation potential areas may require site-specific reclamation measures not addressed in this appendix. Each project would develop a unique set of reclamation success requirements for those areas within the framework of this appendix. During the NEPA process, alternatives to approving development activities in such areas would be carefully analyzed. Alternatives considered would include: avoidance and/or unconventional site specific reclamation requirements. Resource development activities approved in these areas may require additional bonding.

Reclamation Goals

The short-term goal of the reclamation plan would include immediate stabilization of the disturbed area and to create the conditions needed for the long-term goal. Interim reclamation will be done if a site is to be left in a changed state for more than six months. The long-term goal of the reclamation plan is eventual ecosystem restoration by natural processes, this includes: a safe and stable landscape, while meeting desired conditions described in the land use plan.

Reclamation Objectives

The following reclamation guidelines apply to all surface disturbing activities, including BLM initiated activities, and must be addressed in each reclamation plan. These guidelines must be met prior to release of the bond and/or reclamation liability. Where these reclamation guidelines differ from more stringent, applicable, laws, rules, and regulations, those standards replace this policy.

1 **1. Manage all waste materials.**

- 2
- 3 a. The site would be cleaned of all equipment, structures, material, and debris.
- 4 b. Surface pipelines/utility lines would be removed during final reclamation; deep lines (typically 3 feet or
- 5 deeper) would be removed only if required by authorized officer.
- 6 c. Segregate, treat, and/or bioremediate contaminated material. Free fluids must be removed. Waste material
- 7 must be disposed of at a state approved facility.
- 8 d. Bury only authorized (by BLM or state) waste materials on site. Buried material would be covered with a
- 9 minimum of 5 feet of suitable material or meet other program standards. Buried material must meet the
- 10 following criteria: range of pH 6-9, moisture content <50% by weight, oil and grease content <3% by
- 11 weight, EC <12 mmhos/cm, unconfined compressive strength >20 lb/in², and the total metals content must
- 12 not exceed EPA limits.
- 13

14 **2. Ensure subsurface integrity and eliminate sources of ground and surface water contamination.**

- 15
- 16 a. Properly plug all drill holes and other subsurface openings and seal from the bottom to the top of water-
- 17 bearing formations.
- 18 b. Stabilize, properly back fill, cap, and/or restrict from entry all open shafts, underground workings, pits, and
- 19 other openings.
- 20 c. No adverse changes in quality of receiving surface or ground waters would occur. Control sources of
- 21 contamination to protect surface and ground water quality. See the **Monitoring Appendix** for specific
- 22 guidelines.
- 23 d. Maintain all erosion or sedimentation control devices until vegetation is reestablished, site is stabilized, or
- 24 are no longer needed.
- 25

26 Water Bar Guidelines

- 27
- 28 1) Water bars are required on 25% slopes or greater and will be used as necessary on gentler slopes. Vary
- 29 water bar spacing to:
- 30 a) Fit site conditions
- 31 b) Promptly intercept surface water before the volume of water and velocity increase enough to
- 32 generate erosion
- 33 c) Facilitate drainage toward natural dips, rocky ground, or vegetation to intercept sediment
- 34 2) Suggested spacing between water bars:
- 35

<i>Slope (%)</i>	<i>Spacing at Least Every (Feet)</i>
<10	100-400
10-19	75-200
20-39	50
>39	25

- 36
- 37 3) Water bars would:
- 38 a) Be 4-6 inches high but can be deeper depending on site conditions.
- 39 b) Be at a 20° angle to the slope and channel water to the downhill side.
- 40 c) Avoid pushing sediment into streams, draws, or coulees.
- 41 d) Be placed to intercept runoff before channelization can occur (specifically the first water bar at the
- 42 top of the slope).
- 43 4) The Gold Book (Surface Operating Standards and Guidelines for Oil and Gas Exploration and
- 44 Development, 4th edition, 2007) has further guidance and cross-sectional diagrams, including standards
- 45 for water dips that are driveable.
- 46 5) Fertilizer and soil additives would not be applied where they could adversely impact water quality.

- 1 **3. Re-establish slope stability, surface stability, and desired topographic diversity.**
2
3 a. Reconstruct the landscape to the approximate original contour and to blend with adjacent contours.
4 However, if the site has stabilized and recontouring would cause additional disturbance, this step may not
5 be necessary and could be waived by the authorized officer.
6 b. Maximize geomorphic stability and topographic diversity of the reclaimed topography.
7 c. Disturbed areas would be recontoured to provide proper drainage.
8 d. Eliminate highwalls, cut slopes, and/or topographic depressions on site; unless otherwise approved.
9 e. Backfill to prevent surface subsidence. No downward movement of surface material would be evident,
10 maintain to correct settling. See the **Monitoring Appendix** for specific guidelines..
11 f. There would be no evidence of slope instability on/or adjacent to the site other than minimal sheet or rill
12 erosion. Minimize accelerated erosion/sedimentation on/or adjacent to the reclaimed area with appropriate
13 erosion/sedimentation control measures immediately following disturbance. See the **Monitoring**
14 **Appendix** for specific guidelines.
15 g. Reclaim all roads and trails unless they meet public demand.
16 h. The Burned Area Emergency Stabilization and Rehabilitation Handbook (BLM handbook H-1742-1) has
17 further guidance on erosion/sedimentation control Best Management Practices.
18
- 19 **4. Reconstruct and stabilize water courses and drainage features.**
20
21 a. Reconstruct drainage basins and reclaim impoundments to maintain the drainage pattern, profile, and
22 dimension to approximate the natural features found in the sites naturally functioning basin or nearby,
23 similar reference basins if appropriate.
24 b. Reconstruct and stabilize stream channels, drainages, and impoundments to exhibit similar hydrologic
25 characteristics found in the sites naturally functioning system or nearby, similar reference systems if
26 appropriate.
27 c. Upland erosion from surface disturbing activities must be controlled effectively and not be allowed to be
28 transported to stream systems.
29
- 30 **5. Maintain the biological, chemical, and physical integrity of the soil resource.**
31
32 a. Identify, delineate, and segregate all salvaged topsoil and subsoil based on a site-specific and project-
33 specific soil evaluation.
34 b. Soil would be direct hauled to similar sites in the process of reclamation whenever possible. If that's not
35 possible, topsoil would be stockpiled separately from subsoil. Identify stockpiles with appropriate signage.
36 c. Protect all stored soil material from erosion, degradation, and contamination. Stockpiles would be no more
37 than 8-feet deep and of a stable configuration. Stockpiles would be located away from riparian areas,
38 floodplains, wetlands, and other sensitive areas. Erosion control and seeding would be applied to the
39 stockpile within 30 days of storage. ROW and road stockpiles for oil and gas pads would be stored near the
40 cut/fill site.
41 d. Incorporate stored soil material into the disturbed landscape.
42 e. Displaced farmland, in production or not, would be reclaimed to original productivity. See the **Monitoring**
43 **Appendix** for specific guidelines.
44 f. Soils which were naturally barren before disturbances would be evaluated for reclamation by recontouring
45 the surface to blend in with the topography and then compacting the reconstructed surface to 100% bulk
46 density, rather than using trying to seed and vegetate the site.
47
- 48 **6. Prepare site for revegetation.**
49
50 a. Redistribute soil resources in a manner similar to the original vertical profile.
51 b. Reduce subsoil compaction to a minimum of 4 inches below the compacted root zone prior to redistribution
52 of topsoil to accommodate desired plant species.

- 1 c. Provide suitable surface and subsurface physical, chemical, and biological properties to support the long-
2 term establishment and viability of the desired plant community as soon as possible following disturbance.
- 3 d. Remedial reclamation techniques would be evaluated and used to reclaim sites which were originally
4 vegetated, but were badly impacted by poor techniques and practices used in disturbing the soil to develop
5 a project. In such cases this can result in inadequate topsoil quantity, degraded topsoil, and increased
6 problems with high erodibility, low water holding capacity, sodicity in soils, and salinity in soils. These
7 remedial efforts would be made so that the site again supports ecosystem values, as well as the potential for
8 economic use.
- 9 e. Soil amendments would be evaluated for use including forms of organic matter, such as wood chips,
10 manure, sawmill waste, etc. Methods such as hydroseeding, the use of matting, etc., would be evaluated
11 for use. Chemical amendments would be evaluated for use such as iron sulfide, calcium chloride,
12 magnesium chloride, calcium sulfate, etc., to physically change soil properties, which would result in the
13 ability to support adequate vegetation.

14
15 **7. Establish a desired, self-perpetuating, native plant community.**

- 16
17 a. Establish species composition, diversity, structure, and total ground cover appropriate for the desired plant
18 community as soon as possible following disturbance. Within 5 years of disturbance, the site would
19 contain a minimum of 80% of the vegetative cover as compared to the reference site or NRCS Ecological
20 Site Description (<http://www.mt.nrcs.usda.gov/technical/ecs/range/ecosites/>), whichever is appropriate.
21 Within 5 years of the disturbance, 90% of the vegetative cover would consist of desirable species. Multiple
22 treatments may be required before success is achieved. Monocultures would not be allowed. See the
23 **Monitoring Appendix** for specific guidelines.
- 24 b. Select genetically appropriate and locally adapted native plant materials based on the site characteristics
25 and ecological setting whenever possible, using NRCS ecological sites and soil surveys. If local seed is
26 required it must be collected in the wild. Stream banks would be replanted with riparian vegetation
27 following current ecological restoration practices.
- 28 c. Native species are preferred; select non-native plants only as an approved short-term, non-persistent,
29 alternative to native plant materials (BLM handbook 1740-2 and Executive Order 13112). Ensure the non-
30 native species will not hybridize, displace, or offer long-term competition to the endemic plants, and are
31 designed to aid in the re-establishment of native plant communities. Native species are required for
32 projects with the subactivities 1110 (wildlife management), 1120 (fisheries), or 1150 (threatened and
33 endangered species).
- 34 d. Seed sites as soon as possible following re-contouring and seed-bed preparation and when environmental
35 conditions are appropriate. Approved seed rates would be specified in pounds of pure live seed (PLS) per
36 acre and be designed to adequately cover the soil upon germination. Seed must be tested to ensure viability
37 and purity (germination or TZ tested by a registered seed analyst within 1 year of receipt). Seed must be
38 certified weed-free (WO IM No. 2006-073 and BLM handbook H-1742-1 and BLM handbook H-1740-2).
39 Commercial seed must have documentation (not seed bag tags) easily accessible, including sources.
- 40 e. Drill or broadcast seed along contours. Drill seed with a 6 inch row spacing, ½ to ¾ inches deep.
- 41 f. The recommended drill seeding rate for large seeded species is 20 PLS/ ft². The recommended drill seeding
42 rate for small seeded species (most BLM seed mixes) is 30-40 PLS/ ft². Broadcast or aerial seedings are
43 recommended at the rate of 60-80 PLS/ ft² (approx. double the drilled rate); not to exceed 80 PLS/ ft².
- 44 g. Seed additives are allowed (e.g. rhizobium, mycorrhiza, fungicide, pilling).
- 45 h. Protect seed and seedling establishment with appropriate measures. Erosion control matting and mulch
46 must be certified weed/insect-free in accordance with the State's Department of Agriculture laws and
47 requirements, the Federal Seed Act, and specification JJJ-181. Fencing to prohibit cattle and/or wildlife
48 may be necessary.
- 49 i. The Burned Area Emergency Stabilization and Rehabilitation Handbook (BLM handbook H-1742-1), the
50 Integrated Vegetation Management handbook (H-1740-2) and www.nativeseednetwork.org have further
51 guidance on revegetation Best Management Practices.
52

1 **8. Reestablish complementary visual composition.**

- 2
- 3 a. Ensure the reclaimed landscape features blend into the adjacent area and conform to land use plan
- 4 decisions (BLM Handbook H-8431).
- 5 b. Ensure the reclaimed landscape does not result in a long-term change to the scenic quality of the area;
- 6 therefore the Scenic Quality Rating would not change (BLM Handbook H-840).
- 7

8 **9. Manage Invasive Species**

- 9
- 10 a. Develop an invasive species management plan if appropriate.
- 11 b. Control invasive species utilizing an integrated pest management approach.
- 12 c. Do not allow invasive species to be transported offsite without appropriate disposal measures.
- 13

14 **10. Develop and implement a reclamation monitoring and reporting strategy.**

- 15
- 16 a. Conduct compliance and effectiveness monitoring in accordance with a BLM approved monitoring
- 17 protocol. Observations must include erosion/sedimentation, revegetation, and invasive species. An on-site
- 18 inspection by the BLM is required within one year of the interim and final reclamation. See the
- 19 **Monitoring Appendix** for specific guidelines.
- 20 b. Evaluate monitoring data for compliance with the reclamation plan.
- 21 c. Document and report monitoring data. Recommend revised reclamation strategies where appropriate.
- 22 d. Implement revised reclamation strategies where appropriate.
- 23 e. Continue the process of monitoring, evaluating, documenting/reporting, and implementing, until
- 24 reclamation goals are achieved.
- 25
- 26

27 **Glossary**

28

29 **Casual Use** – Any activity that does not cause appreciable surface disturbance or damage to lands, resources, and

30 improvements. Examples include: the use of hand tools to remove surface material (e.g. post holes, hand-line for

31 fire control) or to collect mineral/vegetative specimens, off-road vehicle use contained in BLM land-use plans, or

32 livestock herbivory. It does not include occupancy where cumulative effects of activities result in more than

33 negligible disturbance. *Adapted from the CFR*

34

35 **Contamination** – The presence of man-made chemicals or other alterations in the natural soil or water environment

36 (e.g. pesticides, hazardous substances, petroleum, salts). *Adapted from various sources.*

37

38 **Ecosystem** – Includes all the organisms of an area, their environment, and the linkages or interactions among all of

39 them; all parts of an ecosystem are interrelated. The fundamental unit in ecology, containing both organisms and

40 abiotic environments, each influencing the properties of the other and both necessary for the maintenance of life.

41 *Vegetation Treatments Using Herbicides in 17 Western States, Programmatic Environmental Impact Statement*

42 *(USDI, BLM 2007c)*

43

44 **Invasive Plant** – A species that is not native (or is alien) to the ecosystem under consideration and whose

45 introduction causes or is likely to cause economic or environmental harm or harm to human health. Plants listed on

46 the State of Montana, Designated Noxious Weed List, would be included under this definition. *Executive Order*

47 *13112, Invasive Species (1999)*

48

49 **Reclamation** – The stabilization of the terrain, assurance of public safety, aesthetic improvement, and a return of the

50 land to what, within the regional context, is considered to be a useful purpose. *Adapted from the Society of*

51 *Ecological Restoration*

52

1 **Reclamation Plan** – The reclamation plan is a written document that addresses the reconstruction of disturbed
2 ecosystems by returning the land to a stable and productive condition compatible with the land use plan. *Adapted*
3 *from various sources*
4

5 **Restoration** – The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.
6 Restoration attempts to return an ecosystem to its historic trajectory, i.e., to a state that resembles a known prior state
7 or to another state that could be expected to develop naturally within the bounds of the historic trajectory. The
8 restored ecosystem may not necessarily recover its former state, since contemporary constraints and conditions can
9 cause it to develop along an altered trajectory. *Adapted from the Society of Ecological Restoration*
10

11 **Scenic Quality** – The overall impression of a landscape retained after driving or walking through, or flying over an
12 area. The Scenic Quality of an area is rated as Class A (outstanding visual characteristics), Class B (combination of
13 outstanding and common visual characteristics), and Class C (common visual characteristics). *BLM Handbook H-*
14 *8410 Visual Resource Inventory and BLM Handbook H-8431 Visual Resource Contrast Rating*
15

16 **Soil** – The collection of natural bodies occupying parts of the earth’s surface that is capable of supporting plant
17 growth and that has properties resulting from the integrated effects of climate and living organisms acting upon
18 parent material, as conditioned by topography over periods of time. *Elements of the Nature and Properties of Soils*
19 *(Brady and Weil 2004)*
20

21 **Subsoil** – This is roughly, the part of the solum below the organic topsoil and above the rocky parent material of the
22 C horizon; the B horizon. When suitable, the subsoil may be salvaged to supplement the topsoil for plant
23 establishment. *Adapted from various sources*
24

25 **Surface Disturbance/Surface-Disturbing Activity** – Any action created through mechanized or mechanical means
26 that would cause soil mixing or result in alteration or removal of soil or vegetation and expose the mineral soil to
27 erosive processes. Used in the literal context of actual, physical disturbance and movement or removal of the land
28 surface and vegetation. Examples include: construction of roads and trails, well pads, pits, reservoirs, pipelines,
29 facilities, the use of explosives, and occupancy where cumulative effects of activities result in more than negligible
30 disturbance. This definition excludes casual use. *Adapted from the Rawlins Final EIS/Proposed RMP*
31

32 **Topsoil** – The organically enhanced, biologically active, mineral, surface horizon; the A horizon. *Elements of the*
33 *Nature and Properties of Soils (Brady and Weil 2004)*
34

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