Normally Pressured Lance Natural Gas Development Project

Final Environmental Impact Statement

Appendix C

Reclamation, Monitoring, and
Weed Management Plan

NORMALLY PRESSURED LANCE

NATURAL GAS DEVELOPMENT PROJECT

Reclamation, Monitoring, and Weed Management Plan

U.S. Department of the Interior
Bureau of Land Management

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The Bureau of Land Management is responsible for the stewardship of our public lands. The Bureau of Land Management's mission is to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

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ACRONYMS AND ABBREVIATIONS

APD	Application for Permit to Drill
BLM	Bureau of Land Management
ESD	Ecological Site Description
FEIS	Final Environmental Impact Statement
GIS	Geographic Information System
IM	Instruction Memorandum
LRP	Limited Reclamation Potential
NPL	Normally Pressured Lance
NRCS	Natural Resource Conservation Service
POD	Plan of Development
RMP	Resource Management Plan
ROD	Record of Decision
ROW	Right-of-Way
SAR	Sodium Absorption Ratio
SEIS	Supplemental Environmental Impact Statement
SPCCP	Spill Prevention, Control, and Countermeasure Plan
SUP	Surface Use Plan
SWPPP	Storm Water Pollution Prevent Plan
WDEQ	Wyoming Department of Environmental Quality
WGFD	Wyoming Game and Fish Department
WOGCC	Wyoming Oil and Gas Conservation Commission

1.0 INTRODUCTION

This Reclamation, Monitoring, and Weed Management Plan was designed to define reclamation objectives and monitoring criteria for surface disturbance resulting from the development of the Normally Pressured Lance (NPL) Natural Gas Development Project. The Reclamation, Monitoring, and Weed Management Plan uses current information based on third-order soil data (NRCS 2012),Ecological Site Descriptions (ESDs) from the Natural Resource Conservation Service online database and local expertise. Any future modifications to the ESDs would be incorporated into this Reclamation Monitoring and Weed Management Plan.

The Bureau of Land Management (BLM) considered and incorporated information from the following sources for this Reclamation, Monitoring, and Weed Management Plan:

- Bureau of Land Management (BLM) Proposed Lander Resource Management Plan (RMP) and Final Environmental Impact Statement (FEIS) (BLM 2013a)
- BLM Green River RMP (BLM 1997)
- BLM Pinedale RMP (BLM 2008a)
- BLM Pinedale Anticline Project Area (PAPA) Supplemental Environmental Impact Statement (SEIS) – Reclamation Plan (BLM 2008b)
- BLM Jonah Infill Drilling Project FEIS (BLM 2006)
- BLM Instruction Memorandum (IM) WY-2012-032 – *Wyoming BLM Reclamation Policy* (BLM 2012a)
- BLM IM WYD-2012-005 – *High Desert District Policy for Reclamation of Disturbed* Lands – (BLM 2012b) and
- *Approved Resource Management Plan Amendments for the Rocky Mountain Region Greater Sage-Grouse (GRSG) sub-regions of Lewistown, North Dakota, Northwest Colorado, and Wyoming (ARMPAs)* (BLM 2015).

The BLM encourages the use of new technology for achieving successful reclamation as it becomes available.

Other information considered and incorporated in this Reclamation, Monitoring, and Weed Management Plan includes federal, and state (Wyoming) and county (Sublette and Sweetwater) policies concerning Greater Sage-Grouse habitat, big game crucial winter ranges, other wildlife habitat, and livestock grazing, as well as input from the operator, BLM and other cooperating agencies. Interim and final reclamation implementation are critical following disturbance of these areas. Reclamation would be conducted in compliance with all applicable federal, state, county, and local regulations. The sub-sections below further describe guidance and policies that are particularly relevant to reclamation and monitoring for the NPL Project.

Three phases of reclamation will be described in this document; temporary, interim and final reclamation. Temporary reclamation is referred to as site-stabilization. Site-stabilization is using measures including but not limited to seeding and erosion control measures to maintain topsoil viability and reduce erosion from the topsoil pile and disturbed area. Interim reclamation is recontouring all or most of the disturbed area and redistributing all or most of the topsoil and reseeding/re-vegetating (using established plants) over all or most of the disturbed area, where there are no remaining production facilities. Final reclamation includes but is not limited to: removing all of the facilities, recontouring and redistributing topsoil and reseeding/re-vegetating the entire disturbed area.

1.1 Wild Horses

In most cases, wild horses would benefit from reclamation criteria based on ESDs because the criteria would allow more grass in reclaimed areas than in the current plant communities, once reclamation is established.

1.2 Wildlife

For wildlife, BLM reviewed the following for guidance in developing this Reclamation, Monitoring, and Weed Management Plan:

- *Approved Resource Management Plan Amendments for the Rocky Mountain Region Greater Sage-Grouse (GRSG) sub-regions of Lewistown, North Dakota, Northwest Colorado, and Wyoming (ARMPAs)* (BLM 2015);
- State of Wyoming Executive Order 2015-4 – Greater Sage-Grouse Core Area Protection (State of Wyoming 2015);
- 10-Year Sublette Mule Deer Mitigation Plan (BLM 2012c) and other sensitive wildlife species (i.e., mountain plover and pygmy rabbits).

1.3 Livestock Grazing

The BLM currently uses ESDs to monitor and manage livestock grazing allotments. Each ESD has an associated Reference Sheet which NRCS provides online as a tool for assessing rangeland health. The BLM would continue to consult, cooperate, and coordinate with the Wyoming Department of Agriculture (WDA), Sublette and Sweetwater County Conservation Districts and grazing permittees as necessary.

1.4 Wyoming BLM Reclamation Policy

The Wyoming BLM Reclamation Policy Instruction Memorandum No. WY-2012-032 (BLM 2012a) identifies the minimum requirements for federal actions requiring a reclamation plan. This policy provides short-term (stabilize disturbance) and long-term goals (establish a desired native plant community and ecological function), and provides reclamation requirements: (summarized and subject to change with any updates to this policy):

- manage all waste materials;
- ensure subsurface integrity and eliminate sources of ground and surface water contamination;
- re-establish slope stability, surface stability, and desired topography;
- reconstruct and stabilize water courses and drainage features;
- maintain the biological, chemical, and physical integrity of the topsoil and subsoil (where appropriate);
- prepare site for revegetation;
- establish desired self-perpetuating native plant community;
- reestablish a complementary visual composition;
- manage invasive plants, and;

- develop and implement a reclamation monitoring and reporting strategy.

1.5 Other Requirements

Implementation of this Reclamation, Monitoring and Weed Management Plan would also meet the objectives and standards from the following:

- Applicable RMPs including revisions and amendments
- Onshore Oil and Gas Orders;
- Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (BLM 2007), and;
- Applicable local, county, state, and federal regulations.

2.0 PREDISTURBANCE AND SITE PLANNING

Predisturbance planning minimizes the amount of reclamation at a site by reducing land disturbance. Preparing the site for construction while concurrently planning for reclamation with practices such as salvaging, separating, and stockpiling topsoil and spoil, locating facilities away from cut-and-fill slopes, and minimizing the area occupied by facilities would advance the goal of achieving reclamation success.

2.1 Predisturbance Planning

During selection of well pads, access roads, pipelines, and ancillary facility locations, the operator would avoid developing in the following areas, unless acceptable mitigation can be achieved as described below:

- areas with high erosion potential (e.g., rugged topography, steep slopes [>25 percent], stabilized sand dunes, floodplains);
- areas with saturated soils;
- areas within 500 feet of wetland or riparian areas (e.g., playas and open water areas);
- areas within 100 feet of ephemeral and intermittent channels; and,
- areas with limited reclamation potential (includes areas with limited reclamation potential as defined by the NRCS Soil Web Survey database).

The operator would conduct site-specific preconstruction inspections with the BLM and cooperating agencies for each proposed surface disturbance. The site-specific preconstruction inspections would determine the suitability of the proposed production facility locations and/or access road, pipeline and utility disturbances regarding the above-listed avoidance areas, as well as other areas. The operator would submit Surface Use Plans (SUPs) and/or Plans of Development (PODs) for each proposed surface disturbance area or for BLM approval. These plans would include the following components:

- project administration, timeframes, and responsible individuals;
- commitment to adhere to this reclamation plan and its success standards;
- detailed descriptions of all deviations from this plan required due to site-specific conditions and the rationale for changes.

The operator would submit a plan to the BLM each year projecting what would be disturbed or reclaimed that year. Each Application for Permit to Drill (APD) submitted by the operator would discuss reclamation in number 10 of the 12-point surface use plan including but not limited to: filling in cellars, drill cuttings and cuttings pit reclamation, how much of pad would be in interim reclamation, soil amendments used, proposed seed mix, cover crops if needed, fencing if needed, weed control and a shapefile, showing actual disturbance.

The operator will follow the initiating and conducting baseline inventory in Table M-1 of the BLM *Approved Resource Management Plan Amendments for the Rocky Mountain Region Greater Sage-Grouse (GRSG) sub-regions of Lewistown, North Dakota, Northwest Colorado, and Wyoming (ARMPAs)* (BLM 2015).

2.2 Site Preparation

Locations would be built to maximize reclaimed area by reducing the amount of disturbance to develop and operate the wells.

The BLM recommends the operator plan to the extent feasible, to avoid sharply contrasting soil types (loamy versus saline for example) within the same location. This strategy will increase the reclamation potential for each location by reducing the potential for mixing of different soil types.

2.2.1 Trash and Spills

Trash removal would routinely occur throughout field development and operation. Trash would be picked up by field personnel and disposed of in on-site trash receptacles. These receptacles would be serviced by a licensed solid waste contractor.

Spills would be handled in accordance with operator-specific Spill Prevention, Control, and Countermeasure Plans (SPCCPs) for the field.

Removal of trash or spill materials would be included in the operation plan rather than in the reclamation plan because these types of disposals would occur routinely during project operations.

Topsoil would not be placed on contaminated materials. The absence of contaminated materials at or near the ground surface is a reclamation requirement and a criterion of reclamation success.

2.2.2 Topsoil and Spoil Handling

The operator would design well pads to minimize bare soil and maximize reclamation per location.

Topsoil would be salvaged from all proposed disturbance areas and stockpiled unless the BLM deems that leaving topsoil in place, where mat pads or other methods could be used, would facilitate better reclamation. Vegetation would be salvaged and stockpiled with topsoil to incorporate native seeds and organic matter. The operator may consider the use of a grinding machine to salvage topsoil and vegetation in one pass rather than having heavy machinery make multiple passes over the site.

The volume of topsoil, other suitable plant growth material to be salvaged, proposed topsoil replacement depth, and topsoil storage areas would be specified in the SUP or POD. With BLM approval, if less than two inches of topsoil is available, the topsoil can be mixed with suitable spoil so that a minimum of two inches of plant growth material is available for use during reclamation. Spoil to be mixed with topsoil would be amended as needed to meet suitability criteria for topsoil (see Table C-1 below); no unsuitable materials would be used. This would only be done if the location's integrity is not compromised and if topsoil and spoil (subsoil) have similar physical and chemical properties.

For example, topsoil from an alkali location would not be mixed with topsoil from a non-alkali location. Alternatively, the operator would identify other topsoil stockpile(s) from which topsoil would be obtained for reclamation. If Location A has less than 2 inches of topsoil but 24 inches were salvaged from neighboring Location B, the operator may identify the neighboring location as the source of additional surface soil material. The SUP or POD for both locations would note that a specific volume of topsoil from Location B is slated for use at Location A, subject to BLM approval.

To minimize the volume of spoil stockpiled, the operator would balance the volumes of cut versus fill material where applicable and to the extent feasible. Spoil would be salvaged and stockpiled separately from topsoil.

Topsoil would be salvaged from all areas to be disturbed and stockpiled. For pipelines and access roads constructed on slopes of less than 15 percent, topsoil would be stored in windrows within the construction right-of-way (ROW). Where pipelines and roads are to be constructed on slopes greater than 15 percent, topsoil would be transported to more level terrain for storage.

When the ground is frozen, construction would be pre-approved by BLM with the conditions of approval.

Criteria to establish suitability of topsoil substitute (spoil) are described below in Table C-1.

Table C-1. Criteria to Establish Suitability of Topsoil (or topsoil substitutes)†

Parameter	Suitable	Marginal‡	Unsuitable
pH	5.5-8.5	5.0-5.5;8.5-9.0	<5.0; >9.0
Electrical Conductivity (EC) mmhos/cm	0-8	8-12	>12
Saturation percentage	25-80	<25; >80	
Texture		Clay, silty clay, sand	
Sodium Absorption Ratio (SAR)£	0-10	10-12¥;10-15	>12¥;>15
Selenium	<0.3 ppm	>0.3-0.8 ppm	
Boron	<5.0 ppm		>5.0 ppm
Coarse Fragments (% vol.)	<25	25-35	>35

†Adapted from Wyoming Department of Environmental Quality Land Quality Division Rules Update (WDEQ 2015).
‡ Evaluated on an individual basis for suitability
£ As an alternative to sodium absorption ration (SAR) calculations, exchangeable sodium percentage (ESP) can be determined. ESP should be determined if suitable SAR value is exceeded.
¥ For fine textured soils (clay >40%)

Storage and handling of topsoil would include but would not be limited to:

- a maximum soil stockpile height of 15 feet;
- avoiding the stripping of topsoil or redistributing topsoil when it is wet or frozen;
- using BLM's procedures for constructing during frozen soil conditions;
- reclaiming the disturbed locations during the first appropriate growing season after well drilling and completion;
- fencing of all or portions of the topsoil stock pile with wildlife friendly fence could be considered as an aid to vegetation establishment and improving soil organic matter content;
- seeding topsoil pile with sterile and non-competitive cover crop (or alternative approved by the BLM) in accordance with BLM Manual 1745, to avoid aggressive or invasive species that may succeed so well in a particular situation that other species suffer. These well adapted competitors spread fast, crowding out less aggressive native plants, competing for water, light and nutrients. They have the potential to out-compete other plant species and create a monoculture. This could harm native plant communities and leave the persistent species or monoculture vulnerable to destruction by species-specific pests or pathogens, and;
- The use of non-native species must comply with BLM Wyoming State Policy.

Topsoil and spoil stockpiles would be designed to minimize the surface disturbance needed for oil and gas development, as practically allowed and would be constructed to remain stable until they are used for reclamation. Stockpiles may be used in the interim to screen activities on the well pads.

Topsoil and spoil stockpiles must be clearly marked and noted on site maps and may be identified with signs. oil and spoil stockpiles should be placed separately to avoid contamination between stockpiles.

If a topsoil stockpile would be located on or adjacent to ground that slopes from 15 to 25 percent, runoff would be diverted around the stockpile via interceptor ditches. Interceptor ditches would be rounded V-shaped—one foot deep and four feet wide—with a minimum longitudinal gradient of at least 0.5 percent (BLM Road Manual Section 9113) and would empty onto native, undisturbed vegetation. Alternatively, energy dispersing devices (e.g., rock aprons) would be placed at each end of the interceptor ditch. All stockpiles would be located to not affect existing drainages.

Topsoil would be spread after all wells on a location are producing, when the ground is not frozen, and when moisture is not greater than field capacity to prevent soil compaction and rutting.

2.2.3 Additional Procedures for Wetlands or Riparian Areas

Wetland construction would follow guidelines within the applicable RMPs. Well pads would not be located in wetlands or riparian areas. Where roads and pipelines must cross wetlands or riparian areas, construction would occur during the appropriate season when the area is at its driest. In work areas that would not be excavated but would be driven on (e.g., scalped pipeline disturbances adjacent to pipeline trenches), vegetation would be cut to ground level leaving existing root systems intact; these areas would not be graded.

All of the topsoil would be salvaged and replaced from wetland or riparian areas except in areas with standing water, saturated soils, and/or where no topsoil would be salvaged. If standing water or saturated soils are present, either wide-track/balloon-tire construction equipment or typical construction equipment operated on equipment pads would be used. Equipment pads would be removed immediately upon completion of construction.

2.3 Reclamation Timing

Topsoil re-spreading can occur anytime during the year after the ground thaws and is not saturated, or after excess compaction and rutting would occur in the spring until the ground refreezes in the fall. Seeding for site-stabilization, interim reclamation, and final reclamation should occur during the first fall after topsoil re-spreading, so long as wet and frozen soils can be avoided. If the operator cannot seed during the fall, the BLM would consider an alternative seeding time in the spring or defer to the next fall. See Section 3.2 of for details on seeding.

2.4 Site-Stabilization

Site-stabilization would occur on areas that would be re-disturbed (e.g., topsoil pile and/or pad surface, including cut and fill slopes) before project abandonment. For example, if the topsoil pile would not be respread for more than a year, the operator would stabilize the location, including topsoil. Site-stabilization would prevent erosion and minimize the population of undesirable weeds such as Russian thistle and halogeton. Site-stabilization would not be used as a means to delay interim or final reclamation on areas that would not be re-disturbed.

Site-stabilization areas would be graded to the original contours where possible and practical. Graded surfaces would be ripped if necessary to eliminate soil compaction. Surfaces would then be disced at the operator's discretion to loosen surface material.

Topsoil would not be replaced on site-stabilized areas to minimize topsoil handing. Replacing and then re-disturbing topsoil on site-stabilized areas would increase the potential for topsoil loss while it is being handled, stockpiled, and replaced a second time.

Disturbed areas would be seeded using the seed mixture (Table C-2) for site-stabilization. Light discing might be used to improve soil and seed contact and moisture capture and reduce compaction. The operator would determine which mixture to use based on seed availability, cost, or other operational considerations. The BLM would consider alternative seed mixtures in addition to the one shown in Table C-2.

Table C-2. Seed Mixture for Site-Stabilization†

Species	Approximate Seeding Rate (PLS/acre)‡
Western wheatgrass (*Elymus smithii*)	2.0
Thickspike wheatgrass (*Elymus lanceolatus spp lanceolatus*)	2.0
Bluebunch wheatgrass (*Pseudoroegneria spicata*)	2.0
Winter wheat (*Triticum aestivum*)¥	5.0
TOTAL	**11.0**

† It is anticipated that this seed mixture primarily would be used on topsoil and subsoil stockpiles designated for long-term storage.
‡ Pure Live Seed (PLS)/acre = pounds of pure live seed per acre; alternate seeding rates may be applied in some areas as deemed appropriately by BLM and specified in approved SUPs and/or PODs.
¥ A sterile hybrid would be seeded as a cover crop; cover crops would be used only in areas where rapid site stabilization is desired and where further disturbance and reseeding efforts would be likely.

2.4.1 Site-Stabilization Standards

Erosion would not be permitted to exceed what is natural per tolerable soil loss data for each soil series (tolerable soil loss information can be found on each soil map unit description produced by NRCS) and applicable ESD Reference Sheet. Site-specific authorizations for site-stabilization would be followed.

3.0 INTERIM AND FINAL RECLAMATION OBJECTIVES AND STANDARDS

This section describes interim and final reclamation objectives and standards for the NPL Project. Reclamation would begin as soon as practicable on areas not needed for well production. Reclamation objectives and standards are based on lessons learned and measures adopted from relevant sources (e.g., Jonah Infill Drilling Project, Pinedale Anticline, BLM Wyoming Sage-Grouse RMP Amendments, Green River, Lander, and Pinedale RMPs, BLM BMPs) and site-specific characteristics of the Project Area. In some cases, interim and final reclamation standards were adopted from the Jonah Infill Drilling Project FEIS Appendix DP-B – Reclamation Plan (BLM 2006), PAPA SEIS Appendix C – Reclamation Plan (BLM 2008b).

Interim and final reclamation for the NPL Project would be based on ESDs where applicable. The concept of using ESDs was adopted from the proposed Lander RMP and FEIS Appendix D – Reclamation Objectives and Standards (BLM 2013a). The BLM determined that adoption of these ESDs with possible modification offers the BLM Rock Springs and Pinedale field offices reasonable considerations for site-specific reclamation standards in the NPL Project Area. The ESD concept is defined based on reference conditions representing disturbed and undisturbed reference states. For more information, see the Interagency Ecological Site Handbook for Rangelands (NRCS 2013) available online at: http://www.ars.usda.gov/SP2UserFiles/Place/62351500/InteragencyEcolSiteHandbook.pdf.

Another method for determining reclamation success is to use reference sites. This process, which references existing plant communities, has been used in the past to represent benchmarks for success. Reference plant communities represent plant communities in their current state under existing management, which may not represent the desirable plant communities for the area. The quality and density of plant communities within reclaimed areas should be similar to information found within the ESD for the site (or a reference site). Reclaimed sites could represent either successional communities (trending toward communities described in the ESD) or the original plant community (pre-disturbance/reference site).

Some rangeland forbs (such as hoods phlox and prickly pear) become more abundant over time, either through natural causes or in response to management. In some cases, these forbs may compete with more desirable species and skew baseline measurements. ESDs are one way to represent what can occur on a given site and provide a benchmark for desired reclamation outcomes. These outcomes are partially dependent upon management of the resource(s). Even under theoretically "perfect" management, these less desirable forbs will increase in accordance with time since disturbance is a natural process and part of the functioning ecosystem.

The following sections describe surface preparation procedures that would be implemented as necessary to achieve successful interim and final reclamation.

3.1.1 Backfilling and Grading

Backfilling would occur before fine grading. Areas to be backfilled include cuttings pits, cut slopes, pipeline trenches, borrow ditches, and facility foundations. Pipeline trenches would be backfilled so there is enough soil to avoid subsidence and gullying (to be determined by operator). Spoil for backfill would be obtained from fill material and spoil stockpiles.

Areas to be reclaimed would be graded to approximate original contours to blend in with adjacent topography. Area-wide drainage would be restored so that surface runoff flows and gradients are returned to the conditions present before development. Graded surfaces would be made suitable for replacement of topsoil at a uniform depth, would promote cohesion between subsoil and topsoil layers, reduce wind erosion, and facilitate moisture capture.

Specialized grading techniques would be applied at the operator's discretion and may include slope rounding, bench grading, and/or contour furrowing.

Dozers, loaders, scrapers, and motor graders are typically used for backfilling and grading of subsoil.

3.1.2 Ripping and Discing

Compacted areas such as roads and well pads would be ripped (before topsoil is spread) to a depth determined by the operator to improve soil aeration, water infiltration, and root penetration. Ripped areas would be disced if necessary to fill in deep furrows where topsoil would be lost and to break up large clods. The topsoil should be rough enough to allow moisture capture and reduce runoff without minimizing soil/seed contact.

Motor graders or tractors equipped with ripping shanks are typically used for ripping. Ripper shanks would be set about two feet apart. Discing is typically accomplished using a tractor-drawn disc set two to six inches deep. Discing and ripping are optional methods. However, if reclamation fails and the BLM determines soil compaction was an issue, BLM would have the authority to require these methods.

3.2 Seedbed Preparation

Seedbed preparation maximizes seeding efficiency and improves reclamation success. It includes topsoil replacement with amendments where appropriate and discing, if necessary. Surface roughening procedures (e.g., pitting, gouging) may be applied at the discretion of the operator.

3.2.1 Topsoil Replacement

Where necessary and before topsoil is replaced, waterbars and other erosion control devices would be installed on reclaimed areas to control topsoil erosion.

Stockpiled topsoil would be redistributed uniformly on areas to be reclaimed. Topsoil could be mixed with suitable spoil or imported from another area where conditions warrant the application and approved by the BLM. The operator should use caution to avoid mixing subsoil with topsoil when using a disc or harrow to prepare soils for seeding. Topsoil would not be replaced on contaminated material; all contaminated material would be removed or otherwise handled in accordance with the SPCCPs and applicable Wyoming Oil and Gas Conservation Commission (WOGCC) or Wyoming Department of Environmental Quality (WDEQ) soil cleanup guidelines.

Topsoil is typically replaced using scrapers, dozers, and/or motorgraders. Excavators may also be used to redistribute topsoil in sensitive or confined areas when compaction or shifting subsoil is a concern.

After topsoil is replaced, seeding would typically occur in the fall, when soil is not frozen, when soil is less than field moisture capacity, and when soil moisture (relative to soil texture) is below the point at which soils are prone to compaction and/or rutting. Seeding would be delayed until moisture falls below saturated conditions, to prevent rutting and compaction, and soils have thawed and become

friable. An early frost would not be used to delay seeding until the following spring if subsequent fall conditions are appropriate for seeding. If the operator cannot seed during the fall, the BLM would consider an alternative seeding time in the spring or defer to the next fall. Requirements for replacing topsoil could include, but would not be not limited to:

- recontouring – refer to Handbook of Western Reclamation Techniques (OSMRE 1996);
- not mixing topsoil & subsoil if not approved by the BLM;
- not planting on compacted soil (rip or disc first, if necessary). Compacted soil is soil that has an increased bulk density, decreased infiltration rate and an increased restriction for root penetration;
- not planting on powdery soil. Add moisture, mulch or bonding agents;
- stabilizing slopes (e.g., no types of active erosion, sloughing or land sliding and/or erosion control measures are in place to prevent these from happening) before planting;
- planting along contours, not up/down slopes;
- ensuring good soil-seed contact to:
    - Prevent seed or root desiccation
    - Reduce chance of seedling death soon after germination
    - Reduce seed exposure to wind, birds, rodents, disease and micro-organisms;
- roughening soil before seeding to improve seed/soil contact, create depressions that trap moisture and reduce removal of seed by wind;
- using appropriate equipment to break up soil and cover seeds, and;
- covering seed to appropriate depth for each species (check seeding depth and calibrate/adjust drill seeding equipment).

3.3 Revegetation

If a pad expansion is necessary, previously reclaimed areas would be redisturbed rather than undisturbed areas. However, if it appears that the plant community within the reclaimed area is providing more forage and better habitat than the surrounding plant community, the BLM would consider that the operator not disturb the reclaimed area; thus requiring new surface disturbance.

Reclaimed areas would be seeded using the BLM approved seed mixtures. These mixtures would be developed based on the following criteria:

- general conditions within the analysis area;
- species adaptations to site conditions;
- usefulness of the species for rapid site stabilization, species success in past re-vegetation efforts;
- availability, and;
- compliance with *Executive Order* 13112 and its amendment *Executive Order 13751* and *BLM Manual 1745* (i.e., use of native species) and ESDs.

Alternative species and seeding rates may be used at operator discretion, with approval of the BLM Authorized Officer (AO), if warranted by site-specific conditions or seed-availability provided that the alternative species/seeding rates facilitate achieving reclamation success and all modifications are documented.

The operator would utilize seed mixes based on current guidelines and procedures during site-specific permitting in consultation with the BLM, state, and local agencies, and other appropriate entities. For example, for mountain plover habitat, the seed mix may not include woody plant species. The operator may also elect to use inter-seeding techniques. Inter-seeding is not required for the first-time attempt at interim and final reclamation but may be required at a later date by BLM if reclamation success is not achieved. Noxious and invasive weeds, undesirable weeds (if present), and erosion would be monitored and controlled annually and more often when conditions warrant.

The operator has discretion to inoculate selected seed mixtures with soil microorganisms to facilitate germination and growth. It is not required for the first-time attempt at interim or final reclamation but may be required at a later date by BLM if reclamation success is not achieved.

Broadcasting of seeds, and seeding in general, would be determined during site-specific permitting based on procedures and guidance in place at the time of site-specific permitting.

3.3.1 Limited Reclamation Potential (LRP)

Areas possessing unique landscape characteristics such as 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 the Wyoming Reclamation Policy and applicable RMPs. As part of subsequent NEPA analysis during APD processing, the BLM would further analyze potential LRP areas on a site-specific basis.

3.4 Erosion Control

3.4.1 Construction-and Operation-Phase Erosion Control

Erosion control would follow guidelines set forth in the applicable RMPs.

The operator would adhere to the following additional erosion control measures during construction and operation:

- construction would be avoided on slopes greater than 25 percent;
- culverts, road ditches, and roads would be designed in accordance with Gold Book standards and typical engineering practices to minimize erosion along active roads;
- culverts would be sized to pass expected 100-year flows without causing erosion above, below, or around the culvert and would be annually inspected and maintained;
- culvert inlets and outlets would be protected with energy dissipaters such as riprap or rock aprons as necessary;
- road ditches would be sized to collect runoff from roads and surrounding areas;
- energy dissipating structures would be used to prevent ditch erosion;
- roads would be designed to enable head-on traffic to pass without leaving the surfaced travel-way;
- if turnouts are built to accommodate passing vehicles, the operator would instruct field personnel to use turnouts to avoid traveling on roadside ditches;

- water discharged from culverts, roadside ditches, and turnouts would be directed either into undisturbed vegetation or natural drainages;
- interceptor ditches would be installed, as appropriate, above all cut slopes, as determined by the BLM AO. Interceptor ditches would be rounded V-shaped, sized appropriately for anticipated flows, with gently sloping sides, and would empty onto native, undisturbed vegetation. Alternatively, energy-dissipating devices (e.g., rock aprons) would be placed at each end of the interceptor ditch;
- re-vegetating ditches along roads would be required to dissipate energy of water flow and to prevent erosion;
- where appropriate, sediment control devices would be installed at the base of all slopes and stockpiles prone to erosion and would be annually inspected and maintained;
- where road or pipeline construction occurs on slopes greater than 15 percent, temporary sediment barriers such as silt fences and/or staked weed-free straw bales would be installed along the contour downhill from the access road, pipeline and utility disturbances;
- silt fences or other sediment filtering devices would be installed wherever road or pipeline construction occurs within 100 feet of a drainage;
- temporary sediment barriers would remain in place until the surfaces are stable and reclamation success standards are met. Sediment filtering devices would be cleaned out and maintained in functional condition throughout the life of the project;
- soft plugs would be installed during pipeline construction every one-quarter mile with a gated access (opening) for wildlife and livestock;
- where roads and pipelines cross a water body (i.e., wetlands or drainages), topsoil and spoil would be placed at least ten feet from the edge of the water body, and sediment control structures would be placed between the topsoil/spoil and the water body, and;
- soil and brush riprap would not be used; rock, vegetation mats, or another BLM approved alternative would be used to stabilize the ROWs at water body crossings.

3.4.2 Reclamation-Phase Erosion Control

Reclamation-phase erosion control measures would be identified in the operator's SWPPP submitted with each APD/SUP. Erosion and sediment control structures would be installed on reclaimed areas on slopes greater than 15 percent and where monitoring demonstrates that erosion control structures are needed.

Runoff from reclaimed areas where slopes exceed 15 percent (and/or where experience and/or monitoring suggests that it is warranted) would be controlled using structures including but not limited to waterbars, silt fences, geotextile, and energy dissipaters.

All disturbed areas would be subject to reclamation efforts that address cumulative runoff regardless of slope. Waterbars would be installed in accordance with standard BLM specifications and would drain into undisturbed vegetation. Waterbars generally would be 12 to 18 inches high with a two percent grade. Waterbars would be installed after ripping and before topsoil placement. Silt fences would be placed downhill from reclaimed areas where erosion may impact a water body and would be installed according to manufacturers' instructions. Energy dissipaters would be used to slow flows wherever water is channelized (e.g., by a waterbar or an interceptor ditch).

All runoff and erosion control structures would be inspected, maintained, and cleaned-out by the operator whenever necessary throughout the life of the project. Inspections would occur after runoff events such as spring runoff and storm events. Sites and sources of soil movement would be addressed in a timely manner and recorded in a way that would allow for erosion pattern tracking. These reports would be provided to BLM annually by March 1, from the previous year's data.

3.5 Weed Control

The operator would be responsible for the annual inventory and control of noxious, non-native, invasive, and undesirable weeds (or when directed by BLM in urgent cases) for all NPL project activities, and shall prepare an annual project-wide plan specifying what remedies (mechanical, chemical, biological), would be used. As site-specific conditions arise, the BLM would consider alternative methods with cooperating agencies. If use of herbicides is deemed necessary by the operator, a Pesticide Use Proposal would be submitted for approval to the BLM. All herbicides would be used only in the season or growth stage during which they are most effective.

Weed management must also be performed in accordance with any additional guidelines set forth in the applicable RMPs.

3.6 Interim Reclamation

3.6.1 Site-Stabilization Objectives

The objectives of site-stabilization are to prevent erosion, increase moisture capture, maintain site/topsoil-productivity and minimize weeds.

3.6.2 Interim Reclamation Objectives

The objectives of interim reclamation are to:

- maintain healthy and biologically active topsoil;
- control erosion; and
- restore habitat, visual, and forage function on those portions of the disturbed area not needed for production operations for the life of the well(s) and facilities or until final reclamation is initiated.

The BLM would consider interim reclamation successful when disturbed areas not needed for long-term production operations or vehicle travel are re-contoured, protected from erosion, and re-vegetated. Successful re-vegetation would occur when plant communities are self-sustaining, vigorous, diverse, and sufficient to minimize visual impacts, provide wildlife habitat and forage suitable for wildlife and livestock, stabilize soils, and impede the invasion of undesirable and noxious and invasive weeds.

The BLM would consider alternative reclamation criteria for plant communities, cover percentage, and density in soils that are difficult to reclaim on a case-by-case basis if no feasible alternative locations can be identified for development.

3.6.3 Interim Reclamation Standards

Interim reclamation standards will be based on site-specific authorizations and subject to the inspection and enforcement process.

3.7 Final Reclamation

3.7.1 Final Reclamation Objectives

The objective of final reclamation is to achieve an established desired plant community that provides site-stability, habitat, forage, and hydrologic functions. This would include (but not limited to) all development activities completed and all facilities removed and restoration of the original landform or creating a landform that approximates and blends with the surrounding landform. Final reclamation involves having the following trend toward long-term goals: re-establishing natural vegetation, hydrologic systems, visual resources, agricultural values, and wildlife habitats.

Final reclamation standards will be based on site-specific authorizations and subject to the BLM inspection and enforcement process.

4.0 RECLAMATION PLAN AND ANNUAL REPORT

Annual reporting for reclamation would be based on existing guidance and procedures for reporting during site-specific permitting.

The operator will provide the BLM with an annual report for all sites disturbed.

Copies of the completed individual site review forms (operator onsite forms) or a BLM-approved electronic report. A summary of monitoring data and results, including but not limited to:

- Individual site reclamation monitoring reporting data
- Identification of sites successfully reclaimed by reclamation years (starting with the first growing season)
- Identification of sites needing additional work or more reclamation activities (adaptive management) by reclamation year
- Sites proposed for meeting interim and final reclamation

The BLM's useable shapefile(s) or geographic information system (GIS) layer(s) that details location, name, type, and extent of:

- Original surface disturbance and new surface disturbance (new surface disturbance can be re-disturbed reclamation on an existing pad or access road, pipeline and utility disturbances, new pad expansion, etc.)
- New reclamation
- Successful interim reclamation
- Successful final reclamation
- Failed or unsuccessful reclamation
- Locations of noxious/invasive weed infestation (this can be included with the pesticide use proposal or pesticide annual report
- Further vegetation treatments planned (e.g., mulching, matting, and weed control).

On these shapefiles or GIS layers, *location* shall be given as the legal location and geo-referenced location of the site; *name*, as appears on the BLM's APD, lease, or other BLM file name for the site; *extent*, as the appropriate component boundary.

5.0 BEST MANAGEMENT PRACTICES

This section identifies Best Management Practices (BMPs) that could be suggested as recommendations during interim and final reclamation based on BLM specialist local expertise.

- "Live-hauling" topsoil from one location to another location may aid in reclamation success, but should only be considered on a "case-by-case basis" because the ESD for topsoil from one location could be different from its destination. Timing problems could also occur when stripping topsoil from one location and hauling to another location. The quantity of topsoil could likely vary from one location to another location.

The BLM AO may direct the use of containerized plants in not more than gallon-sized pots and germinated from a local seed source. These plants would be planted in clusters to catch snow, retain moisture, and provide a seed source. This would mostly apply to native shrubs such as sagebrush and saltbush with the purpose of quickly establishing the shrub component. Some or all of the following practices may be implemented to expedite reclamation:

- planting bare-root seedlings (shrubs such as sagebrush);
- importing topsoil to add to spots where it is absent or not productive;
- erecting fences (wildlife friendly) around reclaimed areas to allow for enhanced establishment of vegetation;
- using snow fences or an alternate snow-capture device to capture moisture, and;
- irrigating reclamation (enough to simulate typical spring and summer moisture) to establish roots.

Irrigating reclamation could be repeated for the first two years but not more than three. A pause in irrigation after three years provides a period for the vegetation to demonstrate persistence before the reclamation can be accepted as complete.

6.0 SEED MIXES

Jonah Energy would utilize seed mixes based on current guidelines and procedures during site-specific permitting, in consultation with the BLM, state, county and local agencies, and other appropriate entities.

7.0 WEED MANAGEMENT PLAN FOR THE NPL PROJECT AREA

Weed management during site-specific permitting would be based on procedures and guidance at the time of site-specific permitting.

8.0 GLOSSARY

Alkali soil: Soils with pH above 8.5.

Avoid: Paraphrasing the Council on Environmental Quality (CEQ) Regulations (40 CFR 1508.20), avoidance means to circumvent, or bypass, an impact altogether by not taking a certain action, or parts or an action. Therefore, the term "avoid" does not necessarily prohibit a proposed activity, but it may require the relocation of the action, or the total redesign of an action to eliminate any potential impacts resulting from it.

Avoidance Areas: Areas to be avoided which may be available for location of ROWs and Section 302 permits, leases, and easements with special stipulations or mitigation measures. For such authorizations, the area's environmental sensitivity and other feasible alternatives will be strongly considered.

Reference sites: Plant communities in their current state.

Benchmarks: Goals.

Compacted soil: Soil with an increased bulk density (g/cm3), decreased pore space limiting water infiltration, percolation, and storage; plant growth; and nutrient cycling.

Desired plant community: A plant community that meets the land uses for a given area.

Ecological Site Description: Framework for classifying and describing rangeland and forestland soils and vegetation.

Field moisture capacity: The percentage of water remaining in the soil two or three days after having been saturated and after free drainage has practically ceased.

Natural landscape: A landscape unaltered by human activities such as but not limited to agricultural, industrial, recreational and transportation use.

Non-alkali soil: Soil with pH less than 8.5.

Noxious and invasive weed: A county, state or federally listed weed.

Reclamation: The act of reclaiming disturbed areas by recontouring back to the original topography as much as possible and practical and establishing desired plant communities that provide site-stability, hydrologic function and biotic integrity.

Powdery soil: Soil lacking structure and moisture, most likely due to the soil particles being dispersed by salts.

Saturated soil: All pores in the soil filled with water.

Soft Plugs: Barriers across an open pipeline trench that typically consist of compacted soils or sandbags. They serve to reduce erosion and to provide access across the trench for livestock and wildlife.

Spoil: Soil beneath the topsoil not meeting reclamation standards.

Suitable plant growth material or suitable soil: Soil that meets reclamation standards due to its chemical and physical properties set forth in the Wyoming Department of Environmental Quality regulations.

Temporary reclamation: Reclamation used for site-stabilization to reduce erosion and maintain site/topsoil productivity.

Topsoil: Soil used for reclamation, typically the O and/or A horizons.

Third order soil data: Soil mapping based on landform scale.

Undesirable weed: An undesirable plant not listed as a noxious and invasive weed.

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