

APPENDIX A

Master Application for Permit to Drill

**FIELDWIDE DRILLING OPERATIONS PLAN FOR DRILLING AND
SURFACE USE FOR ALL FIELDS/UNITS/LEASES (FEDERAL) IN
PHILLIPS COUNTY AND ALL FIELDS/UNITS/LEASES (FEDERAL) WEST
OF HINSDALE IN VALLEY COUNTY**

March 21, 2005

All drilling and surface operations in the above listed natural gas fields will comply with the intent of 43 CFR 3101.1-2; 3101.1-3; 3160, Onshore Oil and Gas Orders (OOGO) No. 1, No. 2, No. 6 and No. 7, Notice to Lessees (NTLs) 3-A and 4A, NTL-MSO-1-85 and the BLM-USFS brochure, "Surface Operating Standards for Oil and Gas Exploration and Development" (the gold book). A copy of this book is available at GFFS.

A copy of this plan, the particular Application for Permit to Drill (APD) and APD attachments shall be on the well location and available for reference during the construction and drilling phase. The APD attachments that will be required for approval and required to be at the well site during drilling operations are the following:

- 1) Survey Plat of the well;
- 2) A cut and fill diagram of the well pad including rig orientation per Exhibits 3 or 4;
- 3) A topo map (7½ minute map) which displays the pipeline route, water source, access road, mud disposal and well location;
- 4) The specific areas as addressed within the Drilling Operations Plan; Items 1, 4, 5 and 7 and
- 5) The APD Form (3160-3) with the self certification statement as outlined in OO#1 Section III.G.4.(b).(13).
- 6) The specific Conditions of Approval, if needed, which are attached to the APD.

In addition, in Item #23 of this Form, the Operator can outline any deviations to this Surface Use Plan of Operations, which may need additional approval.

The overriding NEPA document for the above areas is titled, "Environmental Assessment for Bowdoin Area Increased Density Drilling - 1989" (Bowdoin EA). ***This EA establishes a level of drilling wells at a spacing of 4 wells/section. Currently the cumulative effects analysis for the 4 Units (Loring, Whitewater, Ashfield and Bowdoin) and the 4 Fields (East Loring, West Loring, East Whitewater and Swanson Creek) is still valid.*** The EA did not analyze either the Martin Lake or Milk River Units which were formed in late 1998.

DRILLING OPERATIONS PLANS - This plan will apply only to those wells drilled in the areas specified above and for proposed wells to be drilled and completed 400 ft deeper than the top of the Phillips/Greenhorn formation (i.e., TD no deeper than 2500 ft).

1. **Estimated Tops of Important Geologic Markers**

It will be required under this plan to disclose the top of the following geologic markers on the APD Form 3160-3 and whether oil, gas or water will be present within the following formations:

Claggett, Eagle, Niobrara, Carlile (Bowdoin) and Greenhorn (Phillips)

2. **Pressure Control Equipment**

BOPE and CHOKE MANIFOLD The pressure control equipment to be used under this plan will be consistent with a 2M system under OOGO No. 2. Particularly, at a minimum the BOP equipment shall be comparable with the 6" 900 Series 2,000 PSI Regan "Torus" BOP (annular BOP). The choke manifold will be a 2" steel line system and be rated to 2000 PSI, including all valves, chokes and fittings (See Exhibits No. 1 and 2; BOP and Choke Manifold Diagrams.). Blowout preventer controls will be installed prior to drilling the surface casing plug ***and will remain in use until the well's mechanical integrity is secure and the drilling unit has left the location.***

ACCUMULATOR SYSTEM Under this plan, rather than using the required accumulator system, wells will be allowed to be drilled using the rigs' hydraulic pumps and a hand/foot hydraulic pump as backup to activate the annular preventer. Per a field test and review of the described, this system was deemed to be acceptable to the Great Falls Resource Area following a demonstration showing that the rig pumps or the backup hand/foot pump could affectively close the annular BOP within an acceptable time given the fields' downhole pressure conditions.

PRESSURE TESTING and Operation of BOP EQUIPMENT Under this plan, the annular preventer and related well control equipment will be tested in accordance with the requirements of OOGO No. 2.III.A.2.i. Specifically, to mention a few of the requirements but not limited to these requirements: the annular preventer shall be tested to **600 psi**. If a test plug is utilized, the test shall be performed for a minimum of 10 minutes and no bleed off pressure is acceptable. For a test not utilizing a test plug (testing against the casing), the test shall be performed for a minimum of 30 minutes. Should the pressures decline more than 10% in thirty minutes, the test shall be considered to have failed and the equipment will need to be retested until the test requirements are met.

Pressure tests of BOP equipment that may be subject to pressure shall be conducted before drilling the surface casing shoe, when initially installed, whenever any seal subject to test pressure is broken, following related repairs and at 30-day intervals. Annular preventers shall be inspected and operated weekly to ensure good mechanical working order. These inspections shall be recorded on the daily drilling report.

3. **Casing and Cement Program** Casing under this plan shall meet the following requirements:

Surface Casing — A minimum of 150 feet or 10 percent of the projected total depth of the well, whichever is greater, of 7-inch, 17#/ft API-graded H-40 casing would be set. New limited-service pipe may be used for the surface casing but would require prior approval by the BLM prior to being installed in a federal well. The surface casing will be set utilizing a minimum of 65 sacks of Class "G" cement with reasonable necessary additives (this allows for 70% excess over the

calculated annular volume). The surface casing shall be cemented back to surface either during the primary cement job or by remedial cementing. Five bbls of fresh-water flush shall be used ahead of cement when cementing surface casing. At a minimum a top wiper plug shall be used while displacing cement into place and shall be displaced no closer than 30 ft from above the shoe. Surface casing shall have a centralizer on each of the bottom three joints.

Production Casing — At a minimum production casing will be consistent with 4½", 9.5#/ft, J-55 casing. The production casing will be set utilizing a minimum of 11.5 sacks/100 ft of hole of class "G" cement with reasonable necessary additives (this allows for 25% excess over the calculated annular volume at a cement yield of 1.15 ft³/sack). Higher yield cement (i.e., 50-50 Poz) is allowed under this plan provided the cement will reach a compressive strength of 1500 psi.

The production casing shall be cemented back to surface either by primary cementing or by remedial cementing. A best attempt shall be made to assure that all productive intervals are isolated with good cement coverage around the pipe. This shall be accomplished by placing centralizers at 100 feet above and below the productive interval and placing the centralizer every 100 ft between the top and bottom centralizer. Ten bbls of fresh-water flush shall be used ahead of cement when cementing production casing.

4. **Mud Program** Under this plan, the mud program shall comply with applicable requirements of OOGO No. 2.III.C. ***It will be required under this plan to disclose the specific mud system to be used prior to approval of the APD (i.e., a mud system with Alcomer 120L-Os Polymer or E-Z Mud Polymer).***

Weighting materials and loss circulation materials will be on location if pressures require or in the event of loss circulation. Visual monitoring of the mud pits is acceptable.

No trivalent or hexavalent chromate additives shall be used in the mud system. Due to potential for contamination of usable quality water aquifers, chromates are banned from Federal leases. An example disclosure of the mud system would be something similar to the following table:

<u>Depth</u>	<u>Type</u>	<u>Wt. #/gal</u>	<u>Vis. sec./qt.</u>	<u>Fluid loss</u>
0-150	Native muds	8.5-9.0	30-40	--
150-TD	Low fluid-loss mud system	9.5	45	n/c

5. **Evaluation Program** Drill stem testing and coring will not be required under this plan, however should it be desired to conduct DST operations, they shall be conducted in accordance with the requirements of OOGO No. 2.III.D. Drilling Stem Testing Requirements. Coring operations are allowed in conjunction with normal drilling operations, however the results of the coring operations will be required to be submitted with the completion report.

At a minimum but not limited to, the logging program shall consist of tools that will allow for geologic correlation between the wells ***in either cased or open hole logging applications*** (i.e., Gamma Ray/Compensated Neutron-Density log, ***Gamma Ray/TDT***

log, or an SP/Resistivity log from total depth to the base of the surface casing). The results of the logging operations shall be submitted with the completion report.

6. **Anticipated Abnormal Pressures, Temperatures or Other Hazards** Based on empirical data of the described area, no abnormal pressures or temperatures have been noticed or reported in wells drilled, nor within the proposed zones of interest identified above. Bottom hole pressure expected is 400 PSI. No hydrogen sulfide or other hazardous fluids or gasses have been found, reported, or know to exist at these depths in the area of interest.
7. **Drilling Activities** The anticipated starting date is set for as soon as possible after examination and approval of the APD. Operations should be completed within five days after spudding the well to casing point.

Operator shall disclose those activities on an attachment to the APD varying from Drilling Operations Plan Items 2, 3 and 6 for the approval of the Authorized Officer. This may include but not be limited to changes in casing sizes, changes in the BOP equipment, or fundamental changes in how the well is to be drilled (conventional drilling techniques versus coiled tubing techniques).

SURFACE OPERATIONS

1. EXISTING ROADS

For the area(s) covered by the Transportation Plan (Ashfield, Whitewater and Loring Units; East Loring, West Loring, East Whitewater and Vandalia Fields), between the BLM and Noble Energy Inc, the Plan will be the governing document for road and access issues. If an Operator needs to access his lease/well and must travel through the fields/units which are under the Transportation Plan, the Operator must notify Noble Energy Inc. of the activity and understand that the stipulations and mitigation measures contained in the Plan apply to his access. For all areas outside of this Plan, this fieldwide guide will be the governing document for road and access issues.

Existing lease roads will be maintained, bladed and graveled, as necessary, to keep them in a good usable condition for safe vehicular traffic and free of surface erosion and excessive ruts. Culverts, ditches, water turnouts and other features, if necessary, will be fully functional and maintained. All lease roads which travel through private surface or state surface will have the concurrence of the private land-owner before any road work is undertaken. Any exceptions must be approved by the GFFS.

When safety, excessive rutting or erosional problems are discovered on existing roads, they will be repaired, by the primary Operator who uses the road, to assure safety and stability and to limit erosion. The new road standards described below will be followed where practical and effective under the working conditions at hand. Snow will be plowed only when necessary to keep roads open for orderly operation of the field. Roads and trails no longer needed for oil/gas operations will be closed to vehicular traffic and may, if necessary, need to be obliterated and reclaimed. The Operator must notify the Great Falls Field Station (GFFS) on an annual basis, which roads, including private, are to be closed. In the case where the road is on private surface, reclamation and obliteration will be at the discretion of the private land-owner, but it will be the responsibility of the Operator to either perform the work or assure the work is done.

2. ACCESS ROADS TO BE CONSTRUCTED AND RECONSTRUCTED

In all road situations, every Operator is highly encouraged to establish a working relationship with the private land-owners in this area. Since the land-ownership is mixed and new roads can cross a variety of owners, it is imperative that each Operator take the responsibility to be a good neighbor.

In situations on private lands where new roads are built or old roads are reconstructed, written permission will need to be obtained from the private land-owner. This applies to both on-lease and off-lease situations. This permission must be submitted before the APD will be approved. ***For federal lands, both off lease and on lease, please contact either the GFFS or Malta Field Office.***

Future and systematic development of a transportation network that serves all Operators in North Phillips County may involve requiring Operators to look at locating roads with the philosophy of "one road in - one road out" of each well location. This philosophy is an attempt to eliminate or curtail the "spider web roads" which are being made in the affected areas.

New roads on level or nearly level ground will not be bladed unless required by the GFFS. Once these roads are established, the Operator will be required to use these "roads/trails" for access. The Operator may also be responsible for drainage (See Section C below) as specified by GFFS. Shortcutting of roads/trails will not be allowed. Any Operator found to be shortcutting established roads/trails will be required to obliterate the trail and compensate the private land-owner for damage.

Road Junctions will be located where site distances are adequate for safe entry and exit. All turns, including junctions, will have radii large enough to handle anticipated truck traffic for both drilling and production. Maximum grades will generally not exceed 10% except for pitch grades (i.e. road sections less than 300 feet).

When new access roads have sustained maximum grades steeper than 10%, on sections longer than 300 feet, or where roads cross side slopes steeper than 25%, the Operator will consult with the Lewistown Field Office Civil Engineer under advisement of the GFFS. If he deems necessary, the Operator will secure the services of a licensed professional engineer to design a safe, stable road. Vertical alignment diagrams, cross sections and other engineering studies may be completed as necessary to assure sound engineering practices and proper road construction. Roads will be abandoned in accordance with Point 10.

- A. CLEARING AND GRADING** - Suitable topsoil will be stripped to an average depth of six inches and stockpiled for subsequent application on the in slopes and back slopes of ditches; where needed, the GFFS may require mulching, seeding, and fertilization before final abandonment in order to make up for lost topsoil. The seeding mixture to be utilized is shown in Point 10.
- B. ACCESS DURING CONSTRUCTION** - Construction related traffic will be restricted to the disturbed area needed for construction of the roadway.
- C. DRAINAGE**

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- 1) Culverts, ditches and other drainage features will be designed to handle anticipated runoff events, i.e. 25 year event. Surface cover, slope, length of drainage, return times, channel cross sections and gradients will be considered as appropriate in the hydraulic and engineering analysis of upstream areas to determine the amount of runoff during the life of the access road. To assure proper drainage, the normal standard road will be ditched and crowned and constructed to the following specifications as authorized by the GFFS:

WIDTH OF RUNNING SURFACE	12-14 Feet
DISTURBED AREA (DITCH TO DITCH)	20 Feet
DEPTH OF DITCHES	1 Foot Minimum

A lesser standard may be used where little use occurs, but proper drainage dips will be installed as needed.

On extremely steep side hills or other difficult terrain where cramped conditions make the road standard costly and create potential hazards to road users, the Operator may in consultation with the BLM engineers employ a different standard. Drainage will be managed in accordance with other parts of the guidelines. If this solution results in excessive erosion or sediment loss, the Operator must modify it to fix the problem.

- 2) Culverts will be used for all minor drainage crossings, unless debris problems, low runoff volume or traffic volume justify the use of a drainage dip. Drainage dips will be located to provide safe stopping sight distances, constructed such as to be stable and self cleaning, and will not cause serious erosion or sedimentation, especially at the outlets. Drainage dips will be placed at intervals as recommended by the GFFS.
- 3) In most cases culverts will be 18 inches in diameter. Backfill will be thoroughly compacted, and minimum cover over culverts will be 12 inches or 1/2 the culvert diameter, whichever is greater. In steep, broken terrain where the ditch depth, culvert cover and other design standards necessary for 18 inch culvert installation are impractical and often counterproductive, the Operator may employ smaller pipes (12 inch or greater diameter) in consultation with the GFFS. If casing is used, flanges or other effective anchoring devices will be attached. Cover over casing may be reduced to four inches. If this accepted practice causes plugged pipes, unstable and unsafe roads or unacceptable environmental damage, it will be discontinued.
- 4) Culverts used as laterals to provide cross drainage between natural drainages will be placed such that they are skewed to form an entrance angle of 45 degrees to 60 degrees with the side ditch, and have a gradient equal to or slightly greater than the approach ditch gradient. Suitable ditch blocks will be constructed below culvert inlets.
- 5) Culverts in drainages will be placed on firm, uniform beds which have been shaped to accept them, aligned with the natural channel and set at a gradient that maintains the natural drainage velocity so sedimentation

or erosion is not increased and will allow amphibian or fish travel through the culvert.

- 6) The inlets and outlets of culverts will be modified as necessary to protect from debris and limit excessive channel scour and erosion. The modifications may include racks, cribs, raisers, drop inlets, downspouts, energy dissipaters, flared ends, headwalls, and riprap.
- 7) In areas where near-surface water exists on the roadway, or is exposed by continual use, the Operator will be required to implement a drainage system to clear the water off the roadway or to re-route the roadway away from these "low spots". The Operator will not be allowed to detour in ever-widening circles around these low spots thus creating a large mudhole in the roadway.

D. **SUB GRADE AND SURFACING** - The newly constructed subgrade will be bladed and shaped as necessary to prepare a safe, stable road bed, compacted, and then graveled if necessary for safety, drainage or stability.

3. **LOCATION OF EXISTING WELLS**

Maps showing the location of existing wells will only be submitted when specifically requested by the BLM.

4. **LOCATION OF EXISTING AND/OR PROPOSED FACILITIES IF WELLS ARE PRODUCTIVE**

All new permanent production structures, other than wellheads and electrical devices, that can be seen from a distance of 1/4 mile will be painted Yuma Green or Desert Brown as outlined in the Bowdoin EA. Color charts are available from the GFFS or MaFO offices. The exception to these painting requirements would apply only to those portions requiring OSHA Safety Colors.

Construction activity for flowlines and power lines will be restricted to a route no more than **fifty** feet wide (**25'** on either side of the centerline). After construction is completed, the route will NOT be used as a road, unless approved by the GFFS. All permanent liquid transfer lines, on the surface for more than one year, will be buried once approval is obtained from the GFFS.

A. PIPELINES

- 1) Flagging and Staking - The center-line of the pipeline right-of-way will be surveyed and/or pin flagged prior to any surface disturbing activities. On slopes greater than 25% or on rugged terrain, slope grade, and other construction control stakes may be necessary to ensure proper construction. If stakes are disturbed, they will be replaced before proceeding with construction.
- 2) Construction

- a) All underground steel flowlines will be coated or otherwise protected from external corrosion and will be aligned in as straight a line as possible, and buried to a sufficient depth below frost line, generally three to four feet deep.
- b) Where possible, clearing along the pipeline route will be limited to the topping of shrubs and grasses up to an inside width of 26 feet. Where surface conditions prohibit the safe use of construction equipment, existing grades will be modified. Where supplemental grading is needed, an average of six inches of topsoil will be windrowed along one side of the modified areas, for storage before construction begins. Topsoil will be kept separate from trench soil.
- c) The unbladed portion of the **50'** wide right-of-way will be utilized by trucks and other pipeline laying equipment. This portion will NOT be flatbladed.
- d) When the trench is backfilled, it will be compacted to the approximate bulk densities of the adjacent undisturbed soils and restored to natural ground level. To prevent improper settling of soil material, frozen or saturated soils will not be used during backfilling. Windrows or crowning using the natural settlement method may be used instead of compaction. All soil windrows will be removed when reclamation is completed (i.e., discing/seeding).
- e) Drainage crossings will be constructed to prevent any blocking, diversion, or restriction of the existing channel. The pipelines spanning drainages will provide adequate clearance for anticipated stream flow resulting from a 25 year storm event. Drainage spans must be approved prior to installation of pipe.
- f) No more than 2500 feet of unattended or unprotected open trench will be allowed overnight without warning devices such as signs, flares, warning lights, or inspection personnel. Areas considered hazardous to people, livestock or wildlife will be fenced to reasonably prohibit entry. Warning devices such as flares, signs, flagging, barricades, lights, etc. will normally be used for unattended or unprotected open trenches in other areas not considered hazardous to people, livestock or wildlife. The amount of ditch to be left open is dependent upon the location and circumstances surrounding the situation.
- g) Any changes in product metering along the pipeline route will require prior approval from the GFFS. Rights-of-way will be needed for all pipelines downstream of the meter or custody transfer point that are off unit or off lease and on BLM surface. These rights-of-way are approved by MaFO.
- h) Any pipelines which bisect or are within 100' of sensitive environments such as wetlands (intermittent, ephemeral or perennial), riparian zones, prairie dog towns or any environment which is suspected to contain either federal or state threatened, endangered or sensitive

species, including plants and animals or cultural resource sites, will be re-routed around these environments. In the event the re-route cannot be done for environmental reasons, the pipeline route will be mitigated and approved by the GFFS prior to surface disturbance.

- 3) Operations and Maintenance - Pipeline trenches will be maintained in order to correct settlement and erosion. Waterbars and other erosional control devices will be maintained. When new construction occurs on an existing right-of-way, reasonable care will be taken to protect the pipe from damage or breakage. Adequate soil cover will be retained on buried pipes to prevent freezing and breakage.

B. POWER LINES –To obtain electrical power, minimum disturbance power lines may be constructed to well sites. Approximately 45' from the last pole of each line and 100' from the receiving wellhead, a service pole will be set and connected to the well by means of a buried cable.

- 1) Construction - Dirt work will be limited to drill holes for poles and anchors, and trenching in the buried cable. Excess soil excavated from the pole and anchor holes will be spread evenly in the immediate vicinity of the pole structure or coned around the pole to allow for settling.
- 2) Raptor Protection - All newly constructed or modified structures will meet or exceed features illustrated in the booklet "Suggested Practices for Raptor Protection on Power Lines. The State of the Art in 1981" (Raptor Research Report No. 4, Olendorff, Miller, and Lehman, Raptor Research Foundation, University of Minnesota, St. Paul).

5. LOCATION OF WATER SUPPLY

Drilling water will be transported by means of a temporary surface line or by truck. Water wells will not be drilled on public lands without prior written approval from the GFFS, or on private or state lands without prior written approval of the MT Board of Oil and Gas.

Water obtained from a BLM stockpond will need an authorization from MaFO. Approval of this will include determinations of sufficient water for livestock and wildlife and an adequate supply of surplus water. It is advised that Operators pursue all means of utilizing private water before applying for federal stockpond water. Operator must secure legal access to water, either through land-owner permission, contract or State temporary water use permit. The legal access document must be available upon request by the BLM.

All Operators must submit with the APD a map detailing the location(s) of the water source and mud disposal.

6. CONSTRUCTION MATERIALS

On-site materials will be used for building locations and roads. Gravel, if needed, must be obtained from noxious weed-free sources. MaFO has a listing of approved gravel pits.

7. **METHODS FOR HANDLING WASTE DISPOSAL**

Cuttings and drilling fluids will be disposed of in the reserve pits or may be recycled to the next drilling location.

A. CUTTINGS AND RESERVE PIT FLUIDS - RESERVE PITS

- 1) All reserve pits will be constructed to assure that, at reclamation, the cuttings can be covered with at least three feet of fill, and that the filled areas closely resemble natural, pre-existing contours.
- 2) Pits may be required to be lined in porous soils, on steep and unstable slopes, or where communication between the pit contents and groundwater may occur. This will be determined by the GFFS after consultation with the BLM soil scientist. Liner specs, when needed, can be requested at the GFFS office.
- 3) At least half the depth of the reserve pits will be in native cut. Where the pits are above ground level, the dike will be keyed and constructed in 8-inch lifts. Each lift will be compacted using rubber tired equipment.
- 4) ***Following rig release, reserve pits will be fenced, stock tight, unless the following condition can be met:***

Between drilling and completion, the Operator is responsible for ensuring livestock or wildlife are not trapped in unfenced pits.

Should there be any hydrocarbons on the pit, the hydrocarbons will be removed or netting will be installed until the hydrocarbons can be removed or personnel will remain on-site to deter birds until the hydrocarbons are removed.
- 5) Final backfilling will comply with Point 10.

B. WASTE AND SANITATION

The Operator will comply with all State and Local laws and regulations pertaining to disposal of human and solid waste. All fields will be maintained in a sanitary condition at all times. Any sewage will be disposed of in portable chemical latrines. Garbage and other waste material will be gathered and disposed of in an approved sanitary landfill. No burning or burying will be allowed.

The Operator will generally not be allowed to dispose of drilling mud in BLM stockponds or reservoirs or on public lands unless prior approval has been given, in writing, by the MaFO. In certain instances, approval may be given IF the mud contains ONLY bentonite and water AND the reservoir or stockpond is in need of a clay sealing liner. The Operator is encouraged to discuss with the MaFO situations of drilling mud disposal which meet the above criteria, prior to the drilling season.

C. HAZARDOUS MATERIALS

Operators and their contractors are to ensure all production, use, storage, transport, and disposal of hazardous materials resulting from the proposed project is in accordance with all applicable Federal, state and local laws, regulations and guidelines, existing or hereafter enacted or promulgated that effect the management of hazardous material, as defined in this paragraph. Hazardous material means any substance, pollutant, or contaminant listed as a hazardous substance under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, 42 USC 9601 et seq., and its regulations (found at 40 CFR 302). The definition of hazardous substances under CERCLA includes and "hazardous waste" defined in the Resource Conservation and Recovery Act (RCRA) of 1976, as amended, 42 USC 6901 et seq., and its regulations. The term also includes any extremely hazardous substances defined by 40 CFR 355, and any nuclear or byproduct material defined by the Atomic Energy Act of 1954, as amended, 42 USC 2011 et seq. The term does not include petroleum, including crude oil or any fraction thereof not otherwise listed or designated as a hazardous substance under CERCLA section 101 (14), 42 USC 9601 (14), or natural gas.

Only drilling muds, drilling fluids, cuttings, native soils, cementing materials and/or approved pit solidifying materials will be placed in the reserve or working pits.

Nonexempt wastes will not be mixed with exempt wastes.

No hazardous materials will be used in the drilling and construction of well sites and access roads. Commercial preparations, which may contain hazardous materials may be used in production operations and will be transported with the project area. These materials will be handled in an appropriate manner to minimize potential for leaks or spills to the environment. No hazardous wastes will be generated in the well drilling operation. Other waste disposal methods and locations should be described on the APD or SN and approved by GFFS prior to disposal.

D. PRODUCED SEDIMENTS

Sediments produced by "blowing down the well bore" during the life of the well must be disposed of at the time of well abandonment. Disposal methods may include burying under sufficient depth (generally 3') and covering them with topsoil. These sediments will not be allowed to remain on the surface after abandonment, nor tilled in with the surface soil horizons. Other methods of disposal must be approved by the GFFS prior to well abandonment.

Large amounts of "frac sand" must be spread evenly around the well location, but may remain on the surface and do not have to be buried. If the sand is of sufficient depth that precludes vegetation re-growth, the sand must be tilled into the top layers of the soil. This can occur at any time, but generally should be done at well abandonment. Soil amendments, as determined by the GFFS, may be necessary to return the site to productivity.

E. OTHER METHODS

Other methods of waste disposal or production such as closed systems, fiberglass tanks, landfarming, "leach" fields, etc. must be approved by GFFS prior to implementation.

8. ANCILLARY FACILITIES

Ancillary facilities will be temporary, consisting of three to four trailer houses on the location for authorized personnel. No camps or airstrips will be constructed.

COMPRESSOR STATIONS ON FEDERAL LANDS

Applications for these types of facilities require additional analysis and discussion and therefore will not be considered in this document. The Operator must notify GFFS if considering installing these facilities on federal lands.

9. WELL SITE LAYOUT

The location of mud tanks, reserve pit, pipe racks, living facilities, topsoil and spoil piles will be shown on maps. See Exhibits 3 and 4. No formation fracturings with volatile fluids are anticipated in normal drilling operations. However, all drill pads will be designed to comply with safety regulations for a frac using volatile fluids.

A. FLAGGING AND STAKING

Staking of the location will include two 250' directional survey reference stakes with the exterior boundaries of the pad marked with corner and centerline stakes. Pits will also be marked with corner stakes. Where drainage or rugged slopes create special problems, additional staking may be necessary to ensure construction in accordance with this document. If stakes are disturbed, they will be replaced before construction is commenced.

B. CLEARING AND GRADING

- 1) Approximately six inches of topsoil (e.g. at least 1000 cubic yards for each drilling location) will be removed and stockpiled from the location prior to any pad or pit construction. Burial of topsoil under fill material will be prohibited.
- 2) The Operator(s) will limit the degree of surface disturbance and vegetation removal wherever possible, when safety is not compromised. Where surface disturbance cannot be avoided, all practicable measures will be used to minimize erosion and stabilize disturbed soils. This will reduce the amount of reclamation needed and lessen the amount of disturbance to the rooting zone and topsoil.

C. EROSION CONTROL

If necessary, well pads will be designed to minimize or prevent soil erosion, especially on fill slopes. Measures that may be implemented include erosion mats, culverts, berms, or immediate reseeded of unused pad areas. Any measures will be at the discretion of the GFFS.

10. SURFACE RECLAMATION PLANS

All equipment, hardware, waste or debris will be removed prior to any reclamation or stabilization actions. This includes risers, power line connections including poles, metersheds, fences, electric powerboxes, etc. Pipelines may be purged, but only after consultation with the GFFS. All surface portions of pipelines will be removed, unless excepted by GFFS.

Linear disturbances such as newly constructed or reclaimed pipelines or roads, will be cross drained by water bars. Water bars should be constructed 1-2' deep. The bars should begin and end in undisturbed soils and be constructed parallel to the slope contour with a slight grade to facilitate water runoff. Any slope over 3:1 in steepness and longer than 50' should have at least one water bar to break the slope down to 25' lengths. In soils that normally do not support adequate vegetation to prevent erosion, i.e. acid shales or any site specific area determined by the GFFS to be at risk to excessive erosion, water bars should be constructed every 25' on anything steeper than 5:1. On short, steep grades, additional erosional control structures will be installed as determined by local conditions.

A. INTERIM STABILIZATION AND RECONTOURING

Unused areas around wellpads, unused pits, flowline rights-of-way, cut and fill slopes of roads, and any other surfaces not occupied for field use, will be graded to form stable, rounded slopes that blend with the natural terrain. To prevent improper settling of soil material, grading will not be done when frozen or saturated soil conditions exist. Water bars or other erosion control structures will be built as needed, the areas will be ripped, the topsoil replaced, and the areas seeded as per final abandonment practices. This will occur within 3 months of well completion or the next seeding window, whichever occurs first.

B. FINAL RECONTOURING FOR PRE-ABANDONMENT

- 1) All wells will be completely plugged in accordance with the standards stated in the Conditions of Approval for the NIA before recontouring and reclamation begin.
- 2) Pipelines will be purged of all fluids, as necessary, and the fluids will be disposed of in accordance with measures outlined in Point 7.
- 3) Before recontouring takes place, the stockpiled topsoil and vegetative material will be scraped from cut and fill slopes of roads and pads where stable vegetation has occurred. It will be stockpiled for final distribution after the area is recontoured. The point is NOT to bury good topsoil that has been previously placed on pad edges or road back slopes.

- 4) Before well pads and battery areas are recontoured, oily surface material and cuttings (provided they are not regulated under RCRA, CERCLA, or other applicable regulations) and severely compacted soils should be worked and broken into aggregates of one inch in diameter or smaller, then treated with at least 200 lbs. of ammonium nitrate (33-0-0)/acre, or horse manure, working it into the material. This should be conducted before available topsoil and vegetation is spread on the surface for seed bed preparation. Additional fertilizer may be needed to establish the desired plant growth.
- 5) All disturbed areas (roads, pads, flowline, etc.) will be graded to the original approximate contour. If the disturbed area has stabilized through non-use and if putting the area back to original contour will cause additional disturbance, then recontouring may not be required. This must be approved by the GFFS.
- 6) Drainages will be reclaimed to approximate the original bank configuration, stream bottom width, and channel gradient. Any pilings, debris, or other obstructions will be removed from the drainage channels.
- 7) All roads no longer needed for access will be abandoned and marked at each end of such access by rocks which have been painted florescent green to indicate that access is no longer in effect. This trail may then be rehabilitated and seeded per GFFS.

C. PITS

Burn pits, reserve pits and any other pits will be filled, leveled or sloped to resemble adjacent terrain, when no longer needed. Cuttings and drilling muds will be allowed to dry, and then all contents including liners will be covered with at least three feet of uncontaminated soils.

D. SEEDING AND SOIL AMENDMENTS

- 1) All disturbed areas will be seeded with the certified weed-free seed mixture below. Available substitutes having similar ecological characteristics may be used with prior approval from the GFFS.

<u>SPECIES/MIXTURE</u>	<u>RATE (PLS)</u>
Western Wheatgrass	4 lbs/ac
Thickspike Wheatgrass	4 lbs/ac
Green Needlegrass	2 lbs/ac

DO NOT SEED WITH NON-NATIVE YELLOW SWEETCLOVER.

- 2) The certified weed-free seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS) per acre. There shall be NO primary or secondary noxious weed seed in the mixture. Seed shall be tested and the viability testing shall be done in accordance with Montana State law(s). Commercial seed shall be either State certified or registered seed. The certified weed-free seed mixture container shall be tagged in

accordance with State law(s) and available for inspection by either GFFS or MaFO.

Procedures for properly preparing the seed bed vary with each site. The objectives of reclamation are to re-establish a growing stand of vegetation similar to the adjacent, untouched ground. In all cases the following parameters of re-vegetation must be achieved:

- a. The seed must be covered with 1/4-1/2" of soil.***
- b. The ground must be scarified to allow the seed to establish roots, protect the surface from wind erosion and for maximum rain and snowfall retention.***
- c. The amount of seed must be enough so that upon germination, the soil is adequately covered. Sparse or spotty vegetation re-growth is not acceptable.***
- d. The mixture of seed must be diverse enough to show a variety of native desirable plants upon germination. Monocultures will not be allowed.***
- e. Fertilizer and/or mulching or other supplemental treatments may be necessary to establish a growing stand.***
- f. Seeding will not be allowed in frozen or saturated soil conditions.***

- 3) As much seeding as possible will be conducted during the fall before the ground freezes. Occasional seeding may occur in the spring as long as the ground is not saturated. Seeding will be repeated until a satisfactory stand is obtained.

11. OTHER INFORMATION

A. Noxious weeds will be controlled on disturbed areas in accordance with guidelines established by the EPA, BLM, State, and local pesticide authorities. Appropriate measures, such as chemical, biological or mechanical will be followed to prevent the spread of weed infestations and reduce potential for spreading weed seed via equipment use. This may include, but not be limited to, washing rig frames and all drilling equipment prior to entry onto public lands.

B. FENCES

- 1) Prior notification will be made to the MaFO, when a fence used for livestock control must be cut. The gap will be managed to prevent the passage of livestock by either placing a cattleguard (if regular or frequent passage is necessary) or constructing a wire gate. Fences will be braced and tied off before cutting to prevent slacking of the wire. At completion of construction, the fence will be repaired to a standard as good as or better than what previously existed. In any case, previously existing

management of livestock will be restored. Removal of the cattleguard/gate at the time of abandonment will be at the discretion of the MaFO or the private land-owner.

- 2) Construction and installation of cattleguards will be to industry standards and will allow safe passage of vehicles. They will be as wide as the running surface of the road and at least six feet along the other dimension, and will be set on timber or cast-in-place concrete bases at right angles (90 degrees) to the roadway. Backfill around cattleguards will be thoroughly compacted. Bypass gates will be built adjacent to each cattleguard structure. Maintenance of the cattleguard will be the responsibility of the Operator.

C. CULTURAL RESOURCES

- 1) ***The Operator shall not disturb the surface of the lease until a cultural resource inventory has been conducted by a professional archaeologist acceptable to BLM for the specific area on which surface disturbing activity is planned. For tribal minerals or surface, please contact GFFS for further instructions.***
- 2) ***If archaeological or historical materials or human remains are discovered during operations, the Operator shall suspend all operations that may further disturb such materials or remains and immediately contact the GFFS. Operations are not to resume until written authorization to proceed is issued by the GFFS. Within five (5) working days, the GFFS will evaluate the discovery and inform the Operator of actions that will be necessary to prevent loss of significant cultural resource values or human remains. The Operator may be responsible for the cost of mitigation required by the GFFS.***
- 3) ***The Operator shall be responsible for insuring that cultural resources recorded near the area of proposed surface lease operations are not inadvertently damaged during the construction, use, maintenance and abandonment phases of the drilling and production program. Damage, alteration or removal of these resources which are attributable to the Operator's activities may be subject to penalties under the Federal Land Policy and Management Act (FLPMA) and/or the Archaeological Resources Protection Act (ARPA).***
- 4) ***A standard "avoidance" color for flagging all cultural sites will be blue.***
- 5) ***If paleontological resources are discovered, the Operator will be responsible to follow the procedures in Item #2 above.***

D. GENERAL CONDITIONS OF APPROVAL FOR APDS

- 1) Approval of APDs does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle

APPENDIX A: MASTER APD

the applicant to conduct operations thereon. In addition, approval of APDs does not imply that the Operator has legal access to the drilling location. For private surface, on lease, 43 CFR 3814 regulations must be complied with for the portion of the access road and the drilling locations.

- 2) APDs are valid for a period of two years from the date of approval or until the oil and gas lease expires/terminates, whichever occurs first. If the APD terminates, any surface disturbance created under the application must be reclaimed in accordance with the approved plan.
- 3) All applicable local, state and/or federal laws, regulations, and/or statutes must be complied with.
- 4) A complete copy of the approved APD must be at the drill site during the construction of the roads and drill pad, the drilling of the well, and the completion of the well.
- 5) Individual spud dates will be reported orally to the GFFS, 24 HOURS PRIOR TO SPUDDING, unless otherwise required in site specific conditions of approval.
- 6) Verbal notification shall be given to the GFFS at least 24 hours in advance of formation tests, BOP tests, running and cementing casing (other than conductor casing), and drilling over lease expiration dates. Notice will also be given 24 hours prior to any construction activity approved under an APD or Sundry Notice.
- 7) Reports and Notifications (3162.4-1, 3162.4-3, Operating Form chart at beginning of 43 CFR Part 3160)
 - a) Form 3160-4, Well Completion or Recompletion Report (in duplicate) plus one copy of the log, due 30 days after well completion.
 - b) One copy Of MMS Form 3160, Monthly Report of Operations, for each calendar month, beginning with the month in which drilling operations are initiated. This report is due to Mineral Management Service on or before the 15th day of the second month following the month of production (e.g., the report for May is due on July 15).
 - c) Section 102(b)(3) of the Federal Oil and Gas Royalty Management Act of 1982, as implemented by the applicable provisions of the operating regulations at Title 43 CFR 3162.4-1(c), requires that "not later than the 5th business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, or resumes production in the case of a well which has been off production for more than 90 days, the Operator shall notify the authorized officer by letter or Sundry Notice, Form 3160-5, orally to be followed by a letter or

Sundry Notice, of the date on which such production has begun or resumed."

The date on which production is commenced or resumed will be construed for oil wells as the date on which liquid hydrocarbons are first sold or shipped from a temporary storage facility, such as a test tank and for which a run ticket is required to be generated, or the date on which liquid hydrocarbons are first produced into a permanent storage facility, whichever first occurs; and, for gas wells, as the date on which associated liquid hydrocarbons are first sold or shipped from a temporary storage facility, such as a test tank, and for which a run ticket is required to be generated or, the date on which gas is first measured through permanent metering facilities, whichever first occurs.

Operators who fail to comply with this requirement in the manner and time allowed, shall be liable for a civil penalty of up to \$10,000 per violation for each day such violation continues, not to exceed a maximum of 20 days. See Section 109(c)(3) of the Federal Oil and Gas Royalty Management Act of 1982 and the implementing regulations at Title 43 CFR 3163.2(E)(2).

- d) Pursuant to Onshore Oil and Gas Order No. 1, Section IV, General Operating Requirements, Operator Responsibilities, paragraph (e), Completion Reports, Operators are encouraged to submit all well logs in an electronic format, such as ".LAS" format, in lieu of providing the BLM with two (2) paper copies of all well logs, as currently required.
- 8) The Operator shall be responsible for the prevention and suppression of fires on public lands caused by its employees, contractors or subcontractors. During conditions of extreme fire danger, surface use operations may be limited or suspended in certain areas. Operator will be notified by the MaFO when such conditions are in effect.
- 9) All survey monuments, both official and recognizable civil, found within the area of operations shall be protected. In the event of obliteration or disturbance of any survey monuments, the incident shall be reported to the GFFS or MAFO. A system will then be implemented to re-monument the marker, as authorized by the BLM.
- 10) If at any time the facilities located on public lands authorized by the terms of the lease are no longer included in the lease (due to contraction in the unit or other lease or unit boundary change) the GFFS will process a right-of-way authorization to conform with the appropriate statute. This change in authorization will apply to off-lease portions of pipelines, roads and well pads. The authorization will be subject to appropriate rentals, or other financial obligation determined by the MaFO.

- 11) Mitigation measures in the "Bowdoin EA" that are in effect to protect wildlife are:
 - a) Access routes that need to be built prior to June 30th could be approved by MaFO Biologist prior to using the route (Ch IV, Section H).
 - b) No water will be taken from public land reservoirs from May 1 to June 30 (Ch IV, Section H).
 - c) No development will occur within 1/4 mi of wetland basins containing suitable piping plover nesting habitat during May 15 to July 30. If drilling is proposed within the window and at less than a 1/4 mi, a survey will be done prior to approval. If plovers are found, the activity will not be permitted until after July 30 or are cleared by the USFWS (Ch IV, Section I).

E. WELL ABANDONMENT

- 1) The GFFS will be notified sufficiently in advance of actual plugging work so that a representative may have the opportunity to witness the operation.
- 2) ***Prior approval for abandonment must be obtained. Initial approval for abandonment during drilling operations may be verbal but must be followed by written notification on form 3160-5, in triplicate.***
- 3) ***Upon completion of the approved plugging, the Operator will cut the well off at least three feet below reclaimed ground level and a ¼" x 12" x 12" plate will be welded onto a fitting to be screwed into a collar either welded or screwed to the production casing. The standard dry-hole marker in accordance with 43 CFR 3162.6(d) has been waived by the Great Falls Field Station unless the Surface Management Agency (SMA) or the private land-owner requires a dry-hole marker (DHM) to be set. Should it be desired that the DHM be set, the DHM will be a piece of pipe (preferably 4¼" casing) and extend approximately 4 feet above ground level. The top of the DHM will be closed or capped. The DHM will be screwed into a collar that has been either welded or screwed to the production casing. By screwing the DHM or plate into the well, this will allow easier reentry into the wellbore, if future problems exist with the well. It will also be a requirement under this Master APD that pipe thread compound be used to make-up and prevent corrosion on the described fittings above.***

In either case of a plate or the DHM, an _ " weep hole will be left in the pipe or the plate. To allow for any settling of the cellar, dirt will be heaped up around the base of the marker or above the well about 18 inches. Both the plate or the DHM will have the following information placed on the plate/post by beading on with a welding torch:

"Fed" or "Ind" as applicable; Operator Name, Lease serial number, well number, location by 1/4, 1/4 section, township, range."

- 4) Within 30 days after well bore plugging operations are completed, Form 3160-5(Subsequent Report of Abandonment) must be filed showing location of plugs, amount of cement in each, amount of casing left in hole, and status of surface restoration.
- 5) **All reclamation work will be done within one year of plugging, unless an exception is granted by the GFFS. Failure to finish the surface reclamation work within this year will result in the issuance of an INC.**

F. PRODUCED WATER DISPOSAL

- 1) The Operator will follow the procedures in Onshore Order #7 for injection wells, disposal wells and surface discharge. For wells which produce less than 5 bwpd, the following items will be submitted for pit approval:
 - a) Form 3160-5, Sundry Notice cover page which will state: the amount of water produced daily, soil permeability/percolation rate and soil type.
 - b) Water analysis.
 - c) **All pits will be no larger than 40' x 40' x 4' (top of berms) and must contain the produced water through all seasons.**
 - d) All pits will be fenced with preferably corral panels or with 4-strand barbed wire (as diagrammed in OO#7). A fence diagram will no longer be submitted.
- 2) Since the remaining required items are common for the Bowdoin fields, the GFFS will no longer require the submittal of the following items unless requested:

pit diagram, mean annual evaporation map, well location topography, soil listing(s) from reference manual, fence diagram and mean annual precipitation map.
- 3) The pit can be lined with bentonite, a common soil element in the area. The GFFS may require additional lining as needed, for conditions of rapid soil permeability, high TDS counts (over 10,000 TDS), where communication between pit contents and groundwater may occur or in sensitive waterfowl environments.
- 4) If the Operator wants to fill MaFO stockwater impoundments with excess freshwater, the Operator must first consult with GFFS whom will then coordinate with MaFO range and wildlife biologists.
- 5) All pits will be subject to the following condition:

You are required to take all necessary steps to prevent any death of a migratory bird in pits or open vessels associated with the drilling, testing, completion or production of this well. The death of any migratory bird found in such a pit or open vessel is a violation of the Migratory Bird Treaty Act and is considered a criminal act. Any deaths of migratory birds attributable to pits or open vessels associated with drilling, testing, completing or production operations must be reported to this office and the US Fish and Wildlife Service within 24 hours.

We may require that the pit be designed or the open vessel be covered to deter the entry of birds in any facility associated with drilling, testing, completing, or production of this well. Fencing, screening and netting of pits may be required as a means to prevent the entry of migratory birds if oil is left in pits or open vessels after the cessation of drilling or completion of operations, if water disposal pits consistently receive oil, or if pits or open vessels are used repeatedly for emergency situations which result in the accumulation of oil.

Voluntary pit fencing, screening, and netting or sealing vessels is encouraged to avoid potential instances that may result in the death of a migratory bird.

- 6) ***The transfer of produced water from one well location to another is permitted under the following conditions:***
- a) ***If the water is dumped in another unit, field or PA, permission of that Operator must be obtained, in writing, prior to dumping.***
 - b) ***The mixing of produced waters with waters greater than 10,000 TDS will not be allowed to mix with lesser TDS's.***
 - c) ***Water greater than 10,000 TDS cannot be dumped in an unlined pit.***
 - d) ***The receiving pit must meet the standards of OO#7 and be a BLM or state-approved pit, prior to dumping.***
- 7) ***This office must be notified if the quantity and/or quality of water results in the pit to no longer meet the unlined pit criteria or pit enlargement is necessary due to an increase of produced water.***

G. OTHER SMA'S PERMITTING SYSTEMS (FWS, BOR, PVT, STATE)

The Operator may be required to submit all necessary right-of-way and surface use/damages permits from other SMAs prior to APD approval, if requested by the BLM.

12. ROUTINE MAINTENANCE CONSIDERATIONS

- A. New construction** will not take place in wet and unstable soils. Routine maintenance of prepared road and pad surfaces will take place when soils are dry enough to prevent rutting or serious erosion. Unplanned construction to control spills, fires, and other undesirable events will occur at any time.

- B. Normal day-to-day routine operations** which do not require prior written approval from the GFFS:
 - 1) Routine maintenance of existing lease roads which does not widen or otherwise extend existing surface disturbance.

 - 2) Repairing or replacing existing culverts which does not require additional surface disturbance.

 - 3) Repair or replacement of 500' or less of existing pipelines which does not require additional surface disturbances, except in sensitive environments, which includes wetlands, prairie dog towns, riparian/streambank areas and cultural resource sites. In these cases, notify the GFFS.

13. SIGNS

New well signs shall have the following information contained on them:

- A. Well Name and Number

- B. Name of Operator

- C. The Lease Serial Number

- D. The Surveyed Location
 - 1) 1/4, 1/4 Section, Section, Township, Range (Footages are Optional)

 - 2) Or other authorized survey designation acceptable to the authorized officer.

- E. Unit or Communitization Name or Number

- F. Name of the Indian Allottee Lessor(s)

CONTACTS - BUREAU OF LAND MANAGEMENT

The primary contact for all oil/gas operations in the above listed areas (Phillips and portions of Valley County) is the Great Falls Field Station. Please notify that office before implementing surface-disturbing activities. Situations which may require Malta Field Office involvement will be coordinated by the GFFS.

GREAT FALLS FIELD STATION
1101 15th St N
Great Falls, Montana 59401
(406)791-7700

MALTA FIELD OFFICE
501 South Second Street, E.
Malta, Montana 59538
(406) 654-5100

PETROLEUM ENGINEERS

Barney Whiteman (406) 750-3417
Dale Manchester (406) 454-2402

PETROLEUM ENGINEERING TECHNICIAN

Lisa-Marrie Fox (406) 727-5114
Donna Mitchell (406) 727-2239
Steven McCracken (406) 964-1039

MINERAL RESOURCE SPECIALIST
(SURFACE CONCERNS AND REPORTING OF UNDESIRABLE EVENTS)

Andrea Parrott (406) 952-0067

Appendix B

Potential Bird Species Within or Near the BNGPA

APPENDIX B: POTENTIAL BIRD SPECIES IN OR NEAR THE BNGPA

Table B-1. Occurrence Potential and Pertinent Wildlife Section of Bird Species Within or Near the BNGPA

Common Name¹	Scientific Name	Occurrence Potential²	Wildlife Section³
Alder Flycatcher*	<i>Empidonax alnorum</i>	t	M
American Avocet	<i>Recurvirostra americana</i>	B	SWB
American Bittern	<i>Botaurus lentiginosus</i>	B	SWB
American Black Duck	<i>Anas rubripes</i>	t	SWB
American Coot	<i>Fulica americana</i>	B	SWB
American Crow	<i>Corvus brachyrhynchos</i>	b	M
American Golden-Plover	<i>Pluvialis dominica</i>	t	SWB
American Goldfinch	<i>Carduelis tristis</i>	B	M
American Pipit	<i>Anthus rubescens</i>	t	M
American Redstart	<i>Setophaga ruticilla</i>	t	M
American Robin	<i>Turdus migratorius</i>	B	M
American Tree Sparrow	<i>Spizella arborea</i>	t	M
American Wigeon	<i>Anas americana</i>	B	SWB
Baird's Sandpiper	<i>Calidris bairdii</i>	t	SWB
Baird's Sparrow*	<i>Ammodramus bairdii</i>	B	M
Baltimore Oriole	<i>Icterus galbula</i>	B	M
Bank Swallow	<i>Riparia riparia</i>	B	M
Barn Swallow	<i>Hirundo rustica</i>	B	M
Barrow's Goldeneye	<i>Bucephala islandica</i>	t	SWB
Bay-breasted Warbler	<i>Dendroica castanea</i>	t	M
Belted Kingfisher	<i>Ceryle alcyon</i>	b	M
Black-and-white Warbler*	<i>Mniotilta varia</i>	t	M
Black-bellied Plover	<i>Pluvialis squatarola</i>	t	SWB
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	B	M
Black-billed Magpie	<i>Pica pica</i>	B	M
Black-capped Chickadee	<i>Poecile atricapillus</i>	B	M
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	t	M
Black-necked Stilt	<i>Himantopus mexicanus</i>	B	SWB
Black-throated Green Warbler	<i>Dendroica virens</i>	t	M
Blackburnian Warbler	<i>Dendroica fusca</i>	t	M
Blackpoll Warbler	<i>Dendroica striata</i>	t	M
Blue Grosbeak	<i>Guiraca caerulea</i>	t	M
Blue Jay	<i>Cyanocitta cristata</i>	B	M
Blue-winged Teal	<i>Anas discors</i>	B	SWB
Bobolink*	<i>Dolichonyx oryzivorus</i>	b	M
Bohemian Waxwing	<i>Bombycilla garrulus</i>	W	M
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	B	M
Brewer's Sparrow*	<i>Spizella breweri</i>	B	M
Brown Creeper	<i>Certhia americana</i>	t	M
Brown Thrasher	<i>Toxostoma rufum</i>	B	M
Brown-headed Cowbird	<i>Molothrus ater</i>	B	M

APPENDIX B: POTENTIAL BIRD SPECIES IN OR NEAR THE BNGPA

Common Name¹	Scientific Name	Occurrence Potential²	Wildlife Section³
Buff-breasted Sandpiper	<i>Tryngites subruficollis</i>	t	SWB
Bufflehead	<i>Bucephala albeola</i>	B	SWB
Bullock's Oriole	<i>Icterus bullockii</i>	B	M
Canada Goose	<i>Branta canadensis</i>	B	SWB
Canvasback	<i>Aythya valisineria</i>	B	SWB
Cape May Warbler	<i>Dendroica tigrina</i>	t	M
Cassin's Finch	<i>Carpodacus cassinii</i>	W	M
Cedar Waxwing	<i>Bombycilla cedrorum</i>	B	M
Chestnut-collared Longspur*	<i>Calcarius ornatus</i>	B	M
Chimney Swift	<i>Chaetura pelagica</i>	B	M
Chipping Sparrow	<i>Spizella passerina</i>	B	M
Cinnamon Teal	<i>Anas cyanoptera</i>	B	SWB
Clark's Grebe	<i>Aechmophorus clarkii</i>	B	SWB
Clay-colored Sparrow	<i>Spizella pallida</i>	B	M
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	B	M
Common Goldeneye	<i>Bucephala clangula</i>	B	SWB
Common Grackle	<i>Quiscalus quiscula</i>	B	M
Common Loon*	<i>Gavia immer</i>	B	SWB
Common Merganser	<i>Mergus merganser</i>	t	SWB
Common Nighthawk	<i>Chordeiles minor</i>	B	M
Common Redpoll	<i>Carduelis flammea</i>	t	M
Common Yellowthroat	<i>Geothlypis trichas</i>	B	M
Dark-eyed Junco	<i>Junco hyemalis</i>	t	M
Downy Woodpecker	<i>Picoides pubescens</i>	B	M
Dunlin	<i>Calidris alpina</i>	t	SWB
Eastern Kingbird	<i>Tyrannus tyrannus</i>	B	M
Eurasian Collared-Dove	<i>Streptopelia decaota</i>	t	M
Eurasian Wigeon	<i>Anas penelope</i>	t	SWB
European Starling	<i>Sturnus vulgaris</i>	B	M
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	t	M
Fox Sparrow	<i>Passerella iliaca</i>	t	M
Gadwall	<i>Anas strepera</i>	B	SWB
Garganey	<i>Anas querquedula</i>	t	SWB
Golden-crowned Kinglet	<i>Regulus satrapa</i>	t	M
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	t	M
Grasshopper Sparrow*	<i>Ammodramus savannarum</i>	B	M
Gray Catbird	<i>Dumetella carolinensis</i>	b	M
Gray-cheeked Thrush	<i>Catharus minimus</i>	t	M
Gray-crowned Rosy-Finch*	<i>Leucosticte tephrocotis</i>	W	M
Great-tailed Grackle	<i>Quiscalus mexicanus</i>	b	M
Greater Scaup	<i>Aythya marila</i>	t	SWB
Greater White-fronted Goose	<i>Anser albifrons</i>	t	SWB
Greater Yellowlegs	<i>Tringa melanoleuca</i>	t	SWB

APPENDIX B: POTENTIAL BIRD SPECIES IN OR NEAR THE BNGPA

Common Name¹	Scientific Name	Occurrence Potential²	Wildlife Section³
Green Heron	<i>Butorides virescens</i>	t	SWB
Green-winged Teal	<i>Anas crecca</i>	B	SWB
Hairy Woodpecker	<i>Picoides villosus</i>	B	M
Harlequin Duck*	<i>Histrionicus histrionicus</i>	t	SWB
Harris' Sparrow	<i>Zonotrichia querula</i>	W	M
Hermit Thrush	<i>Catharus guttatus</i>	t	M
Hoary Redpoll	<i>Carduelis hornemanni</i>	t	M
Hooded Merganser	<i>Lophodytes cucullatus</i>	b	SWB
Horned Grebe	<i>Podiceps auritus</i>	B	SWB
Horned Lark	<i>Eremophila alpestris</i>	B	M
House Finch	<i>Carpodacus mexicanus</i>	B	M
House Sparrow	<i>Passer domesticus</i>	B	M
House Wren	<i>Troglodytes aedon</i>	B	M
Hudsonian Godwit	<i>Limosa haemastica</i>	t	SWB
Killdeer	<i>Charadrius vociferus</i>	B	SWB
Lapland Longspur	<i>Calcarius lapponicus</i>	t	M
Lark Bunting*	<i>Calamospiza melanocorys</i>	B	M
Lark Sparrow	<i>Chondestes grammacus</i>	B	M
Lazuli Bunting	<i>Passerina amoena</i>	b	M
Le Conte's Sparrow*	<i>Ammodramus leconteii</i>	t	M
Least Flycatcher	<i>Empidonax minimus</i>	B	M
Least Sandpiper	<i>Calidris minutilla</i>	t	SWB
Lesser Scaup	<i>Aythya affinis</i>	B	SWB
Lesser Yellowlegs	<i>Tringa flavipes</i>	t	SWB
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	t	M
Loggerhead Shrike*	<i>Lanius ludovicianus</i>	B	M
Long-billed Curlew*	<i>Numenius americanus</i>	B	SWB
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	t	SWB
Long-tailed Duck	<i>Clangula hyemalis</i>	t	SWB
McGillivray's Warbler	<i>Oporornis tolmiei</i>	t	M
Magnolia Warbler	<i>Dendroica magnolia</i>	t	M
Mallard	<i>Anas platyrhynchos</i>	B	SWB
Marbled Godwit	<i>Limosa fedoa</i>	B	SWB
Marsh Wren	<i>Cistothorus palustris</i>	B	M
McCown's Longspur*	<i>Calcarius mccownii</i>	B	M
Mountain Bluebird	<i>Sialia currucoides</i>	t	M
Mountain Chickadee	<i>Poecile gambeli</i>	W	M
Mountain Plover*	<i>Charadrius montanus</i>	B	SWB
Mourning Dove	<i>Zenaida macroura</i>	B	M
Mourning Warbler	<i>Oporornis philadelphia</i>	t	M
Nelson's Sharp-tailed Sparrow*	<i>Ammodramus nelsoni</i>	t	M
Northern Flicker	<i>Colaptes auratus</i>	B	M
Northern Mockingbird	<i>Mimus polyglottos</i>	t	M

APPENDIX B: POTENTIAL BIRD SPECIES IN OR NEAR THE BNGPA

Common Name¹	Scientific Name	Occurrence Potential²	Wildlife Section³
Northern Pintail	<i>Anas acuta</i>	B	SWB
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	B	M
Northern Shoveler	<i>Anas clypeata</i>	B	SWB
Northern Shrike	<i>Lanius excubitor</i>	t	M
Northern Waterthrush	<i>Seiurus noveboracensis</i>	t	M
Oldsquaw	<i>Clangula hyemalis</i>	t	SWB
Olive-sided Flycatcher*	<i>Contopus cooperi</i>	t	M
Orange-crowned Warbler	<i>Vermivora celata</i>	t	M
Orchard Oriole	<i>Icterus spurius</i>	b	M
Ovenbird	<i>Seiurus aurocapillus</i>	t	M
Palm Warbler	<i>Dendroica palmarum</i>	t	M
Pectoral Sandpiper	<i>Calidris melanotos</i>	t	SWB
Pied-billed Grebe	<i>Podilymbus podiceps</i>	B	SWB
Pine Grosbeak	<i>Pinicola enucleator</i>	t	M
Pine Siskin	<i>Carduelis pinus</i>	t	M
Piping Plover*	<i>Charadrius melodus</i>	B	SWB
Purple Finch	<i>Carpodacus purpureus</i>	t	M
Purple Martin	<i>Progne subis</i>	t	M
Red Crossbill	<i>Loxia curvirostra</i>	t	M
Red Knot	<i>Calidris canutus</i>	t	SWB
Red Phalarope	<i>Phalaropus fulicaria</i>	t	SWB
Red-breasted Merganser	<i>Mergus serrator</i>	t	SWB
Red-breasted Nuthatch	<i>Sitta canadensis</i>	t	M
Red-eyed Vireo	<i>Vireo olivaceus</i>	t	M
Red-headed Woodpecker*	<i>Melanerpes erythrocephalus</i>	B	M
Red-necked Grebe	<i>Podiceps grisegena</i>	t	SWB
Red-necked Phalarope	<i>Phalaropus lobatus</i>	t	SWB
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	B	M
Redhead	<i>Aythya americana</i>	B	SWB
Ring-necked Duck	<i>Aythya collaris</i>	t	SWB
Rock Dove	<i>Columba livia</i>	t	M
Rock Wren	<i>Salpinctes obsoletus</i>	b	M
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	t	M
Ross' Goose	<i>Chen rossii</i>	t	SWB
Ruby-crowned Kinglet	<i>Regulus calendula</i>	t	M
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	B	M
Ruddy Duck	<i>Oxyura jamaicensis</i>	B	SWB
Ruddy Turnstone	<i>Arenaria interpres</i>	t	SWB
Rusty Blackbird	<i>Euphagus carolinus</i>	t	M
Sage Thrasher*	<i>Oreoscoptes montanus</i>	b	M
Sanderling	<i>Calidris alba</i>	t	SWB
Sandhill Crane	<i>Grus canadensis</i>	B	SWB
Savannah Sparrow	<i>Passerculus sandwichensis</i>	B	M

APPENDIX B: POTENTIAL BIRD SPECIES IN OR NEAR THE BNGPA

Common Name¹	Scientific Name	Occurrence Potential²	Wildlife Section³
Say's Phoebe	<i>Sayornis saya</i>	B	M
Scarlet Tanager	<i>Piranga olivacea</i>	t	M
Scissor-tailed Flycatcher	<i>Tyrannus forficatus</i>	t	M
Sedge Wren*	<i>Cistothorus platensis</i>	t	M
Semipalmated Plover	<i>Charadrius semipalmatus</i>	t	SWB
Semipalmated Sandpiper	<i>Calidris pusilla</i>	t	SWB
Short-billed Dowitcher	<i>Limnodromus griseus</i>	t	SWB
Smith's Longspur	<i>Calcarius pictus</i>	t	M
Snow Bunting	<i>Plectrophenax nivalis</i>	t	M
Snow Goose	<i>Chen caerulescens</i>	t	SWB
Snowy Plover	<i>Charadrius alexandrinus</i>	t	SWB
Solitary Sandpiper	<i>Tringa solitaria</i>	t	SWB
Song Sparrow	<i>Melospiza melodia</i>	B	M
Sora	<i>Porzana carolina</i>	B	SWB
Spotted Sandpiper	<i>Actitis macularia</i>	B	SWB
Spotted Towhee	<i>Pipilo maculatus</i>	B	M
Sprague's Pipit*	<i>Anthus spragueii</i>	B	M
Stilt Sandpiper	<i>Calidris himantopus</i>	t	SWB
Surf Scoter	<i>Melanitta perspicillata</i>	t	SWB
Swainson's Thrush	<i>Catharus ustulatus</i>	t	M
Tennessee Warbler	<i>Vermivora peregrina</i>	t	M
Townsend's Solitaire	<i>Myadestes townsendi</i>	t	M
Townsend's Warbler	<i>Dendroica townsendi</i>	t	M
Tree Swallow	<i>Tachycineta bicolor</i>	B	M
Tundra Swan	<i>Cygnus columbianus</i>	t	SWB
Upland Sandpiper	<i>Bartramia longicauda</i>	B	SWB
Varied Thrush	<i>Ixoreus naevius</i>	t	M
Veery	<i>Catharus fuscescens</i>	t	M
Vesper Sparrow	<i>Poocetes gramineus</i>	B	M
Virginia Rail	<i>Rallus limicola</i>	B	SWB
Warbling Vireo	<i>Vireo gilvus</i>	b	M
Western Grebe	<i>Aechmophorus occidentalis</i>	B	SWB
Western Kingbird	<i>Tyrannus verticalis</i>	B	M
Western Meadowlark	<i>Sturnella neglecta</i>	B	M
Western Sandpiper	<i>Calidris mauri</i>	t	SWB
Western Tanager	<i>Piranga ludoviciana</i>	B	M
Western Wood-pewee	<i>Contopus sordidulus</i>	B	M
Whimbrel	<i>Numenius phaeopus</i>	t	SWB
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	t	M
White-rumped Sandpiper	<i>Calidris fuscicollis</i>	t	SWB
White-throated Sparrow	<i>Zonotrichia albicollis</i>	t	M
White-winged Dove	<i>Zenaida asiatica</i>	t	M
White-winged Scoter	<i>Melanitta fusca</i>	t	SWB

APPENDIX B: POTENTIAL BIRD SPECIES IN OR NEAR THE BNGPA

Common Name¹	Scientific Name	Occurrence Potential²	Wildlife Section³
Whooping Crane*	<i>Grus americana</i>	t	SWB
Willet	<i>Catoptrophorus semipalmatus</i>	B	SWB
Willow Flycatcher	<i>Empidonax traillii</i>	B	M
Wilson's Phalarope	<i>Phalaropus tricolor</i>	B	SWB
Wilson's Snipe	<i>Gallinago delicata</i>	B	SWB
Wilson's Warbler	<i>Wilsonia pusilla</i>	t	M
Winter Wren	<i>Troglodytes troglodytes</i>	t	M
Wood Duck	<i>Aix sponsa</i>	B	SWB
Wood Thrush	<i>Hylocichla mustelina</i>	t	M
Yellow Rail*	<i>Coturnicops noveboracensis</i>	t	SWB
Yellow Warbler	<i>Dendroica petechia</i>	B	M
Yellow-billed Cuckoo*	<i>Coccyzus americanus</i>	t	M
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	t	M
Yellow-breasted Chat	<i>Icteria virens</i>	t	M
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	B	M
Yellow-rumped Warbler	<i>Dendroica coronata</i>	t	M

¹ Special status species indicated by asterisk.

² Occurrence potential of bird species includes: direct evidence of breeding (B), indirect evidence of breeding (b), over-wintering (W), and known transient or migrant (t) in the 1 degree grid block covering 48 N and 49 N latitude and 107 W and 108 W longitude (USFWS 1999, MDBB 2006a, MDBB 2006b).

³ Pertinent Environmental Assessment wildlife sections include: 3.11.1.8, Shorebirds and Other Waterbirds (SWB) and 3.11.1.9, Migratory Birds (M).

APPENDIX C

Hazardous Materials Management Summary

Hazardous Materials Management Summary

This table includes the types and quantities of hazardous and extremely hazardous materials that may be expected to be used, stored, transported or disposed within the BNGPA

Materials	Hazardous Substances	CAS #	RCRA #	Reportable Quantity
Air Foam	2-Butoxyethanol	111-76-2	~~	~~
	Ethylene Glycol	107-21-1	~~	5000Lbs
Alcomer 120L	Mineral Oil	64742-52-5	~~	~~
	Petroleum Solvent	8032-32-4	~~	~~
	Proprietary Surfactants	Proprietary	~~	~~
ARMCO Products	Grease	64742-52-5	~~	~~
	Oil	64741-53-5	~~	~~
	Graphite	7782-42-5	~~	~~
	Lamp Black	7440-44-0	~~	~~
	Lead	7439-92-1	~~	10Lbs
	Talc	14807-96-6	~~	~~
Collar Dope	Grease	64742-53-5	~~	~~
	Oil	64742-53-5	~~	~~
	Lead	7439-92-1	~~	~~
	Talc	14807-96-6	~~	~~
	Graphite	7782-42-5	~~	~~
	Carbon Black	1333-86-4	~~	~~
Zinc	Grease	64742-53-5	~~	~~
	Oil	64742-52-5	~~	~~
	Talc	14807-96-6	~~	~~
	Lime	1305-78-8	~~	~~
	Zinc	7440-66-6	~~	~~
BA-2 Buffering Agent	Sulfamic Acid	5329-14-6	~~	~~
Bachman KCI-1	Organic Acid Salt Solution (no known Hazardous Ingredients)	~~	~~	~~
BE-6 Microbiocide	2-Bromo-2nitro-1,3-propanediol	52-51-7	~~	~~
Refined Bleached and Deodorized Canola Oil	No known Hazards	~~	~~	~~
CF II Drilling Mud Thinner powder	Lignin Not listed	~~	~~	~~
CLA-STA XP Additive	Polyepichlorohydrin, trimethyl amine quaternized	51838-31-4	~~	~~
	Trimethylamine, N-oxide	1184-78-7	~~	100Lbs
CLAYFIX-II Material	Alkylated quaternary chloride	~~	~~	~~

APPENDIX C: HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Materials	Hazardous Substances	CAS #	RCRA #	Reportable Quantity
Cotton Seed Hulls	Cotton dust (raw) Particulates Not Otherwise Classified (PNOC)	~~	~~	~~
D-D	Proprietary Ingredients Isopropyl alcohol	~~ 67-63-0	~~ ~~	~~ ~~
Drilling Paper	Particulates Not Otherwise Classified (PNOC)	~~	~~	~~
DRISPAC® Polymer (regular, XT and Superlo®)	Does not meet the definition of a hazardous material CFR 1910.1200 (OSHA)	~~	~~	~~
FA-1 or Van Foam	Ethanol Poly (oxy-1-2-ethanediyl), alpha- sulfo-omega-hydroxy, C6-10- alkyl, ethers, ammonium salts Alcohols, c6-10 ethoxylated	64-17-5 68037-05-8 68439-45-2	~~ ~~ ~~	~~ ~~ ~~
FSF Polyswell	Proprietary Ingredients	~~	~~	~~
GBW-30 Breaker	Cellulose enzyme	~~	~~	~~
Gel	Bentonite Clay	11302-78-9	~~	~~
Hydrated Lime	Calcium Oxide	1305-62-0	~~	~~
Lignite	Leonardite	1415-93-6	~~	~~
Liquik 2 NU RLU - Drilling Detergent	LIQUIK 2 NU RLU	~~	~~	~~
Max Gel	Bentonite Silica, crystalline, quarts Silica, crystalline, Tridymite Gypsum	1302-78-9 14808-60-7 15468-32-3 13397-24-5	~~ ~~ ~~ ~~	~~ ~~ ~~ ~~
Maxi-Seal	No Hazardous Ingredients	~~	~~	~~
MO-67	Sodium hydroxide	1310-73-2	~~	1000Lbs
PELS (R) Caustic Soda Beads	Sodium hydroxide Water	1310-73-2 7732-18-5	~~ ~~	1000Lbs 1000Lbs
Polypac ®	Carboxymethylcellulose sodium salt	9004-32-4	~~	~~
Polypac UL ®	Carboxymethylcellulose sodium salt	9004-32-4	~~	~~
Poly-Plus (liquid)	Petroleum distillates, hydrotreated light Anionic polyacrylamide	64742-47-8	~~	~~

APPENDIX C: HAZARDOUS MATERIALS MANAGEMENT SUMMARY

Materials	Hazardous Substances	CAS #	RCRA #	Reportable Quantity
Rod Coat B	Barium Tallow Fatty Acid Complex	68201-19-4	~~	~~
	Mineral Oil, Petroleum distillates, hydrotreated heavy naphthenic compounds	64742-52-5	~~	~~
Rod Ease	Vegetable Oil	~~	~~	~~
	Additives	~~	~~	~~
S.A.P.P.	Sodium Acid Pyrophosphate	7758-16-9	~~	~~
SAND-BRADY	Crystalline silica, quartz	14808-60-7	~~	~~
Soda Ash	Sodium Carbonate	497-19-8	~~	~~
Sodium bicarbonate	baking soda	144-55-8	~~	~~
SSO-21M Winterized	Ethoxylated nonylphenol	~~	~~	~~
	Ethylene glycol monobutyl ether	111-76-2	~~	~~
	Methanol	67-56-1	U154	5000Lbs
Tetra sodium Pyrophosphate	Tetra sodium Pyrophosphate, anhydrous	7722-88-5	~~	~~
VIS-Cease	Petroleum distillates: (Hydro-treated Light)	~~	~~	~~

APPENDIX D

Reclamation Plan

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Table 2 Examples of seed mixtures for the BNGPA.

1.0 INTRODUCTION

This document establishes construction, erosion control, interim reclamation, final reclamation and monitoring procedures for the Bowdoin Natural Gas Development Project Area (BNGPA). These procedures are designed to facilitate successful reclamation of the area. The procedures were developed using the “Fieldwide Drilling Operations Plan for Drilling and Surface Use for All Fields/Units/Leases (Federal) in Phillips County and All Fields/Units/Leases (Federal) West of Hinsdale in Valley County” and “Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, The Gold Book” (BLM 2006).

The BNGPA is under the management of the Bureau of Land Management (BLM) Malta Field Office. Any Operator wishing to deviate from the guidelines set forth in this document shall receive prior approval from the Great Falls Oil and Gas Field Station and Malta Field Office. In this document, use of the terms *shall* or *will* denote practices that are required by BLM to be completed by the Operator. Use of the terms *should* denote practices that are recommended by BLM to be completed by the Operator.

Possible disturbed areas include drill pads, access roads, pipelines, compressor sites, and other ancillary areas used during development. The reclamation procedures presented are designed to be completed either concurrently with, or at the cessation of, construction and production activities. The procedures will serve to minimize the impact of activities in the BNGPA on natural resources and facilitate successful reclamation of disturbed areas to approximate pre-disturbance conditions.

Erosion control is a major part of the reclamation plan as it is a continuous process from disturbance through final reclamation. Erosion control measures outlined in this document will be used to stabilize disturbed sites and reduce erosion, runoff and sedimentation in the entire BNGPA throughout the life of the project.

Interim reclamation will be completed on all areas where final reclamation procedures cannot be promptly implemented to minimize the footprint of disturbance. Interim reclamation measures include recontouring, respreading topsoil, and seeding and/or implementation of erosion and weed control measures.

Final reclamation measures will be implemented when all disturbance and use of an area are finished. Final reclamation will serve to return the area to the approximate pre-disturbance condition and set the course for eventual ecosystem restoration. Final reclamation procedures include all of the steps involved in recontouring, respreading topsoil, seeding, and ensuring natural vegetation establishment, such as ripping, erosion and weed control, and grazing deferment.

The last step in this reclamation plan is the monitoring and maintenance of final reclamation. This will include observing and measuring the success of final reclamation efforts, and determining if further reclamation efforts are needed.

2.0 OBJECTIVES

Natural-gas development is one of many uses of public lands and resources. While development may have a short- or long-term effect on the land, successful reclamation can ensure the effect is not permanent. The reclamation process involves restoring the original landform or creating a landform that approximates and blends in with the surrounding landform.

The objectives of reclamation during and after development of the BNGPA are to return the land to safe and predisturbed conditions, consistent with the establishment of productive post-development uses. The designated post-development uses for the project area are defined as wildlife habitat, livestock production, farming, recreational use, and ongoing operation of natural gas production activities.

This plan has been developed to meet the following objectives for interim reclamation during active operations and final reclamation of roadways, pipelines, compressor stations, drill locations, and ancillary facilities:

- During the life of the development, all disturbed areas not needed for active support of production operations will undergo interim reclamation in order to minimize the environmental impacts of development on other resources and uses.
- At final abandonment, well locations, production facilities, and access roads will undergo final reclamation so that the character and productivity of the land and water are restored (BLM 2006).
- Establishment of long-term, self-sustaining vegetation communities by reseeding with native plants and promoting natural re-establishment and succession;
- Protection of surface water quality including compliance with all applicable water quality standards and storm water management requirements;
- Minimization of post-reclamation visual contacts with surrounding areas to the extent practical; and
- Minimization of long-term closure requirements, especially for ongoing care and maintenance.

These objectives shall be considered during all phases of reclamation including construction, interim reclamation, and final reclamation.

3.0 PERFORMANCE STANDARDS

Reclamation success will be evaluated using defined performance standards. Interim reclamation success will be measured by the following standards:

- Erosion control methods shall be in place to mitigate any highly erosive features, such as rills, gullies, or sheet erosion.

In rangeland areas:

The following criteria refer to desirable species. Desirable species are those species present in the seed mix of the surrounding undisturbed natural vegetation. Within two to three growing seasons of the initial seeding, a short-term evaluation of revegetation success should be completed to determine if the standards are met.

- Vegetative cover, measured as canopy cover using a BLM approved method, will be at least 50 percent of adjacent undisturbed area cover (BLM approved methods can be found in BLM (1996));
- Desirable species will comprise 85 percent of the total vegetative cover of the revegetated area;
- No single species will account for more than 50 percent of the total vegetative cover unless it comprises more than 50 percent of the vegetative cover on adjacent undisturbed areas;

In farmland areas:

- Crop production will be 85 percent of that in adjacent crop areas;
- Desirable species will comprise 85 percent of the species present.

If these standards are not met, additional reclamation measures such as reseeding, fencing, fertilizing or erosion control shall be implemented. When the short-term standards are not met, the likelihood of achieving the final reclamation standards presented below is very low unless mitigating measures are taken.

Final reclamation success will be measured by the following standards:

- Erosion susceptibility of the site shall be equal to or less than the reference site, i.e., no erosive features shall be present on the revegetated sites that are not also prevalent in the adjacent undisturbed areas.

In rangeland areas:

- Vegetative cover will be at least 80 percent of adjacent undisturbed area cover; or, potential vegetative cover is as defined in the NRCS Ecological Site guides for the area;
- Desirable species will comprise 90 percent of the revegetated area;
- No single species will account for more than 35 percent of the total vegetative cover unless it comprises more than 35 percent of the vegetative cover on adjacent undisturbed areas;
- No category 1, 2, or 3 invasive and non-native species will be present;

In farmland areas:

- Crop production will be 95 percent of that in adjacent crop areas;

- Desirable species will comprise 90 percent of the species present;
- No category 1, 2, or 3 invasive and non-native species will be present;
- The integrity of sub-irrigation, where present, will be re-established, i.e., disturbed sites will be returned to their original surface elevation, and fill will be of equal textural class of surrounding undisturbed areas.

4.0 PLANNING AND VEGETATION AND SOIL INVENTORIES

4.1 PLANNING

Reclamation planning should be completed to define the scope for interim and final reclamation activities. Characterization of soil resources and vegetation reference sites should be completed to develop the reclamation and stabilization work plan. Physical and chemical soil characterization should be completed to support development of certified weed-free seed mixtures, soil amendments, and fertilizer requirements. Vegetation reference sites should be identified to evaluate reclamation success.

Planning should consider the timing between initial construction and final reclamation for abandonment. The extent of stabilization and interim reclamation practices should be appropriate for the site conditions with respect to the duration between construction and final reclamation activities. When a short duration will occur before final reclamation, stabilization practices should focus on erosion and weed control.

The availability of topsoil for final reclamation shall be considered prior to construction. Topsoil shall be respread during interim reclamation; however, topsoil deficiencies at the time of final reclamation may result. Salvage of topsoil used for interim reclamation may result in a decrease in the overall quality and quantity of topsoil available for final reclamation. The suitability of seeding and establishing vegetation in subsoil should be considered for interim reclamation.

4.2 VEGETATION

An adjacent undisturbed area reference site should be identified for each area to be or already disturbed. Each area marked for disturbance should be observed, and a representative reference site with similar aspect, soils, growing conditions, and vegetation cover identified. This undisturbed site should be used as a comparison for the revegetated area whenever any vegetation data is collected. Typical reference sites may be used for numerous locations having similar conditions. If a suitable reference site is not available, the site should be matched to the appropriate NRCS Ecological Site.

4.3 SOIL RESOURCE INVENTORY

Prior to disturbance, soil samples may be required to be collected in the areas to be disturbed. The soil samples should be analyzed at a soil testing laboratory to determine the texture and any limiting factors of the soil. The factors tested may include pH, lime, salts, sodium adsorption ratio (SAR), and soil nutrient availability. From these tests, those factors that may inhibit revegetation can be identified. This soil testing can be used to determine the depth of topsoil to

be salvaged as well as rates and composition of any required soil amendments and fertilizers. The soil testing results would also aid in the prescription of the seed mix.

5.0 CONSTRUCTION

Drill pads, access roads, and pipelines will be designed and constructed to reduce erosion susceptibility and impacts to the landscape. Wetlands, areas with low reclamation potential, and important wildlife habitat areas should be avoided to the maximum extent possible.

5.1 TOPSOIL SALVAGE

To facilitate successful reclamation, topsoil salvage shall be completed on every area where the soil will be disturbed. Topsoil salvage entails removing suitable topsoil and handling and storing it separately from the subsoil. When final reclamation begins on a site, the topsoil will be applied as the top layer to provide the best medium for plant growth.

It is recommended that an average of four to six inches of topsoil be removed and stockpiled from each location prior to any construction. This depth may be modified based on conditions indicated during the soils resource inventory. Piling subsurface soil on top of topsoil shall be prohibited.

Soil disturbance during construction should be kept at a minimum. The surface should be minimally graded or cleared on drill pads which require less than one foot of cut and fill. Where possible, disturbance will be limited to the topping of shrubs and grasses. Grading should only be used when surface conditions are unsafe for drilling and completion equipment/vehicles. When grading is needed, topsoil will be windrowed along one side of the modified area and kept separate from the trench soil.

It is suggested that for sites with poor reclamation potential and sites that have severe erosion hazards, soil mapping be completed to identify representative soil groups, so that the best available topsoil can be removed and stockpiled to facilitate reclamation. Soil samples can then be obtained to characterize each soil group, and the samples analyzed for limiting factors such as salinity and percent rock content. The best depths and areas for topsoil salvage can be determined from the data. For example, one site may have four inches of topsoil and another may have 12 inches of topsoil.

6.0 EROSION CONTROL

Erosion control is a continuous process that is completed by the Operator from construction through production and interim and final reclamation. Every disturbed area will be evaluated for erosion susceptibility and appropriate erosion control measures implemented when needed. The erosion control process will continue until the disturbed site has met final reclamation standards.

It is suggested that a science-based method to measure erosion susceptibility be used. The Erosion Condition Classification System (Clark, 1980) is one such widely accepted method. This system gives values to erosion features such as rills, pedestals, and surface litter to determine a soil surface factor and the associated erosion condition class. These condition classes range

from stable to severe. Based on the condition class, it can be determined if erosion control is necessary, and if so, the type of control measure to be implemented.

Construction storm water discharge for oil and gas production is regulated under the Montana Pollution Discharge Elimination System (MPDES) Permit No. MTR 100000. Authorization for storm water discharge is required for disturbance areas exceeding one acre in size and for areas less than one acre in size but part of a larger (greater than one acre) common plan of development. Permits may be obtained for combined activities that may include numerous well locations, roads, pipelines, and other facilities being constructed within a common plan of development. Specific rules applicable for storm water related to construction activities are included in the Montana Water Quality Act, Title 75, Chapter 5, Montana Code Annotated (MCA) and the Federal Water Pollution Control Act (the "Clean Water Act"), 33 U.S.C. §1251.

All runoff and erosion control structures will be inspected on a regular schedule and after major runoff events. During inspection, the control structures will be cleaned out and maintained in functional condition. The inspection and maintenance schedule will be conducted throughout the duration of construction, drilling, production and final reclamation until successful revegetation and soil stability is attained.

Often a combination of temporary and permanent techniques is needed to adequately control sediment and erosion. The erosion-control method used shall be based on each site's stability characteristics and the duration required for erosion control. Several small structures may function more effectively than a single large structure. Measures useful during construction include straw mulch, straw wattles, and silt fence barriers. During interim reclamation, temporary seeding, straw mulch, erosion mats, berms, and water bars are often effective. For final reclamation, slope recontouring, straw mulch, and permanent seeding are often used.

6.1 STRAW MULCH

Certified weed-free straw mulch application may be required on disturbed soils to provide temporary protection until permanent vegetation is established. Mulch application aids in preventing wind and water erosion and enhances plant establishment by retaining soil moisture and creating micro-habitats for seedling development. Following fertilizer application, if necessary, and seeding, mulch shall be applied at 1.5-2.0 tons per acre. Mulch should not be applied in the presence of free surface water, but may be applied upon damp ground. Mulch should not be applied to areas having substantial vegetative growth, such as grasses, weeds, and grains. Mulching shall not be performed during adverse weather conditions or when wind prevents uniform distribution. Application shall be in a manner that does not seriously disturb the seedbed surface.

Mulch shall be crimped into the soil using a disk crimper to prevent wind loss. The desired depth for crimping is three inches. Following crimping, the straw mulch should resemble stubble in a harvested wheat field.

6.2 STRAW WATTLES

Certified weed-free straw wattles may be placed on erosion-prone sites with the objective of preventing rill and gully development and capturing sediment. Straw wattles are burlap tubes filled with weed-free rice straw, varying in length and diameter. By placing several wattles

perpendicular to the direction of water flow, surface runoff and sediment loss can be reduced in areas with steep slopes. The lifespan for burlap straw wattles ranges from one to five years, depending on placement and weather. Following placement, straw wattles shall be monitored and replaced as necessary until site stability is achieved.

6.3 SILT FENCES

A silt fence is a barrier of geotextile fabric, or filter cloth, used to temporarily intercept sediment-laden runoff from small drainage areas. A silt fence can be used to promote sheet flow, to reduce runoff velocity, and to help retain transported sediment on the site, thus reducing erosion and enhancing water quality. Silt fences are very effective in sheet flow conditions and usually ineffective with concentrated flows. Silt fences are commonly placed at the bottom of a disturbed slope or adjacent to streams and ponds. They can be used for slope protection, in minor swales or ditches, and around storm drains. Silt fences are most effective when areas draining to the barrier are 2.5 acres or less. Silt fences should not be used where concentrated flows exceed 1cfs (Roberts, 1995) or where rocky soils prevent the full and uniform anchoring of the fence toe.

Life expectancy of a silt fence is dependent on the ultraviolet stability and type of fabric, but is usually six months to several years. Woven and nonwoven synthetic fabrics are available. Woven fabric is generally stronger than nonwoven fabric and usually does not require the additional support of a wire mesh.

6.4 EROSION MATS

Mats are used to prevent erosion on steep slopes or critical areas and to provide a stable seedbed for one or more growing seasons. The mat is laid parallel to the slope and staked down following contouring and seeding operations. Because numerous erosion control mat materials exist, the mat materials shall be installed according to the manufacturer's instructions.

6.5 BERMS

Berms are used to control surface runoff at well sites. Berms are typically 18 inches high and are constructed around the fill portion of well sites to control and contain all surface runoff and/or fuel or petroleum product spills on the pad surface.

6.6 WATER BARS

Water bars are used to divert water from an erosion-prone site to a vegetated and more stable area. A water bar consists of a trench and adjoining down slope embankment. Water bars should be constructed approximately one to two feet deep. Water bars are placed perpendicular to side slopes at appropriate intervals based on the slope gradient. The bars shall begin and end in undisturbed soils and be constructed generally parallel to the slope contour with a slight grade to facilitate water runoff.

Linear disturbances such as newly constructed or reclaimed pipelines or roads should be cross-drained by water bars. Any slope over 3:1 in steepness should have water bars installed to

reduce the slope length. Water bars should be constructed in soils that normally do not support adequate vegetation to prevent erosion, or other sites at risk to excessive erosion.

7.0 INTERIM RECLAMATION

The intent of interim reclamation is to minimize the environmental impacts of the development on other resources and uses during the period between construction and final reclamation. Upon completion of construction, interim reclamation shall be completed in areas where final reclamation will not occur at the completion of construction. In locations that will not require recontouring and interim reclamation, final reclamation shall be completed at the end of construction as described in Section 8. Reclamation operations shall be conducted on all disturbed lands in accordance with MBOGC requirements and surface owner agreements.

7.1 STABILIZATION AND RECONTOURING

Unused areas around well pads, unused pits, flowlines, pipelines, power lines to wells, cut-and-fill slopes of roads, and any other surfaces not required for field use will be graded to form stable, rounded slopes that blend with the natural terrain. Erosion control structures and/or sediment containment systems will be built or installed as needed, the areas will be ripped, and temporary seeding completed. Seeding will occur within three months of completing construction or during the next seeding window, whichever occurs first.

7.2 NOXIOUS WEED CONTROL

Noxious weeds will be controlled on disturbed areas in accordance with guidelines established by the EPA, BLM, State, and local pesticide authorities. Only BLM-approved chemicals will be used on public lands. Appropriate measures, chemical, biological or mechanical, will be followed to prevent the spread of weed infestations and reduce potential for spreading weed seed via equipment use. This may include, but not be limited to, washing rig frames and all drilling equipment prior to entry onto public lands.

8.0 FINAL RECLAMATION

8.1 RECONTOURING

All disturbed areas shall be graded to the approximate original contour or to blend with surrounding topography. In preparation for revegetation, extensive earthwork should be completed to help the location blend in with the adjacent rangeland.

Sites that have been recontoured and stabilized by revegetation and erosion control during the production phase may not need recontouring during final reclamation. Sites with revegetated and bare areas that already closely resemble the approximate original contour do not need to be recontoured. Also, if the disturbed area has stabilized and if restoring the original contour will cause additional disturbance, then recontouring may not be required.

Prior to recontouring, all wells will be completely plugged in accordance with the standards stated in the Conditions of Approval for the Notice of Intent to Abandon (NIA), all pipelines will be purged of all fluids as necessary, and the fluids will be disposed of in the proper manner. The topsoil and vegetative material will be scraped from cut-and-fill slopes of roads and pads where stable vegetation has occurred and stockpiled for final distribution after the area is recontoured. This is done so that topsoil that has been previously placed on pad edges or backslopes of roads will not be buried. Additional stockpiled topsoil is preferred for final cover.

Before well locations are recontoured, oily surface material, cuttings (provided they are not regulated under RCRA, CERCLA, or other applicable regulations), and severely compacted soils should be worked and broken into aggregates of one inch in diameter or smaller. If oily surface materials or cuttings are present, to facilitate the breakdown of the hydrocarbons, the broken soil aggregates should be treated with a nitrogen source to adjust the carbon to nitrogen ratio of the soil. The soil should be sampled and analyzed in a laboratory to determine the correct carbon to nitrogen ratio. This should occur before available topsoil and vegetation is spread on the surface for seed bed preparation.

Drainages will be reclaimed to approximate the original bank configuration, stream bottom width, and channel gradient. Any pilings, debris, or other obstructions will be removed from the drainage channels.

Burn pits, reserve pits, and any other pits that are no longer needed will be filled and leveled or sloped to resemble adjacent terrain. Cuttings and drilling mud will be allowed to dry and then all contents including liners will be covered and regraded to provide surface drainage from the filled area. Pit closure should be completed in accordance with BLM requirements. The concentration of nonexempt hazardous substances in the pit at the time of backfilling should not exceed standards set forth in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), or as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). Hazardous substances removed from the sites shall be disposed of in accordance with applicable standards.

Once the site has been recontoured, the stockpiled topsoil shall be spread evenly over the entire disturbed area.

8.2 Seeding and Soil Amendments

8.2.1 Seedbed Preparation

Seedbed preparation is critical to the success of revegetation projects. Soils are often compacted due to travel by heavy equipment, creating a less-than-ideal substrate for germination. The objective of seedbed preparation is to reduce soil compaction and create a suitable seedbed for germination and plant growth.

Procedures for properly preparing the seedbed vary with each site and may include tilling, disking, and/or dragging. The objectives of reclamation are to re-establish a growing stand of vegetation similar to the adjacent undisturbed ground or as defined in the NRCS Ecological Site Guides. In all cases the following parameters will be achieved:

- a. The certified weed-free seed will be covered with $\frac{1}{4}$ to $\frac{1}{2}$ inch of soil.

- b. The ground will be scarified to allow the seed to establish roots, protect the surface from wind erosion and maximize rain and snowfall retention.

8.2.2 Compaction Reduction

Prior to contouring and topsoil application, sites should be ripped between two and four inches below the bottom of a compacted layer to decrease compaction. Sites may also be disked and floated with chain harrows to further reduce compacted layers, break up large clods, roughen the surface to increase seed-soil contact and create safe germination sites.

8.2.3 Seeding

All disturbed areas will be seeded with a drill seeder or by broadcast seeding when access does not allow drill seeding. As much seeding as possible will be conducted during the fall before the ground freezes. Occasional seeding may occur in the spring as long as favorable conditions exist. Seeding will not be allowed in frozen or saturated soil conditions except for winter seeding of sagebrush on snow. Reseeding will be required when a satisfactory stand is not obtained.

The seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS) per acre. There shall be no invasive or non-native weed seeds in the mixture. Seed shall be tested and the viability testing shall be done in accordance with Montana State law(s). Viability testing results should be available for BLM review, if requested. Commercial seed shall be either State-certified or registered weed-free seed. The seed mixture container shall be tagged in accordance with State law(s) and available for inspection. The amount of seed planted will be enough so that upon germination, the soil is adequately covered.

8.2.4 Seed Mixtures

All disturbed areas will be seeded with an approved seed mixture. An approved standard seed mixture is provided in Table 1, and other approved species that could be included in a customized mix for a particular site, along with recommended seeding rates for a pure stand, are provided in Table 2. Approved species will be used on all BLM surface land and on private surface unless the landowner requests otherwise. Non-native yellow sweetclover will not be allowed as a component of any seed mix. The vegetation inventory described in 3.0 and 4.2 would be used to develop the species composition for the seed mixes. Using species that are already present in an area increases the probability that the area will be revegetated successfully. Soil sampling may also be necessary to ensure that the species in the seed mix will establish on the site. After the vegetation survey and/or soil sampling has been completed, a mix should be developed using species listed in Table 2; no monocultures will be allowed. The mixture should be diverse enough to show a variety of native desirable plants upon germination. The percentage of each species in the mixture will determine the percentage of that species' pure-stand seeding rate used. Forbs and shrubs may be included in the seed mixtures; however, they should not be included when herbicides are used to control invasive weeds.

8.2.5 Fertilizer and Soil Amendments

Fertilizer or other supplemental treatments may be necessary to establish a growing stand of vegetation. The soils in each area should be tested to determine the amounts of plant-available nutrients and any limiting soil factors. Based on this sampling, fertilizer should be applied as needed after seeding. Any soil amendments needed to remediate limiting factors, such as sodic and saline soils, should also be applied to the site.

8.2.6 Mulch

Straw mulch application during final reclamation shall be completed as described above for erosion control (**Section 6.1**).

8.2.7 Grazing

When possible, grazing by livestock should be deferred from sites recently seeded. Heavy grazing can significantly hinder revegetation success. Site conditions and reclamation success should be reviewed prior to initiation of grazing. Grazing should be deferred for one to two growing seasons after seeding takes place or until plants are sufficiently established. This may require construction of fences around sensitive seeded areas.

8.2.8 Weed Control

Seeded and bare areas should be monitored for weed infestations. All category 1, 2, and 3 invasive and non-native species will be controlled and eradicated if possible. Appropriate measures—chemical, biological, or mechanical—will be followed to prevent the spread of weed infestations. Only BLM-approved chemicals will be used on public lands. As indicated above, it may be necessary to plant forbs and shrubs after grasses in order to control weeds. Weed growth following the disturbance of recontouring can be controlled with a broadleaf herbicide; forbs and shrubs can be planted once the weed population is sufficiently diminished. Natural re-establishment and succession of forbs and shrubs will occur from surrounding areas.

9.0 MONITORING AND MAINTENANCE

Reclamation should be monitored to evaluate the success of both interim and final reclamation efforts and determine if the techniques used are effective or if additional measures are needed.

Monitoring of interim reclamation is integral to managing storm water discharges authorized under MPDES. Monitoring of interim reclamation success should include visual observations and measurements of the soil stability and the effectiveness of any erosion-control measures implemented. If any temporary revegetation has taken place, seedling emergence and density should be measured to determine if it is sufficient.

Final reclamation monitoring will be used to determine the effectiveness of the reclamation methods implemented and, in the long-run, determine if an area meets final requirements for reclamation success. After final reclamation has taken place, erosion-control measures and revegetation efforts shall be observed for effectiveness. This should include measuring site stability and seedling emergence and density. Invasive and non-native weeds should also be closely monitored during this period so that measures to stop their spread can be implemented immediately upon infestation.

After sufficient time has passed for vegetation to become established, each disturbed area and corresponding reference area shall be monitored for final reclamation success. Data collected should include site stability and acceptable and repeatable methods of collecting vegetation cover, ground cover, plant density, and species composition. This data can then be used to determine if a site has met the final reclamation success goals listed in the objectives section of

APPENDIX D: POTENTIAL BIRD SPECIES

this document. If sites do not meet these goals, additional reclamation efforts may be needed. However, below-average precipitation for an extended time may prevent a site from meeting the objectives. A site may need more time for vegetation to establish and not require additional reclamation.

Water bars that are no longer needed to control runoff should be flattened to blend with the surrounding landform and vegetation.

Table 1. Standard seed mixture for the BNGPA

<u>Species</u>	<u>% of Mix</u>	<u>PLS lbs/acre</u>
Western Wheatgrass	40	3.2
Blue Grama	10	0.2
Needle and Thread	20	1.2
Prairie Junegrass	25	0.25
Purple Prairie Clover	5	0.15
Total	100	

APPENDIX D: POTENTIAL BIRD SPECIES

Table 2. BNGPA recommended species, cultivars, and pure stand seeding rates

Plant Species	Scientific Name	Recommended Cultivar¹	Drill Seeding Rate^{2,3} PLS lbs/acre⁴
Grasses			
Bluebunch Wheatgrass	<i>Pseudoroegneria spicata</i>	Goldar	6
Green Needlegrass	<i>Nassella viridula</i>	Lodorm	5
Sandberg Bluegrass	<i>Poa secunda</i>	High Plains	2
Prairie Junegrass	<i>Koeleria macrantha</i>	n/a	1
Blue Grama	<i>Bouteloua gracilis</i>	Bad River	2
Needle and Thread	<i>Hesperostipa comata</i>	n/a	6
Indian Ricegrass	<i>Achnatherum hymenoides</i>	Rimrock	6
Prairie Sandreed	<i>Calamovilfa longifolia</i>	Goshen	4
Inland Saltgrass	<i>Distichlis spicata</i>	n/a	5
Alkali Sacaton	<i>Sporobolus airoides</i>	n/a	1
Western Wheatgrass	<i>Pascopyrum smithii</i>	Rosana	8
Forbs			
Dotted Gayfeather	<i>Liatris punctata</i>	n/a	6.4
Western Yarrow	<i>Achillea millefolium</i>	Great Northern	0.5
Purple Prairie Clover or White Prairie Clover	<i>Dalea purpurea</i> <i>Dalea candida</i>	Bismark Antelope	3
Shrubs			
Fourwing Saltbush	<i>Atriplex canescens</i>	Wytana	0.5
Silver Buffaloberry	<i>Shepherdia argenta</i>	Sakakawea	0.5–1
Wyoming Big Sagebrush ⁶	<i>Artemisia tridentata</i>	n/a	3
Silver Sagebrush ⁶	<i>Artemisia cana</i>	n/a	2
Wood's Rose	<i>Rosa woodsii</i>	n/a	0.5–1
Winterfat ⁶	<i>Krascheninnikovia lanata</i>	Open Range	<.5

¹ Other cultivars adapted to the area are acceptable.

² Seeding rates are given for 12-inch drill rows.

³ When broadcast seeding, double the pounds per acre seeded.

⁴ Pure Live Seed

⁵ Lewis Blue Flax should not be seeded in a mix at rates higher than 0.15 lbs/acre.

⁶ These shrubs should always be broadcast seeded; seeding rates listed are for broadcast seeding.

Sources: NRCS Montana Technical Note, Plant Materials MT-46 (Rev. 1);

NRCS Montana Technical Note, Range MT-33

Granite Seed Company, Lehi, UT

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