

**Appendix D: BLM Instruction Memorandum No. WY-2012-007, Management
of Oil and Gas Exploration and Production Pits**



United States Department of the Interior



BUREAU OF LAND MANAGEMENT

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To: District Managers

From: Deputy State Director, Minerals and Lands

Subject: Management of Oil and Gas Exploration and Production Pits

Program Area: Fluid Minerals, Hazardous Materials

Purpose: This Instruction Memorandum (IM) will provide the minimum standards for management of pits authorized by the Bureau of Land Management (BLM) on Federal/Indian oil and gas leases for exploration & production (E&P) activities, with the exception of coalbed natural gas produced water impoundments. Pits covered by this IM include (but are not limited to): reserve, completion, flare, oil-base mud, drill cuttings, emergency, workover, and production pits.

Policy/Action: The BLM has the authority to regulate environmental aspects of oil and gas activities associated with exploration, development, and production of oil and gas deposits from Federal and Indian leases (43 CFR 3162.5-1 and 25 CFR 225.4). This policy provides minimum standards for pit management and is organized by phase of operations.

Pits associated with oil and gas activities have substantial variation for their purpose(s), contents, and potential environmental and health effects. In the absence of site-specific information, E&P pits should be considered to contain potentially hazardous wastes harmful to human health; in all cases, BLM personnel shall follow the BLM's Site Entry Policy (Washington Office (WO) IM No. 2002-138) when working near E&P pits. Where necessary and appropriate, the BLM may require the operator to submit information about the nature, quantity, and hazards posed by chemicals and materials used at facilities located on Federal oil and gas leases.¹

Operators may be obligated to obtain permit approvals from the State of Wyoming and/or other Federal and local agencies. It is the responsibility of the operator to ensure that all necessary permits are obtained. Where other Federal or State permitting and/or regulations are applicable, the guidance and standards in this policy do not supersede or replace those requirements.

Field Offices are instructed to consider and evaluate the standards in this policy when approving actions on Federal oil and gas leases or BLM-administered surface estate that pertain to construction, use, maintenance, closure, and reclamation of oil and gas exploration & production pits. When considering an alternative or modification of a proponent's proposed action, the Field Office must ensure that

¹ In accordance with 43 CFR 3100.4(b), the BLM will keep data and information confidential that is submitted by the operator and that is marked as confidential or proprietary, to the extent allowed by law and regulation. These data and information may be necessary to consider in our compliance with the National Environmental Policy Act (NEPA). See WY IB No. 1997-011, "Hazardous Materials Management/NEPA/Oil and Gas Developments."

alternatives and modifications are appropriately analyzed and disclosed under the National Environmental Policy Act (NEPA),² are reasonable, and are consistent with existing lease rights. The BLM's authority to consider and/or apply reasonable restrictions to Federal oil and gas lease operations is described in WO Information Bulletin (IB) No. 2007-119.³

A pick-list of sample Conditions of Approval (COAs) is attached to this document (Attachment 1). These COAs provide a standardized list of protection measures and requirements consistent with this policy. The BLM should encourage operators to incorporate the appropriate protection measures and requirements into their surface use plans. If necessary, appropriate and reasonable COAs may be attached to authorizations processed by the BLM.⁴

1. Use of enclosed tanks and closed loop or semi-closed loop systems is environmentally preferable to the use of open pits and is to be encouraged by the BLM. Open production pits are to be strongly discouraged. Closed tanks and systems minimize waste, entry by wildlife, fugitive emissions that affect air quality, and reduce the risk of soil and groundwater contamination. In addition, the use of tanks instead of pits expedites the ability to complete interim reclamation. Costs may be reduced with the use of tanks, particularly when the pit requires solidification or netting.
2. Siting and construction of pits

Wherever possible, the BLM should seek to avoid approving pits located in sensitive areas or other locations that have heightened potential to result in adverse impacts to human health or the environment.

- a. Within sensitive areas,⁵ the BLM will require that an alternative to reserve, completion, and open production pits (see Sections 2(f) and (g), below) be used. Exceptions may only be granted in rare cases with sufficient justification (e.g., when sufficient protections are described in a design submitted for prior BLM approval) and after detailed NEPA analysis. When exceptions to this policy are granted, the BLM will consider more stringent operation, closure, and monitoring standards.
- b. Pit construction and design criteria
 - i. Wherever possible, all pits shall be located entirely in cut material; where not possible, pits shall be located at least 50 percent in cut, and shall include at least a 2 foot keyway trench for construction of the dike in their design. This dike shall be compacted in 6 inch lifts.
 - ii. All pits shall be designed to allow at least 3 feet of fill over the top of pit contents upon closure, and allow for the re-establishment of the approximate original contour upon final reclamation.
 - iii. The design of all pits shall provide adequate storage capacity to maintain at least 2 feet freeboard; pits that will hold fluids must include a permanent marker designating the point at which 2 feet of freeboard remains in the pit. If the pit is lined, the permanent marker must not impair liner integrity.

² For example, see BLM Handbook H-1790-1 ("National Environmental Policy Act Handbook") Page 81 (Section 8.3.6)

³ WO IB No. 2007-119 ("Existing Surface Management Authority for Oil and Gas Leases")

⁴ See Onshore Oil and Gas Order Part III.F.a.3.

⁵ Definitions of this and other important terms in this policy are provided in Attachment 2

- iv. Pads and pits shall be sited and designed to divert offsite run-on around the pit. Run-on water may be diverted around the pit by sloping the pad or constructing diversion ditches or berms above and/or below the pad cut slope.
 - v. Pit walls must be sloped so that the stability of the pit wall is not compromised; generally pit walls will not exceed a 1:1 slope.
 - vi. All pits shall be fenced on four sides upon construction, or as otherwise specified by the BLM. Minimum standards for fencing are provided in the BLM-USFS publication “The Gold Book”⁶ and H-1741-1 (“Fencing”).
 - vii. Re-entering a closed or reclaimed pit is prohibited unless the following protection measures are in place:
 - 1. Disturbed pit contents are removed and transported to an authorized commercial disposal or treatment facility, or
 - 2. Disturbed pit contents are protected on-site by
 - a. Placing all excavated material on an impervious, secured liner contained within an adequate berm,
 - b. Preventing wind or water erosion of excavated materials
 - c. Testing previous pit contents to determine potential hazards, and
 - d. Replacing all excavated pit contents upon cessation of operations.
 If wastes are released during re-entry of a previously closed pit, the operator risks causing a release of materials that may no longer be Resource Conservation and Recovery Act (RCRA) E&P exempt.⁷
- c. Water quality protection measures
- i. All pits shall be lined (using a synthetic liner or clay liner) with the exception of flare pits; situations where only fresh water, cement, and nontoxic or nonhazardous muds and additives are being used for drilling, completion, and plugging activities; and pits for pneumatic (air) drilling.
 - ii. Synthetic liners must have a thickness of at least 12 mil. Synthetic liner material must be compatible with the pit contents, and resistant to weathering, sunlight, and puncturing or tearing. Seams of liners shall be overlapped and welded in accordance with manufacturer’s requirements. The BLM may require bedding material under the liner be amended or compacted to ensure that the liner is not punctured during installation or use.
 - iii. Clay liners must be compacted to a depth of at least 6 inches and having a hydraulic conductivity of no more than 1×10^{-7} cm/sec.
 - iv. Liners must be bedded upon a suitable substrate that is level, free of organic material, and without rocks or materials that could puncture the liner.
 - v. Leak detection for pits may be required by the BLM (1) if site-specific analysis determines that pit contents have potential to adversely affect nearby surface and groundwater sources or (2) as required by Onshore Oil and Gas Order No. 7. Requirements for leak detection are provided in Onshore Oil and Gas Order No. 7.

⁶ Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, 2007 (4th Edition), or most current edition

⁷ See WY IB No. 1994-349 (“Oil and Gas Exemptions Under RCRA and CERCLA”) for more information about RCRA-exempt wastes.

- d. Number and type of pits
 - i. Wherever feasible, pit management should allow for the recycling and reuse of fluids and in accordance with the transporting requirements of this policy. This may require, for example, that drilling fluids are removed from a pit prior to the flow-back of completion fluids to that pit, where applicable.
 - ii. Considering other aspects of this policy (see Section 3(d)), the BLM may require consolidated or separate reserve/completion pits in the design of a drilling location.
 - iii. When a proposal includes the use of oil-base muds, a lined drill cuttings pit that is separate from the reserve pit must be used to store oil-base mud cuttings.
- e. Pit centralization
 - i. Where feasible, centralized reserve and completion pits are encouraged. However, the mixing of wastes from non-Federal and Federal leases is prohibited unless the wastes are being disposed of or treated at an authorized commercial disposal or treatment facility. The provisions of this section do not apply to reserve and completion pits servicing multiple-well pads, or wells with completion zones in both Federal and non-Federal leases.
- f. Alternatives to reserve, completion, and production pits
 - i. As previously mentioned in Section 2(a), alternatives to reserve, completion, and production pits are required when operations are proposed in sensitive areas. Using these alternatives in nonsensitive areas is to be encouraged by the BLM, but should consider the potential tradeoffs to their use (such as increased disturbance areas to accommodate storage tanks, and the final disposition of wastes generated). Alternatives include:
 - 1. Closed-loop drilling
 - 2. Semi-closed loop drilling
 - 3. Completion flowback to temporary storage tanks
- g. Preferred alternatives to open production pits
 - i. Below-grade enclosed tanks for storage of produced fluids may be allowed if designed to the following standards:
 - 1. For single-walled tanks, the sides must be available for periodic inspection and leak detection must be employed.
 - 2. For double-walled tanks, the interstitial space must be periodically monitored such that a leak would be detected prior to release from the tank.
 - 3. All below-grade tanks must include a monitoring and reporting plan to ensure that leaks are promptly discovered and reported to the BLM.
 - 4. Open-bottom sub-grade structures are prohibited.
 - 5. Below-grade tanks are prohibited in sensitive areas.
 - ii. Above-grade tanks for storage of produced fluids must adhere to the following standards:
 - 1. Secondary containment storage around the tanks for spill control must be capable of holding at least 110 percent of the volume of the largest tank inside the containment area.
 - 2. The containment system must be capable of containing the wastes or product such that the material will not escape the containment system prior to cleanup.
 - 3. Secondary containment structures shall be protected from livestock, wildlife, and human activities. This may be accomplished by fencing, graveling over earthen berms, expanded metal or grate covers, etc.

- h. Monitoring, inspection, and enforcement
 - i. The BLM will require the operator to regularly inspect pit liners to ensure that the liner has been properly installed and remains intact throughout operations.
 - ii. Where present, secondary containment of above-ground storage facilities should be inspected, at minimum, during the first interim reclamation (IR) inspection.⁸
3. Management of pits during drilling and production operations
- a. Where necessary to protect public health and safety, or to prevent adverse environmental impacts resulting from access to a pit by wildlife, migratory birds, domestic animals, or members of the general public, the BLM will require operators to install fencing and/or other deterrents necessary to preclude access to pits.
 - i. Fencing on one side of the pit may be temporarily laid down or removed during active drilling, completion, or workover operations. All four sides shall be fenced upon release of the rig or equipment for those activities.
 - ii. Other deterrents to preclude pit access may include screening and/or netting. Flagging is not considered an effective deterrent. The BLM will require that the operator ensure pit access is precluded; the BLM generally should avoid prescribing specific deterrents to the operator, but should notify the operator that failure to adequately preclude access may result in violations and/or penalties (e.g., the Migratory Bird Treaty Act provides for up to \$15,000 in fines and up to 6 months in jail, per count).
 - iii. As described elsewhere in this policy (Section 3(h)), pits containing oil or hazardous substances must sufficiently preclude entry by wildlife, livestock, and members of the general public. Onshore Oil and Gas Order No. 7 requires that all pits under purview of the Order be secured to prevent entry by livestock, wildlife, and unauthorized personnel (III.E.1.c).
 - b. Only wastes that qualify for the E&P exemption under RCRA can be disposed of on-lease, and only when permitted by the BLM. All non-exempted wastes must be removed from the lease facility and recycled or disposed of in accordance with applicable Federal, State, and local rules and regulations. Unused/excess product or materials must be removed from lease facilities, and cannot be disposed of on BLM-administered surface estate.
 - c. Use of oil-base muds
 - i. The mixing of oil-base mud cuttings and water-base mud cuttings is prohibited.
 - ii. All oil-base mud cuttings pits shall be lined in accordance with requirements above (Section 2(c)).
 - iii. Pits used for the disposal of oil-base muds and cuttings must be solidified in accordance with the Wyoming Oil and Gas Conservation Commission (WOGCC) rules and Section 4(e)(ii) of this policy.
 - iv. The use of a closed-loop system is required when using oil-base muds.
 - v. The BLM will require the operator to provide the BLM a contingency plan for response to accidental discharge of oil-base mud or cuttings to the reserve pit.
 - d. Dependent upon the chemical constituents of materials used in completion and workover operations, the BLM may require that a separate completions pit or temporary storage tank(s) be

⁸ A tool to measure and evaluate secondary containment berm dimensions is available at <http://web.wy.blm.gov/921/surfaceprotection/toolbox/index.htm>

used for materials flowed back from downhole. Flowback of fluids other than fresh and/or produced water to the reserve pit is prohibited in sensitive areas (in those rare instances when an exception is granted to Section 2(a)).

- e. Transfers of E&P wastes from Federal oil and gas leases
 - i. To BLM-administered surface estate
 - 1. To encourage and promote waste minimization, operators may propose plans for managing and transporting E&P waste through beneficial use, reuse, and recycling by submitting a waste management plan for approval through a Sundry Notice or Right-of-Way. Such plans shall describe, at minimum, the type(s) of waste, origin and final disposition of the waste, the proposed use and/or treatment of the waste, the transportation route, and shall include a copy of any certification or authorization required by other laws and regulations.
 - ii. To non-Federal lands
 - 1. Transport of wastes to a non-Federal location is only allowed when wastes are transported to an authorized commercial disposal or treatment facility, and only with the BLM's prior written approval.
- f. Recycling and reuse of wastes generated on E&P locations
 - i. Treatment of wastes (e.g., fracture stimulation fluids, drilling fluids, drilling solids, produced water, etc.) must be authorized in writing by the BLM, and the operator must obtain permits required by other Federal, State, or local government agencies prior to treatment.
 - ii. Produced water must be tested prior to use for dust abatement and authorized in writing by the BLM prior to application. A copy of any applicable State of Wyoming permits and test results (showing radionuclides, trace elements, metals, salinity, pH, cations, and anions) must be provided to the BLM.
 - iii. Recycling and reuse of wastes must comply with the transfer policy in this IM (Section 3(e)).
- g. Emergency operations
 - i. Permanent Emergency Pits
 - 1. Standards for permanent emergency pits are provided in Onshore Oil and Gas Order No. 7. Alternatives to permanent pits should be considered whenever possible, such as tanks.
 - ii. Temporary emergency pits
 - 1. The BLM will require operators to verbally notify the BLM within 24 hours of the construction and use of temporary emergency pits, and provide the BLM the anticipated timeline for the pit's use.
 - 2. Following emergency operations, the BLM shall require the operator to provide a summary of the event by Sundry Notice (including NTL-3A notifications, if necessary), and actions taken by the operator. This Sundry Notice must be submitted to the BLM no later than 15 days following the emergency actions. The summary should include identification of wastes generated and disposed of into the emergency pits. Disposal of wastes generated by emergency operations must be in accordance with State, local, and Federal rules and regulations, and described in the summary report. A procedure to close and reclaim the emergency pit must be submitted for approval to the BLM.

h. Monitoring, inspection, and enforcement

- i. Oil or other hazardous substances in pits. The regulations at 43 CFR 3162.7-1(b) state that produced oil is not permitted to go into a pit without the approval of the authorized officer. In addition, Onshore Oil and Gas Order No. 7 requires that pits be kept reasonably free from surface accumulation of liquid hydrocarbons that would retard evaporation (III.F.8).
 1. The BLM will require that operators remove oil found in pits as soon as possible, but no later than 48 hours from discovery. Any accumulation of oil in a pit shall be promptly removed.
 2. The BLM will require that operators take measures to minimize or preclude recurring releases of oil into the pits.
 3. The BLM will require that operators also ensure effective deterrence is present to preclude entry by wildlife, livestock, and the public whenever oil or other hazardous substances are present in pits.
- ii. The BLM has the authority to require testing and reporting of pit contents on Federal oil and gas leases to ensure regulatory compliance. When testing is necessary, fluid minerals staff should work with their Hazardous Materials Coordinator to stipulate requirements for the operator. Pit testing guidance is provided in Attachment 3 (Pit Contents Testing Guidance).
- iii. The BLM will require that the operator regularly monitor and inspect liners for integrity. The BLM may require that a pit be closed if the liner integrity is compromised, or may order the pit capacity reduced so that the operator can repair the liner.
- iv. The BLM will require the operator to monitor and evaluate the effectiveness of fencing and any other required deterrents to animals and humans. The BLM will immediately notify the U.S. Fish and Wildlife Service if a dead or injured bird is found in a pit, if the operator fails to provide such notification. The BLM will require operators to notify the BLM if wildlife (other than insects and other invertebrates), or any livestock are discovered in a pit.
- v. If illegal trespass dumping of waste into pits is found, the BLM will immediately contact the BLM Law Enforcement Officer. Such wastes must be removed from the pits by the responsible party or operator and brought to an authorized commercial disposal facility.
- vi. If freeboard is exceeded, the BLM will require the operator to lower the pit volume to provide acceptable freeboard.
- vii. Notification of any releases from pits must be provided to the BLM, including adherence to applicable NTL-3A requirements.

4. Closure and reclamation of pits

a. Fluid removal from pits

- i. Squeezing of pits is prohibited; however, it is acceptable to remove standing fluids and cut in clean spoils, provided:
 1. Pit contents remain in the pit and liner integrity is maintained,
 2. The closed pit is sufficient to provide adequate surface stability and prevent settling of the pit, and
 3. The transport of fluids complies with Section 3(e) of this policy.
- ii. Any measurable quantity of oil must be removed from the pit prior to closure; the burning of hydrocarbons is prohibited.
- iii. The roadspreading or landfarming of wastes requires prior written approval by the BLM. The BLM will also require testing of the wastes prior to distribution. If roadspreading or

- landfarming of wastes is proposed on split-estate over a Federal oil and gas lease, the operator must provide the surface landowner's written approval to the BLM prior to authorization.
- b. Muds, cuttings, cement, and synthetic pit liners (if present) must be covered by a minimum of 3 feet of fill. Transport of these materials off-site must comply with Section 3(e) of this policy.
 - i. Oil-base muds and cuttings must be solidified in accordance with Section 4(e)(ii) of this policy.
 - c. In accordance with Onshore Oil and Gas Order No. 7, wastes generated during emergency operations shall be emptied from temporary emergency pits and the liquids disposed of in accordance with applicable State and/or Federal regulations within 48 hours following its use, unless such time is extended by the authorized officer.
 - d. Wastes not exempt under RCRA are prohibited from entering pits. Synthetic liners must be cut to the level of pit solids before backfilling unless the liner is to be folded over to encapsulate the pit contents. Portions of the liner cut away must be disposed of in accordance with applicable local and/or State regulations.
 - e. The use of mechanical treatments, solidification, or stabilization requires prior written approval by the BLM.
 - i. When using sprinklers or misters to hasten pit evaporation, the BLM will require that operators ensure pit contents are not deposited outside the pool area of the pit.
 - ii. The BLM will require prior written approval of pit solidification by the BLM and WOGCC, use of a WOGCC-approved pit treatment company, and a copy of the pit closure report.
 - iii. The use of fly-ash to absorb free standing liquids (which may result in the addition of heavy metals to the waste) is highly discouraged. If the use of fly-ash is determined necessary and appropriate, however, the BLM will require that the pit be capped with bentonite.
 - f. When closure of pits located in sensitive areas is proposed, the BLM will require that the pit contents be tested prior to closure. Unless otherwise required by the State or Environmental Protection Agency (EPA), the BLM will use the Oil Contaminated Soil Remediation Ranking System (OCSRRS) or other acceptable method to determine clean-up criteria for spills and/or pit contents in sensitive areas (see IM No. WY-2009-021). The operator will be required to meet the standards determined by the State, EPA, or BLM, and may be required to remove and dispose of the pit contents at an authorized commercial disposal facility. Attachment 4 (Radioactive Wastes) provides information and guidance about pit management, including closure, for pits that are known or suspected to contain radioactive materials.
 - g. Timing of pit closure
 - i. Requiring an operator to provide prior verbal or written notification for pit closure is a recommended practice for all BLM Field Offices.
 - ii. Reserve pits must be closed as soon as practical but no later than 6 months after the last well serviced by the pit is spud or completed (whichever is most appropriate for the circumstances and type of drilling activities); variances from closure timing requirements in this policy (shorter or longer timeframes) are allowed with sufficient justification and prior written approval by the BLM.

- iii. Completion and flare pits will be closed as soon as practical, but no later than 6 months from the end of completion operations.
 - iv. Temporary emergency pits require prior approval by the BLM for closure. Temporary emergency pits must be closed as soon as practical, but no longer than 6 months from the end of emergency operations or unless otherwise required by the BLM.
 - v. Production pits will be closed as soon as practical, but no later than 6 months from the date of final production, or unless otherwise required by the BLM.
- h. Testing requirements for pit closures, when mandated by the BLM
- i. Testing is required prior to road spreading and landfarming of wastes.
 - ii. Testing may be required by the BLM prior to closure of emergency pits, depending upon the contents discharged to the pit.
 - iii. Production pits will be tested in accordance with the guidance provided in Attachment 3.
 - iv. Testing of reserve pits prior to closure may be required by the BLM, and is required for instances where pit closures occur in sensitive areas, locations where the pit was unlined or the liner integrity was compromised, at single pits that service multiple wells, or where illegal dumping is suspected.
- i. Reclamation requirements
- i. Reclamation of the disturbed surface must comply with the BLM Wyoming Reclamation Policy, and other site-specific requirements. Reclamation activities must protect the integrity of the liner, when present, unless the pit is solidified in accordance with this policy.
- j. Bioremediation
- i. Onsite bioremediation of suitable wastes is encouraged wherever feasible and practical. Refer to WO IM No. 1999-061 and WY IM No. 2009-021.
- k. Monitoring, inspection, and enforcement
- i. The BLM will require operators to frequently inspect sprinklers/misters while in operation to ensure proper operation and to prevent drift of fluids outside of the pit's pool area. More rigorous protection measures should be in place, or operations temporarily suspended, when wind speeds are high.
 - ii. The BLM will require the operator to inspect the liner throughout the course of operations, and during closure, to ensure that liner integrity is not compromised.
 - iii. The BLM may elect to be present during sampling or testing of pits. The BLM will require the operator to notify the BLM at least 72 hours in advance of sampling to provide the BLM opportunity to be present.
 - iv. If non-RCRA exempt waste is found in a pits, all waste in the pit must be removed and transported to an authorized commercial disposal or treatment facility.
 - v. When liner integrity is compromised in production pits, the BLM may require that the operator determine the extent of contamination/infiltration below the liner.

Timeframe: Effective immediately.

Budget Impact: No overall budget impact.

Background: Current BLM handbooks, manuals, policy and guidance address the management of fluid minerals exploration and production wastes in a general manner. This policy seeks to provide consistent minimum standards for acceptable permitting, operation, and closure of pits, without unduly limiting the ability of Field Offices to tailor their authorizations and decisions to circumstances unique to their office or an individual situation.

Manual/Handbook Sections Affected: None.

Coordination: This IM was coordinated among the Exploration & Production Pit Management Policy Team (Attachment 5), all district and field offices in Wyoming, and the U.S. Fish and Wildlife Service.

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Signed by:
Larry Claypool
Deputy State Director,
Minerals and Lands

Authenticated by:
Sherry Dixon
Secretary

5 Attachments

- 1 – Examples of Waste Management Conditions of Approval (4 pp)
- 2 – E&P Waste Management Definitions (5 pp)
- 3 – Pit Contents Testing Guidance (2 pp)
- 4 – Radioactive Wastes (2 pp)
- 5 – Exploration & Production Pit Management Policy Team Members (1 pp)

Distribution

Director (310), 20 M Street, SE	1 (w/atchs)
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Attachment 1 – Examples of Conditions of Approval for Permit Authorizations

Pit Construction

1. All construction of the well pad, flare pit, reserve pit, roads, flowlines, production facilities and all associated infrastructure on Federal lands shall be monitored onsite by a licensed professional engineer *or* designated qualified inspector (to be identified at the time of construction notification) who will serve as the Operator's Compliance Coordinator to ensure construction meets the BLM-approved plans.
2. If groundwater or bedrock is encountered upon construction of the pad or pits, or upon drilling and completing shallow holes for surface conductor, rat/mouse holes, cathodic protection well, or a water supply well, the Operator must immediately notify the BLM Authorized Officer (AO) before proceeding.
3. Reserve pits will be adequately fenced during and after drilling operations until the pit is reclaimed so as to effectively keep out wildlife and livestock. Adequate fencing, in lieu of more stringent requirements by the surface owner, is defined as follows:
 - a. Construction materials will consist of steel and/or wood posts. Three or four strand wire (smooth or barbed) fence or hog panel (16 foot length by 50 inch height) must be used with connectors such as fence staples, quick-connect clips, hog rings, hose clamps, twisted wire, etc. Electric fences will not be allowed.
 - b. Construction standards: Posts shall be firmly set in ground. If wire is used, it must be taut and evenly spaced, from ground level to top wire, to effectively keep out animals. Hog panels must be tied securely into posts and one another using fence staples, clamps, etc. Fence must be at least 2 feet from edge of pit. Three sides must be fenced before beginning drilling, the fourth side fenced immediately upon completion of drilling and prior to rig release. Fence must be left up and maintained in adequate condition until pit is closed.
 - c. If the pit is constructed and left open for more than one week prior to arrival of the drilling rig, the pit shall be fenced on all four sides. One side will then be temporarily laid down or removed for the duration of drilling operations, to be rebuilt upon removal of the drilling rig.
4. The flare pit is to be constructed/oriented so that the flare does not ignite the reserve pit liner and large enough so that the blowdown from the flare does not escape the flare pit.
5. The reserve pit will be lined with an impermeable liner having permeability less than 1×10^{-7} cm/sec and at least 12 mil thick. The liner will be installed so that it will not leak and will be chemically compatible with all substances that may be put in the pit. Liners made of any synthetic material will be of sufficient strength and thickness to withstand normal installation and pit use. In gravelly or rocky soils, a suitable bedding material such as sand or felt will be used prior to installing the liner. The liner must be installed no more than one month prior to commencing drilling activities.

6. A permanent marker shall be installed in the reserve and/or completion pit (either on the liner or using some other means that does not impair the integrity of the liner) that identifies the level at which 2 feet of freeboard remains in the pit.

Reserve or Completion Pit Operations

1. Only those wastes that qualify as exempt, under the Resource Conservation and Recovery Act (RCRA), Oil and Gas Exemption, may be disposed of in the reserve pit. Generally, oil or gas wastes are exempt if they (1) have been sent down hole and then returned to the surface during oil/gas operations involving exploration, development, or production, or (2) have been generated during the removal of produced water or other contaminants from the oil/gas production stream.
2. Flaring of gas into the reserve or completion pits will not be allowed.
3. All pits shall be kept free of trash and accumulations of liquid hydrocarbons. Any evidence of RCRA non-exempt wastes present in the reserve pit will result in the BLM Authorized Officer requiring specific testing and closure procedures.
4. All pits are required to maintain 2 feet of freeboard. If operations cause fluid levels in pits to rise (or threaten to) above the required freeboard, immediate notification shall be provided to the Authorized Officer with concurrent steps taken to cease the introduction of additional fluids, until alternative containment methods can be approved.
5. For the protection of livestock and wildlife, all pits and open cellars shall be fenced on all sides, and with corner bracing, immediately upon construction. Pits will be adequately fenced during and after drilling operations until pits are reclaimed so as to effectively keep out wildlife and livestock. Approved netting (in accordance with the requirements, below) is required over any pit that contains or is identified as containing hydrocarbons or RCRA-exempt hazardous substances as determined by observation or testing. Netting requirements:
 - a. Maximum netting mesh spacing is 1 ½-inch on any side.
 - b. Netting shall be suspended at least 4 feet above the pit contents.
 - c. A rigid structure made of steel and cable (at no more than 7 foot intervals across the pit) shall be used.
 - d. Netting shall be secured at the ground surface around the entire pit to prevent wildlife entry at the netting edges.
 - e. The operator shall conduct frequent monitoring of the netting and maintenance (as required) to ensure continued function of the netting.
 - f. Drying and/or removal of oil and/or hazardous substances from the pit will eliminate the need to maintain netting of the pit.

6. Oil is not permitted to be discharged into pits without prior written approval of the BLM Authorized Officer. Any oil that is inadvertently put into the reserve pit during operations prior to the time of pit closure will be immediately (within 48 hours) removed by the operator.
7. All waste, other than human waste and drilling fluids, will be contained in a portable trash cage. This waste will be transported to an authorized commercial waste disposal or treatment facility immediately upon completion of drilling operations. No trash or empty containers will be placed in the reserve pit or buried on location. All disposal of human and solid waste will comply with applicable State and local laws and regulations.
8. Produced fluids (including, but not limited to, produced water, frac fluid, and oil), while testing the well will be flowed back to an adequately-sized flowback tank (or tanks). Any oil will be skimmed and transferred to production tanks. Sand and produced fluids other than oil will be transferred to the reserve pit until such time as the gas production is conveyed to the pipeline.
9. Pit liners shall be inspected by the operator during operations (including pit closure), to ensure that the liner remains intact throughout operations.

Oil-Base Mud Operations

1. Mud hoses will be new or like new with hydraulically crimped on hose ends, and no king nipples or hose clamps will be allowed.
2. All oil-base mud drilling operations shall be completed through a closed mud system and all oil-base mud shall be contained in the closed system.
3. The closed drilling system shall be equipped with appropriate drip pans, liners and catchments under probable leak sources as needed to prevent the oil-base drilling mud and cuttings from reaching the reserve pit and/or ground surface of the drill pad.
4. Any cuttings dropped or mud spilled shall be immediately cleaned up and placed in the approved containment device. All spills in excess of one barrel outside the containment devices will be reported to the BLM within 8 hours.
5. The operator shall exercise extreme caution to avoid discharging oil-base drilling mud into the reserve pit. Should an event occur where it is necessary for oil-base mud to be discharged to the reserve pit, the Operator shall immediately initiate the following actions:
 - a. The reserve pit shall be secured to prevent birds and other wildlife from getting into the oil-contaminated cuttings, fluids, and mud.

- b. The Operator shall submit a plan to the BLM Field Office describing how the contaminated pit will be managed (i.e., will the contaminated material/fluids be treated in place, and if so by what method; or will the contaminants be removed to an authorized commercial disposal or treatment facility).
 - c. Submit a Sundry Notice describing how the oil contaminated drill cuttings will be treated to ensure the oil stays contained in the cuttings and where the cuttings will ultimately be stored (i.e., buried in the flare pit, buried in a separate on-location pit, or removed and transported to an authorized commercial disposal or treatment facility). Any on-location disposal sites for the oil-contaminated drill cuttings shall be lined with a 12 mil or thicker impervious liner compatible with oil. A liner meeting this specification shall also be placed under any temporary storage area for the oil contaminated cuttings.
6. Prior to skidding or moving the drill rig to another well or well pad, the pumps, pump lines and tanks shall be cleaned to ensure that no oil-base mud is in the system during surface drilling operations of the new well.
7. Install and maintain siphons, catchments, and absorbent pads to keep hydrocarbons produced by the drill rig from entering the reserve pit. Ensure that hydrocarbons and contaminated pads are disposed of in accordance with applicable State and Federal requirements.

Pit Closure and Reclamation

1. Pits are to be dried within 6 months from the date the well is spud or the date of well completion and prior to any backfilling. Mechanical trenching or squeezing of pit fluids and cuttings is prohibited. Drying by any means other than natural (air) evaporation requires prior approval from the BLM. Pit solids shall be buried at least 3 feet below re-countoured grade. Soils that are moisture laden and saturated, partially or completely frozen shall not be used for backfill or cover. The pit area may require mounding to allow for settling. Before backfilling, synthetic liner portions remaining above the “mud line” shall be cut off as close to the top of the mud surface as possible and disposed of at an authorized commercial waste disposal facility. The pit bottom and remaining liner shall not be trenched, cut, punctured or perforated. Installation and operation of any sprinklers, pumps, and related equipment shall ensure that water spray or mist does not drift outside of pit boundaries.
2. The burning of hydrocarbons and/or other wastes within pits is prohibited.

Mechanical Evaporation of Pits

1. The operator shall monitor operations to mechanically evaporate pits frequently, at least once every 2 hours, and must ensure that operations and conditions do not result in pit contents being deposited outside of the pool area of the pit.

Attachment 2 – Definitions

- Authorized commercial disposal or treatment facility:

A commercial disposal or treatment facility permitted by the Environmental Protection Agency (EPA) or state environmental quality agency that is authorized to accept exploration and production wastes.

- Below-grade storage tank

A storage tank having at least 20 percent of the volume of the tank located below the grade of the surrounding area.

- Blowdown/flare pit:

A pit constructed to contain fluids discharged from the emptying or depressurizing of a vessel or pipeline.

- Centralized pit:

A pit centrally located to accept wastes from multiple sources in a field.

- Closed-loop drilling:

A method of drilling whereby a rig's mud-and-solids-control system efficiently recycles the circulated mud used during the drilling process while at the same time preventing these fluids from coming into contact with native soils by eliminating the need for a reserve pit. This system uses a combination of solids control equipment (e.g., shale shakers, flow line cleaners, desanders, desilters, mud cleaners, centrifuges, agitators, and necessary pumps and piping) incorporated in a series on the rig's steel mud tanks, or as a self-contained unit that continually separates entrained drilling solids within the mud for continued use. In addition to removing solids from the mud, wastewater may also be chemically treated to remove fine solids and reused or disposed off in an environmentally safe manner. The only waste discarded as part of the operations is moist, drilled-up rock materials that may be disposed of off-site. A closed-loop mud system does not necessarily include the use of a small cuttings pit (which would constitute a "semi-closed loop drilling system").

- Completion fluids:

Low-solids fluid or drilling mud used when a well is being completed. It is selected not only for its ability to control formation pressure, but also for the properties that minimize formation damage.

- Completion/re-completion pit:

A pit used to hold completion fluids and small amounts of co-produced water or hydrocarbons that are flowed back from the well during completion operations.

- Drilling mud:

A special mixture of clay, water, and chemical additives pumped downhole through the drillpipe and drill bit. The mud cools the rapidly rotating bit; lubricates the drillpipe as it turns in the wellbore; carries rock cuttings to the surface; and serves as a plaster to prevent the wall of the borehole from crumbling or collapsing. Drilling mud also provides the weight or hydrostatic head to prevent extraneous fluids from entering the wellbore and to control downhole pressures that may be encountered.

- Emergency operations:

Operations to prevent adverse consequences arising from situations which pose an immediate danger to public health, safety, or welfare and/or the environment.

- Emergency pit:

A pit constructed to contain any products generated from emergency well operations (temporary) or a pit designed to collect the discharge from accidental releases (permanent).

- Ephemeral drainage:

A watercourse that flows only in direct response to precipitation, and whose channel is above the water table at all times.

- Exploration and Production (E&P) Wastes:

Those wastes associated with operations to locate or remove oil or gas from the ground or to remove impurities from such substances and which are uniquely associated with and intrinsic to oil and gas exploration, development, or production operations.

- Fracture stimulation fluids:

A fluid, slurry, or foam that carries proppant material (sand grains or other small material) in suspension downhole under very high pressure to fracture and prop open the small cracks and fissures made in the producing formation by the intense pressure. After the proppant material (sand grains or microscopic beads) is in place, the pumping of the fluids is discontinued, allowing the fluid to drain out of the formation, leaving the proppant behind to hold open the small cracks.

- Freeboard:

The vertical distance between the top of the pit wall at its point of lowest elevation and the level of the pit contents.

- Fresh water:

Fresh water means water containing not more than 1,000 ppm of total dissolved solids, provided that such water does not contain objectionable levels of any constituent that is toxic to animal, plant or aquatic life, unless otherwise specified in applicable notices or orders.

- Intermittent drainage:

A watercourse that is below the local water table for at least some part of the year, and obtains its flow from both surface runoff and ground water discharge.

- Lined pit:

An excavated and/or bermed area that is lined with natural or synthetic material that will prevent seepage.

- Oil-base mud:

Drilling mud whose liquid component is oil rather than (or in addition to) water, which is the most common fluid used to mix with the various clays to make drilling mud. Oil-base muds are used in very deep wells where the bottom-hole temperatures preclude the use of water-base muds. Also, oil-base muds are often used when drilling through clay or salt formations. Clay formations have a tendency to absorb the water from water-base muds and swell to the extent that the drillpipe becomes stuck. Salt has the tendency to dissolve in the water and change the properties of the mud, to the point of being ineffective.

- Perennial drainage:

A watercourse that flows continuously. Perennial streams are generally associated with a water table in the localities through which they flow.

- Production pit:

A pit constructed to hold water or hydrocarbons accumulated from well production.

- Reserve pit:

An excavation connected to the working mud pits of a drilling well to hold excess or reserve drilling mud; a standby pit containing already mixed drilling mud for use when extra mud is needed.

- RCRA-exempt E&P wastes:

Exploration and Production wastes that are exempt from Resource Conservation and Recovery Act (RCRA), Subtitle C regulations. The RCRA Subtitle C exemption, however, does not preclude E&P wastes from control under state regulations, under RCRA Subtitle D solid waste regulations, or other Federal regulations.

- Roadspreading:

A process whereby RCRA-exempt exploration and production wastes that exhibit properties similar to commercial road oils, mixes, dust suppressants, or road compaction or de-icing materials are applied to or incorporated into a roadbed. Examples of such wastes include drilling fluids, produced water and produced water-contaminated soils, waste crude oil, sludges, and oil-contaminated soils.

- Sensitive Areas:

Those locations and areas that are:

- Within 500' of perennial or intermittent surface waters/springs and wetlands
- Within 10-year perennial watercourse floodplains
- Within ¼-mi. of public drinking water supply wells or uptakes and domestic water wells
- Within ¼-mi. of residences, schools, hospitals, or other structures where people are known to congregate
- Within BLM-designated recreation sites and Wilderness Study Areas
- Areas where the depth to groundwater is $\leq 20'$ from the bottom of the pit
- Within an identified Groundwater Recharge Area

Waivers, additions, or exceptions to these criteria may be allowed only in limited circumstances when supported through NEPA analysis and affirmed by the BLM Authorized Officer.

- Squeezing of pits:

The mechanical manipulation of pit contents that contain standing fluids.

- Solidification of pit contents:

Solidification refers to techniques that encapsulate the waste in a monolithic solid of high structural integrity. The encapsulation may be of fine waste particles (microencapsulation) or of a large block or container of wastes (macroencapsulation). Solidification does not necessarily involve a chemical interaction between the wastes and the solidifying reagents

but may mechanically bind the waste into the monolith. Contaminant migration is restricted by vastly decreasing the surface area exposed to leaching and/or by isolating the wastes within an impervious capsule.

- Stabilization of pit contents:

Stabilization refers to those techniques that reduce the hazard potential of a waste by converting the contaminants into their least soluble, mobile, or toxic form. The physical nature and handling characteristics of the waste are not necessarily changed by stabilization.

- Tankbottoms:

The unmerchantable accumulation of hydrocarbon material and other substances that settle naturally to the bottom of producing lease tanks and/or pipeline storage tanks after a period of being treated chemically (i.e., surfactants) and/or mechanically (i.e., separator, treater, heater treaters, etc.). Tank bottoms may consist of a combination of several elements including, but not limited to, heavy hydrocarbons, paraffin, basic sediment and water, and emulsions.

- Workover pit:

A pit constructed to hold fluids resulting from any downhole remedial operation in an existing oil or gas well that is designed to sustain, restore or increase the production rate or ultimate recovery in a geologic interval currently completed or producing. Workover pits may contain, but are not limited to containing, fluids and materials from: acidizing, reperforating, fracture treating, sand/paraffin removal, casing repair, squeeze cementing, or setting of bridge plugs to isolate water productive zones from oil or gas productive zones, or any combination thereof.

Attachment 3 – Pit Contents Testing Guidance

A. The purpose of these guidelines is to provide guidance to BLM field offices directing the collection and analysis of soil and sludge samples by operators and taken from pits used in association with oil and gas well drilling and production. Additional information and guidance is available from the WOGCC (“Soil and Sludge Sample Guide” and “Guideline for Closure of Unlined Production Pits”) and the EPA (SW-846 – the official compendium of analytical and sampling methods).

1. Testing Parameters:

- a. Contaminant sample testing must be conducted for the following constituents:
 - Total Petroleum Hydrocarbons (TPH) (refer to WY IM No.2009-021 for target concentrations)
 - pH (Target values 6.5 to 9.0)
- b. Salinity (Target concentrations – 4 mmhos/cm Electrical Conductivity (EC), 15 percent Exchangeable Sodium Percentage (ESP) or 12 Sodium Adsorption Ratio (SAR) maximum). The BLM Authorized Officer may also require other testing on a case-by-case basis, if additional wellbore fluids such as spent acid or hydraulic fracturing waste are present or if there is evidence or suspicion that pits may be contaminated with non-RCRA exempt hazardous waste. Unauthorized RCRA components would include discarded drums, containers, aerosol cans, buckets, hydrocarbon or chemical sheen, or other physical evidence. Other criteria could include proximity to sensitive areas, shallow water table or questionable baseline contaminant test results.

2. Sampling and testing shall be subject to the following procedures and standards:

- a. A composite grab sample will be taken from each pit by the operator's contractor or trained personnel according to EPA approved sampling and testing standards and methods. A "composite grab sample" is defined as soil samples taken from different locations within the pit and combined into a single sample. The samples may be collected using a backhoe, drill rig, hand auger, shovel, or other means. The composite shall be comprised of soil samples from a minimum of four locations within the pit. Additional sample points may be required dependent on impoundment size and type. A stainless steel probe or hand auger is generally used to remove the soil sample from different depths (0 to 24 inches) of the pit. The soil samples, taken from each location in the pit, are combined into a single composite grab sample. At the discretion of the authorized officer, the sampling depth may be increased if there is suspicion that the pit contents have infiltrated over 24 inches or there are sensitive receptors nearby, such as shallow groundwater table or riparian areas.
- b. Dependent on the size of the pit, more than one composite sample may be required. The rule of thumb is one composite sample for every 400 cubic yards of petroleum contaminated soil or sludge to be removed.

- c. An accurate, written chain-of-custody shall be kept and submitted to the BLM Authorized Officer with the test results.
 - The operator shall supply the BLM Authorized Officer with copies of all laboratory test results as soon as they are available.

Attachment 4 – Radioactive Wastes

Origin

There are two general categories of radioactive wastes that are associated with oil and gas drilling; naturally occurring radioactive material and radioactive tracers.

Naturally occurring radioactive materials (NORM) are derived from subsurface formations that also contain oil and gas. NORM that becomes concentrated in the form of scale can be found in separators, pipes, tubing, and other oilfield equipment. The most common isotopes of radium most often associated with barite scale are radium-226 and radium-228. The half life of radium-226 is 1,600 years and for radium-228, 5.8 years.

Radioactive tracers are radioactive isotopes injected into a well to allow observation of fluid or gas movements by means of a radioactive-tracer survey. *Tracer studies* involve a single well and use an electronic well logging tool. *Field flood or enhanced oil and gas recovery studies* involve multiple wells with one or more radioactive isotopes being injected and multiple oil or gas samples containing radioactive material collected from each of the wells to determine the direction and rate of flow through a formation. *Labeled frac sands* have radioactive isotopes that are chemically bonded to glass and/or resin beads and are injected into a single well. Frac sand operations require the use of an electronic well logging tool to assess the amount of radioactive isotope remaining in the underground reservoir formation. Normally, radioactive tracer materials are recycled and not disposed of in a reserve or production pit.

Impacts

The two main isotopes associated with NORM, Radium-226 and radium-228, are generally not an exposure risk to humans because they accumulate inside pipe and other equipment on production sites that are open to the public. Additionally, the pipe and equipment is usually sufficient to shield anyone nearby from radioactive exposure.

Radioactive tracer material normally has a short half life (less than 120 days) and has both internal and external exposure hazards to humans. Disposable gloves and clothing will provide a barrier to protect users from exposure.

Regulatory Authority

The use of radioactive tracers requires licensing by the Nuclear Regulatory Commission. Radioactive tracer waste is considered a low level radioactive waste as defined by the Low-level Radioactive Waste Policy Amendments Act of 1985. This act gave the states responsibility for the disposal of their low-level radioactive waste.

A memorandum of understanding between the Wyoming Department of Environmental Quality and the Wyoming Oil and Gas Conservation Commission (WOGCC), grants WOGCC authority to regulate the disposal of salt water (produced water), nonpotable water, drilling fluids and other oilfield wastes which are uniquely associated with exploration and production operations. Since radioactive tracers and NORM are considered oilfield waste, WOGCC is the designated agency that regulates their disposal in Wyoming.

Disposal Actions

For each radioactive waste disposal action, the WOGCC reviews the operator's disposal plan and, if the authorized, provides specific guidance for the disposal method. The BLM should receive the operator's disposal request and the subsequent disposal report. Currently, the WOGCC is requiring all radioactive tracer waste to be solidified in place at the site it was generated. Scale from NORM waste may also be solidified on location with the possible requirement of signing and/or fencing of the location. If NORM scale from piping, tubing, or other equipment is not removed, the WOGCC recommends the disposal of equipment at a licensed facility authorized to accept low level radioactive waste.

Attachment 5 – Exploration & Production Pit Management Policy Team Members

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Bryce Barlan, Natural Resource Specialist, Washington Office
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Appendix E: WEED MANAGEMENT PLAN
FOR THE
GRIEVE UNIT CO₂ ENHANCED OIL RECOVERY PROJECT

WEED MANAGEMENT PLAN
FOR THE
GRIEVE UNIT CO₂ ENHANCED OIL RECOVERY
PROJECT

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April 3, 2012

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	LAND USE PLANNING	1
3.0	DEFINITIONS.....	2
4.0	PURPOSE AND NEED.....	4
5.0	PRE-ASSESSMENT INVASIVE WEED INVENTORY.....	4
6.0	WEED MANAGEMENT	5
6.1	General Weed Management	5
6.2	Target Species Management.....	6
7.0	TIMING OF MANAGEMENT	11
7.1	Pre-Construction.....	11
7.2	During Construction.....	11
7.3	Post-Construction.....	12
8.0	MONITORING AND RECORD KEEPING.....	12
8.1	Monitoring.....	12
8.2	Report Submittal	13
8.3	Annual Report	13
8.4	Pesticide Application Records	13
8.5	Pesticide Use Report	13
9.0	FEDERAL LAWS, REGULATIONS, AND POLICIES AFFECTING BLM WEED CONTROL.....	14
10.0	REFERENCES	14

LIST OF ACRONYMS

Act	Wyoming Weed and Pest Control Act
AOR	Authorized Officer Representative
APD	Application Permit to Drill
ATV	All Terrain Vehicle
BKS	BKS Environmental Associates, Inc.
BLM	Bureau of Land Management
CC	Compliance Coordinator
COA	Conditions of Approval
EP	Elk Petroleum, Inc.
ESD	Ecological Site Description
GUCO ₂	Grieve Unit CO ₂ Enhanced Oil Recovery
LFO	Lander Field Office
LRMP	Lander Resource Management Plan
NAIPM	North American Invasive Plant Mapping
NAWMA	North American Weed Management Association
PAR	Pesticide Application Records
POD	Plan of Development
PUP	Pesticide Use Proposal
PUR	Pesticide Use Report
SSRP	Site Specific Reclamation Plan
WMC	Weed Management Contractor
WMP	Weed Management Plan
WMS	Weed Management Supervisor

1.0 INTRODUCTION

Elk Petroleum, Inc. (Elk) proposes to implement enhanced crude oil recovery from the Cretaceous Muddy “Grieve Sand” within the Grieve Unit using miscible CO₂ flood with water injection to assist with reservoir re-pressurization. In order to implement the proposed project Elk will modify the existing Grieve Unit infrastructure as outlined in Chapter 2 of the Environmental Assessment. The Grieve Unit CO₂ Enhanced Oil Recovery (GUCO₂) project area is approximately 2,300 acres and is located southwest of Casper, Wyoming, within all or portions of: Sections 5, 6, 8, 9, 15, 16, 17, 18, 19, 21, 22, 26, and 27, T32N R85W; Section 1, T32N R86W; Section 31, T33N R85W; Sections 15, 16, 21, 22, 23, 26, 27, 34, and 35, T32N R85W.

The proposed GUCO₂ project area is located in the Western Range and Irrigated Land Resource Region within the Central Desertic Basins and Plateaus Major Land Resource Area (MLRA 34A) (NRCS 2006). MLRA 34A is primarily located in the Wyoming Basin Province of the Rocky Mountain System. The majority of MLRA 34A is characterized by a semi-desert grass-shrub zone. Average annual precipitation within this zone is 8 to 16 inches (NRCS 2006). Elevation within the proposed project area generally ranges from approximately 6,210 to 7,370 feet above sea level.

Based on plant community descriptions for the 10-14” Precipitation Zone High Plains Southeast Ecological Site Descriptions (ESD) (Braze 2008 a-g) and field observations, uplands within the proposed disturbance area of the GUCO₂ project area are dominated by sagebrush shrublands primarily composed of Big Sagebrush/Mid-Grass plant community and sagebrush grasslands composed of Bluebunch Wheatgrass/Rhizomatous Wheatgrass plant community. Grasslands composed of a Rhizomatous Wheatgrass/Needle-and-thread plant community are less common and interspersed throughout the sagebrush shrublands and grasslands. Saline lowlands are composed of Alkali Sacaton/Basin Wildrye plant communities. Non-saline drainages and lowlands are dominated by a Western Wheatgrass/Kentucky Bluegrass plant community. Limber Pine is also present within the project area. Based on Bureau of Land Management-Lander Field Office (BLM-LFO) disturbance data, approximately 10 percent of the project area has been previously disturbed.

This Weed Management Plan (WMP) will be reviewed and updated, if necessary, with Pesticide Use Proposals (PUPs) for approval annually. This plan will be updated as necessary, specifically after the project area has been seeded and annual monitoring has begun.

2.0 LAND USE PLANNING

The Lander Draft Resource Management Plan (LDRMP) for the Lander Field Office Planning Area (BLM 2011) proposes the following management objectives with respect to land use planning decisions for invasive species management:

- 1) Maintain adequate baseline information, inventory, and monitoring, regarding the extent and control of invasive species to make informed decisions, evaluate effectiveness of management actions, and assess progress toward goals to improve invasive species management. Develop a prevention and early detection program.

- 2) Coordinate with adjoining jurisdictions in management and control of invasive nonnative species (INNS) across jurisdictional and political boundaries.
- 3) Include provisions for INNS management in all BLM-funded or authorized actions.

3.0 DEFINITIONS

Designated Noxious Weed: These are “weeds, seeds, or other plant parts that are considered detrimental, destructive, injurious or poisonous, either by virtue of their direct effect or as carriers of diseases or parasites that exist within this state, and are on the designated list”. The designated list is a list of weeds and pests that are “designated by joint resolution of the Wyoming Board of Agriculture and the Wyoming Weed and Pest Council”. The Wyoming Weed and Pest Control Act (Act) provides information on the State of Wyoming Weed and Pest Districts and the Wyoming designated and prohibited noxious weed species list. The Act currently includes 25 weed species and can be accessed at www.wyoweed.org/documents.html. Per this Act, weed control is the responsibility of the landowner or the owner of the right-of-way or easement (WWP 1973 and US 1999).

The 2011 Wyoming Designated Noxious Weeds and Prohibited Noxious Weeds List include the 25 species listed below:

- 1) Field bindweed (*Convolvulus arvensis* L.)
- 2) Canada thistle (*Cirsium arvense* L.)
- 3) Leafy spurge (*Euphorbia esula* L.)
- 4) Perennial sowthistle (*Sonchus arvensis* L.)
- 5) Quackgrass (*Agropyron repens* (L.) Beauv.)
- 6) Hoary cress (whitetop) (*Cardaria draba* & *Cardaria pubescens* (L.) Desv.)
- 7) Perennial pepperweed (giant whitetop) (*Lepidium latifolium* L.)
- 8) Ox-eye daisy (*Chrysanthemum leucanthemum* L.)
- 9) Skeletonleaf bursage (*Franseria discolor* Nutt.)
- 10) Russian knapweed (*Centaurea repens* L.)
- 11) Yellow toadflax (*Linaria vulgaris* L.)
- 12) Dalmatian toadflax (*Linaria dalmatica* (L.) Mill.)
- 13) Scotch thistle (*Onopordum acanthium* L.)
- 14) Musk thistle (*Carduus nutans* L.)
- 15) Common burdock (*Arctium minus* (Hill) Bernh.)
- 16) Plumeless thistle (*Carduus acanthoides* L.)
- 17) Dyers woad (*Isatis tinctoria* L.)
- 18) Houndstongue (*Cynoglossum officinale* L.)
- 19) Spotted knapweed (*Centaurea maculosa* Lam.)
- 20) Diffuse knapweed (*Centaurea diffusa* Lam.)
- 21) Purple loosestrife (*Lythrum salicaria* L.)
- 22) Saltcedar (*Tamarix* spp.)
- 23) Common St. Johnswort (*Hypericum perforatum*)
- 24) Common tansy (*Tanacetum vulgare*)
- 25) Russian olive (*Elaeagnus angustifolia* L.)

Declared Weed: This is “any plant which the Wyoming Board of Agriculture and the Wyoming Weed and Pest Council have found, either by virtue of its direct effect, or as a carrier of disease or parasites, to be detrimental to the general welfare of persons residing within a district” (i.e., county weed and pest control district) (WWP 1973).

The 2011 Declared Weed List for Fremont County (Wyoming Weed and Pest 2011) includes the species listed below:

- 1) Swainsonpea (*Sphaerophysa salsula* (Pallas) DC.)

The 2011 Declared Weed List for Natrona County (Wyoming Weed and Pest 2011) includes the 11 species listed below:

- 1) Black henbane (*Hyoscyamus niger* L.)
- 2) Buffalobur (*Solanum rostratum* Dunal)
- 3) Curlycup gumweed (*Grindelia squarrosa* (Pursh) Dunal)
- 4) Foxtail barley (*Hordeum jubatum* L.)
- 5) Halogeton (*Halogeton glomeratus* (M. Bieb.) C.A. Mey.)
- 6) Puncturevine (*Tribulus terrestris* L.)
- 7) Showy milkweed (*Asclepias speciosa* Torr.)
- 8) Wild licorice (*Glycyrrhiza lepidota* Pursh)
- 9) Cheatgrass (downy brome) (*Bromus tectorum* L.)
- 10) Yellow starthistle (*Centaurea solstitialis*)
- 11) Black medic (*Medicago lupulina*)

Weed of Concern: Refers to any plant that is typically not native to the county or region and which under the right conditions can be invasive.

The Weeds of Concern List for Fremont County (Fremont County Weed and Pest 2011) includes the 10 species listed below:

- 1) Absinth wormwood (*Artemisia absinthium*)
- 2) Russian thistle (*Bassia sieveriana*)
- 3) Bull thistle (*Cirsium vulgare*)
- 4) Wild licorice (*Glycyrrhiza lepidota*)
- 5) Black henbane (*Hyoscyamus niger* L.)
- 6) Japanese knotweed (*Polygonum cuspidatum*)
- 7) Sulphur cinquefoil (*Potentilla recta*)
- 8) Marsh sowthistle (*Sonchus arvensis*)
- 9) Puncturevine (*Tribulus terrestris* L.)
- 10) Common mullein (*Verbascum thapsus*)

The Weeds of Concern List for Natrona County (Natrona County Weed and Pest 2010) includes the three species listed below:

- 1) Myrtle spurge (*Euphorbia myrsinites*)

- 2) Curly dock (*Rumex crispus*)
- 3) Common cocklebur (*Xanthium strumarium*)

Invasive Weed: Refers to a “species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health”⁰ (US 1999). Invasive weeds include not only weeds of concern, but designated noxious weeds, declared weeds, and other plants that are not native to this country

4.0 PURPOSE AND NEED

Elk is committed to inventorying, monitoring, and treating of weeds associated with the GUCO₂ project. The purposes of this WMP are as follows:

- 1) Prescribe methods to treat existing weed infestations.
- 2) Prevent introduction and spread of infestations during construction.
- 3) Monitor and treat infestations after construction is complete.
- 4) Control expansion of existing noxious weed populations from within the GUCO₂ project area and from adjacent lands, over the life of the GUCO₂ project.
- 5) Manage and control weeds where growth could increase fire hazard, cause excessive snow drifting in undesirable locations, or hinder successful reclamation of disturbed areas.

5.0 PRE-ASSESSMENT INVASIVE WEED INVENTORY

BKS Environmental Associates, Inc. conducted a pre-assessment weed inventory for the GUCO₂ project on August 2, 2011. The weed inventory was conducted to determine if any state designated noxious weeds, Fremont and Natrona County declared weeds, Fremont and Natrona County weeds of concern, or potentially invasive introduced plant species (based on professional judgment) were present. Any occurrences of state designated noxious weeds, Fremont and Natrona County declared weeds, Fremont and Natrona County weeds of concern, or potentially invasive introduced plant species were photographed, marked by GPS points, and marked on aerial imagery maps. General percent cover of each occurrence was recorded. However, if only a few individuals (1% or less of total cover value for project area) of potentially invasive introduced plant species were observed, only general locations were recorded.

Four state designated noxious weeds were observed within the GUCO₂ project area: musk thistle, diffuse knapweed, spotted knapweed, and Canada thistle. Five Natrona County declared weeds were observed within the GUCO₂ project area: showy milkweed, cheatgrass, wild licorice (also a Fremont County weed of concern), curlycup gumweed, and foxtail barley. Halogeton, a Natrona County declared weed, was not observed within the project area, but in close proximity. Occurrences of these species were typically within and along existing disturbances; however, observations also occurred within native areas proposed for disturbance.

Observed species were typically found as isolated individuals or small populations. However, cheatgrass and curlycup gumweed were prevalent along existing access roads within the project area. Curlycup gumweed was also prevalent along existing roadways within the disturbance boundary, outside of the project area. Wild licorice and foxtail barley were common, and showy

milkweed was present in areas where water was present or soils were moist. Isolated individuals and small populations of diffuse knapweed, spotted knapweed, and Canada thistle were present near wetlands. Refer to Addendum 1 for a map of weed locations within the GUCO₂ project area.

6.0 WEED MANAGEMENT

6.1 General Weed Management

An integrated weed management strategy will be employed by Elk throughout the construction and operation of the GUCO₂ project. All factors of the weed population will be taken into consideration when deciding on a management action; these factors include species, location, size of the population, soils, and landscape position. The integrated approach will use one or more of the following methods:

Education

- A significant part of weed management is educating people working on the GUCO₂ project.
- Weed identification handbooks will be made available to all GUCO₂ field personnel, including construction workers. The weed identification handbooks are free at the Wyoming Department of Agriculture, Wyoming Weed and Pest Control Districts, and the University of Wyoming.
- All GUCO₂ project personnel (including maintenance and operations) will be trained to recognize and document new or spreading weed populations.

Cultural

- Disturbance will be minimized to limit the opportunities for weed infestations to colonize.
- Disturbed areas will be immediately re-seeded with BLM approved seed mixes containing certified weed-free seed (blue tags).
- If mulch is used, it will be certified weed-free.
- Equipment and vehicles will be inspected before entering and leaving the GUCO₂ Project area and, if necessary, cleaned of any plant material or soil that may spread weed seeds.
- Use of domestic grazing animals may be used as a cultural control method.

Physical

- Mowing may be used the first season after re-seeding before weeds have set seed to limit their spread.
- On smaller and new weed infestations, hand pulling or digging may be used for removal. Removed vegetation will be bagged to minimize dispersal of vegetative parts and seeds and disposed of properly.

Biological

- Biological control agents, including domestic grazing animals, may be utilized for weed control, with species, management requirements, and desired results being considered.
- Before releasing any biological control agents onto BLM lands a Biological Control Agent Release Proposal will be obtained by Elk.

Chemical

- Herbicides have been found to be very effective in controlling weeds. Selected herbicides will be BLM approved and appropriate for the target species. Application will only occur on locations approved for use, and application rates will adhere to all label instructions to control the target species.
- Herbicides will only be applied by a commercially licensed pesticide applicator.
- Elk will acquire a Pesticide Use Permit (PUP) from the LFO BLM for all pesticide applications on BLM land.
- PUPs will be submitted along with pesticide labels to the Authorized Officer by December 1st for use the following spring/summer season.
- Adjuvants approved for use on BLM land may be added to the pesticide tank mix to improve the effectiveness of the herbicide, promote better contact with the plant surface, and reduce drift.

6.2 Target Species Management

The following species descriptions are from the Wyoming Weed and Pest Council Weed Handbook. Integrated management techniques are derived from a variety of sources: The Nature Conservancy (2011), Beck, K.G. (2008), Schultz (2003), Natrona County Weed and Pest (2010), Natural Resource Conservation Service (2011), Stevens County Noxious Weed Control Board (2010), Pavek, D. (1992), Fremont County Weed and Pest (2012), Wilson and Randall (2005), and Winston and Schwartzlander (2011). Integrated management chemical control agents are based on the 2006-2007 Weed Management Handbook from Cooperative Extension Services (Dewey et al. 2006).

Diffuse knapweed

Diffuse knapweed is a short lived perennial, biennial, or occasionally an annual that spreads by seed. A rosette is established the first year and a flowering stalk the second year. Stems are diffusely branched and rough to the touch; growing 1 to 2 feet tall. Flowering heads are numerous and narrow. Flowers are white to rose in color, sometimes purplish. Leaves are greenish grey and covered with fine hair. Seeds are oblong, dark brown or grey with longitudinal lines.

Management Objective: Containment

Integrated Management

- Chemical: Picloram, 2,4-D, Dicamba, and Curtail are all effective control agents.

- **Biological:** Banded knapweed gall fly (*Urphaora affinis*), UV knapweed seedhead fly (*Urophora quadrifasciata*), green knapweed clearwing fly (*Terellia virens*), knapweed peacock fly (*Chaetoreellia acrolophi*), knapweed seedhead moth (*Metzneria paucipunctella*), lesser knapweed flower weevil (*Larinus minutes*), blunt knapweed flower weevil (*Larinus obtusus*), broad-nosed knapweed seedhead weevil (*Bangasternus fausti*), sulphur knapweed root moth (*Agapeta zoegana*), brown-winged knapweed root moth (*Pterolonche inspersa*), gray-winged knapweed root moth (*Pelochrista medullana*), knapweed root weevil (*Cyphocleonus achates*), and bronze knapweed root borer (*Sphenoptera jugoslavica*) are approved, effective biocontrol agents.
- **Cultural:** Seeding desirable perennial grasses and forbs will provide competition with the knapweed; irrigation can increase the effectiveness of seeding. Grazing management can help decrease populations.
- **Physical/Mechanical:** Hand pulling or digging can be effective on small populations, especially if the entire root system is removed.

Spotted knapweed

Spotted knapweed is a biennial or short-lived perennial that grows up to 3 feet tall and spreads by seed. Rosette formed the first year with a flowering stalk elongating the second year. Stems are erect with slender wiry bracts and are covered with fine hair. Flowering heads are mostly on branch tips, solitary, up to one inch in diameter, and pink to purple in color, rarely white, with black tipped seed head bracts. Leaves are long and divided below the branches and short and narrow above; covered with fine hairs. Seeds are brownish, 1/8 inch long, notched on one side of the base, and have short tufts of bristles at the tip.

Management Objective: Containment

Integrated Management

- **Chemical:** Picloram, 2,4-D, Dicamba, and Curtail are all effective control agents.
- **Biological:** Banded knapweed gall fly (*Urphaora affinis*), UV knapweed seedhead fly (*Urophora quadrifasciata*), green knapweed clearwing fly (*Terellia virens*), knapweed peacock fly (*Chaetoreellia acrolophi*), knapweed seedhead moth (*Metzneria paucipunctella*), lesser knapweed flower weevil (*Larinus minutes*), blunt knapweed flower weevil (*Larinus obtusus*), broad-nosed knapweed seedhead weevil (*Bangasternus fausti*), sulphur knapweed root moth (*Agapeta zoegana*), brown-winged knapweed root moth (*Pterolonche inspersa*), gray-winged knapweed root moth (*Pelochrista medullana*), knapweed root weevil (*Cyphocleonus achates*), and bronze knapweed root borer (*Sphenoptera jugoslavica*) are approved, effective biocontrol agents.
- **Cultural:** Seeding desirable perennial grasses and forbs will provide competition with the knapweed; irrigation can increase the effectiveness of seeding. Grazing management can help decrease populations.
- **Physical/Mechanical:** Small patches can be controlled by hand pulling or digging.

Canada thistle

Canada thistle is a colony forming perennial that reproduces from seed and creeping rootstalks, and can grow up to 4 feet tall. Leaves vary from light to dark green, oblong or lance shaped with deeply grooved spiny toothed margins. Flowers form in small bristly clusters that are light lavender to deep rose purple. Seeds are smooth, light to dark brown, tipped with a cupped conical point, and are approximately 1/8 inch long.

Management Objective: Containment

Integrated Management

- Chemical: 2,4-D, Picloram, Dicamba, and Curtail are all effective control agents.
- Biological: Canada thistle stem weevil (*Ceutorhynchus litura*), musk thistle crown weevil (*Trichosirocalus horridus*), and Canada thistle stem gall fly (*Urophora cardui*) are all approved, effective biocontrol agents.
- Cultural: Increased competition from desirable plants is effective, proper management of perennial grasses helps greatly.
- Physical/Mechanical: Hand pulling is not effective. Repeated cultivation is successful if conducted every 3 to 4 weeks.

Showy milkweed

Showy milkweed is a perennial, 2 to 5 feet tall, reproducing by seeds and underground rootstocks. Leaves are opposite, oval-shaped, prominently veined, 4 to 7 inches long, and covered with fine, soft hairs. The plant has a grayish-green color and grows erect. All foliage parts exude a milky latex sap when cut. Flowers are arranged in umbels at the top of the plant and are purplish-pink. Reddish-brown flat seeds are borne in 3 to 5 inch spindle-shaped pods. Each seed bears a tuft of hairs allowing seeds to be spread by wind.

Management Objective: Containment

Integrated Management

- Chemical: Picloram and Dicamba are effective control agents.
- Biological: No known biological control agent.
- Cultural: Seeding desired perennials can help to reduce populations.
- Physical/Mechanical: Cultivation, pulling, and digging can result in increased population size because each root segment left behind can generate a new plant; therefore, it is not a recommended treatment option.

Cheatgrass

Cheatgrass is an annual growing 4 to 30 inches tall and reproducing by seed. Leaf sheaths and flat blades are densely covered with soft hairs. Inflorescence is dense, slender, usually drooping, 1-sided 2-6 inches long. Spikelets are nodding, slender 3/8 to 3/4 inches long. Awns are 3/8 to 5/8 inch long, usually purplish at maturity.

Management Objective: Containment

Integrated Management

- Chemical: Imazapic and Glyphosate are effective control agents.
- Biological: No known biological control agents.
- Cultural: Seeding of competitive perennials is recommended. Repeated early and late season grazing can reduce populations.
- Physical/Mechanical: Mowing is not recommended for control. Hand pulling before seed-set would be effective on small populations if repeated for several years.

Wild licorice

Wild licorice is a perennial that grows 1 to 3 feet tall and reproduces by seed or deep spreading roots. This plant grows erect in patches or clumps in moist areas. Leaves are alternate, compound with 11-19 lance shaped leaflets. Stems are simple or erect branches toward the top. Flowers are green-white to white in color, pea-type in clusters on a long stem. Seeds are bean shaped, 1/8 inch long, reddish brown, smooth and dull, contained in a bur-like seed pod to 3/4 inch long, covered with stout, hooked prickles.

Management Objective: Containment

Integrated Management

- Chemical: Picloram, Dicamba, and Redeem R&P are all effective control agents.
- Biological: Bruchid beetle (*Acanthosclides aureoles*) is a known seed predator.
- Cultural: Livestock grazing early in the growth of the plants can reduce plant vigor.
- Physical/Mechanical: Hand pulling and digging can be effective on smaller populations.

Curlycup gumweed

Curlycup gumweed is a biennial or short-lived perennial that reproduces by seed and grows 1 to 3 feet tall. The roots are fibrous; leaves alternate, 1 to 3 inches long, with saw toothed margins. Leaves are gland-dotted and exude a sticky material. Flowers are bright yellow, 1 inch in diameter, borne singly on the end of the branches. Curved bracts surrounding the flower also secrete a sticky substance which gives the plant its name. Seeds are oblong, cream colored, four-angled and deeply ridged.

Management Objective: Containment

Integrated Management

- Chemical: Metsulfuron, 2,4-D, Picloram, and Grazon P&D are all effective control agents.
- Biological: No known biological control agent.
- Cultural: Planting competitive grasses or cover crops.

- Physical/Mechanical: Hand pulling can be effective for small populations. Repeated mowing is not effective as the plant generally does not re-grow tall enough to be affected.

Halogeton

Halogeton is an annual ranging in height from a few to over 18 inches. Main stems branch from the base, spreading at first, and then becoming erect. Plants are blue-green in the spring and early summer, turning red to yellow by late summer. Leaves are small, fleshy, and nearly tubular, ending abruptly, tipped with a delicate needle-like spine. Plants resemble Russian thistle in early stages but can be distinguished by leaf shape, and by the presence of minute cottony hairs in the leaf axils.

Management Objective: Containment

Integrated Management

- Chemical: Metsulfuron, 2,4-D, and Imazapic are all effective control agents.
- Biological: No known biological control agents.
- Cultural: Seeding of immigrant kochia (*Kochia prostrata*) and crested wheatgrass (*Agropyron cristatum*) have been shown to decrease halogeton populations.
- Physical/Mechanical: Tillage is an effective method when combined with immediate seeding of perennials. Cutting or digging the plant before seed production can be effective on smaller populations.

Foxtail barley

Foxtail barley is a perennial that grows 1 to 2 feet tall and reproduces by seed. Plants produce a pale green bushy like spike. Leaf blades are 1/8 to 1/4 inch wide; the sheaths may vary from smooth to densely hairy. At maturity the heads break into 7-awned clusters, spikelets are one flowered awns 1 to 2 ½ inches long.

Management Objective: Containment

Integrated Management

- Chemical: Imazapic and Glyphosate are effective control agents.
- Biological: No known biological control agents.
- Cultural: Seeding with fast growing forage will help reduce population density.
- Physical/Mechanical: Mowing before seed set can be effective at reducing populations.

Musk thistle

Musk thistle is a biennial or winter annual that grows erect up to 7 feet tall and reproduces only by seed. Rosette forms the first year with a flowering stem forming the second year. Leaves are dark green with a light midrib, hairless, with long sharp spines. Flowers are solitary, 1 ½ to 3 inches in diameter, and deep rose to violet to purple in color. Roots are fleshy taproots that are

hollow near the ground surface. Seeds can be produced in excess of 20,000 per plant with 90% of the seeds being viable. Seeds may germinate after 10 years in the soil.

Management Objective: Containment

Integrated Management

- Chemical: Escort, Grazon P&D, and Tordon are all effective control agents on rosette stage.
- Biological: Thistle stem hover fly (*Cheilosia corydon*), musk thistle leaf beetle (*Psylliodes chalmomera*), musk thistle crown weevil (*Trichosirocalus horridus*), and musk thistle seed head fly (*Urophora solstitialis*) are approved, effective biocontrol agents.
- Cultural: Increased competition from desirable plants is effective proper management of perennial grasses helps greatly.
- Physical/Mechanical: Digging and pulling is effective when most of the tap root is removed.

7.0 TIMING OF MANAGEMENT

Weed management will occur in three phases: pre-construction, during construction, and post construction. Weed infestations can occur and/or be discovered in each phase. The pre-construction phase details the weed inventory prior to construction activities and aids in determining if new weed populations were brought into the area due to construction activities. Post construction monitoring will take place during yearly reclamation monitoring to determine if the weed populations are under control or if treatment is required.

7.1 Pre-Construction

All vehicles should be cleaned before entering the GUCO₂ project area during all inventories as a preventative measure. The pre-construction weed inventory was conducted in August 2011 and found musk thistle, diffuse knapweed, spotted knapweed, Canada thistle, showy milkweed, cheatgrass, wild licorice, curlycup gumweed, , and foxtail barley were all present in the project area. Halogeton was found outside the project area. Cleaning of vehicles and equipment should be conducted to keep the species from establishing in the project area.

Elk will conduct pre-construction spraying in the GUCO₂ project area for species listed above according to pesticide label directions. The pre-construction spraying may decrease the spread of designated and declared weeds and weeds of concern once construction crews are on site. Elk will need to notify the BLM-LFO and submit a PUP and pesticide labels before completing this action.

7.2 During Construction

To ensure protection of the GUCO₂ project area from introduction of invasive weeds and to ensure weed control, the following items will be implemented:

- 1) To the best available, gravel and mineral materials transported to the GUCO₂ project area will be weed free.
- 2) Construction equipment and vehicles are required to be certified weed free when arriving on the project. This will be verified through inspection of equipment and vehicles from all accessible points, including use of mirrors as necessary. Inspections will be conducted by the Compliance Coordinator (CC) (consultant for Elk) acting on behalf of the BLM.
- 3) The extent of vegetation or soil disturbance will be limited to the minimum required to safely perform construction activities as designed. This will be established in the APD, flagged/marked on-the-ground, and enforced by the CC.
- 4) Disturbed areas not needed as work areas/road surfaces, such as road ditches, will be reclaimed/re-seeded within six months of initial disturbance. This timeframe will be dependent on the presence of wildlife stipulations.
- 5) Certified weed free seed (blue tag seed) will be used during reclamation of disturbed areas within the project area. The seed mix to be will be recommended by the BLM-LFO.
- 6) Hay, straw, or other material used as mulch within the project area will be weed free.

7.3 Post-Construction

Weed inventory/monitoring will continue post-construction and will follow the guidelines presented in Section 6. Mapping of weed populations within the GUCO₂ project area will continue into off-project areas if the weed population extends off the site and is a direct result of the project. Elk will treat infestations of weeds that occur within the GUCO₂ project area and weeds in the adjacent undisturbed area, if these are a direct result of the GUCO₂ project.

To ensure protecting of the GUCO₂ project area from the spread of weeds during maintenance and operations, the access roads will be surveyed for weeds as stated in Section 9.1.

8.0 MONITORING AND RECORD KEEPING

Elk will collect and maintain all records pertaining to the control and management of weeds within the GUCO₂ project area. This includes, but is not limited to, the following: inventories, treatments, monitoring, and re-infestation trends as related to frequency of re-occurrence in specific areas, and the rate of spread of existing infestations. The reports will be written and submitted annually. Elk or its contractor will provide these reports to BLM-LFO Authorized Officer Representative (AOR).

8.1 Monitoring

This section provides for monitoring of the GUCO₂ project area for noxious and invasive weeds. Monitoring by Elk or an approved contractor will commence the first growing season after the disturbed areas in the GUCO₂ project area have been seeded and yearly thereafter, in order to track vegetation trends and weed presence/absence. For example, if the area was seeded in the fall, then monitoring will start in the spring/summer of the following year. If the area was seeded in the spring, then monitoring will start in the summer.

Each year, during interim reclamation monitoring of the GUCO₂ project area, a weed inventory will be conducted. Inventories will be in accordance with protocols contained in the North American Invasive Plant Mapping Standards (NAWMA 2002). The findings will be provided in the interim reclamation report submitted to the Bureau of Land Management-Lander Field Office (BLM-LFO) by Elk or contractor for Elk by December 31 of each year. All monitoring forms will be included in an appendix of the interim reclamation report and can be directly input into the BLM-LFO GIS geodatabase as necessary. An Excel file will be provided to the BLM-LFO for inventory reporting and treatment tracking. Weed locations will be in a shapefile and in UTM Zone 13, NAD 83, meters. All invasive weed inventory data will be provided to the BLM-LFO annually. Surveys, as well as monitoring, will continue throughout the life of the GUCO₂ project. The intent of post-construction inspections is not only to identify and inventory new infestations, but also to maintain control of weeds before seed is set and dispersed. Elk will also inspect for invasive weed populations which extend off the Grieve Unit CO₂ EOR project if the weed population is a direct result of the project.

8.2 Report Submittal

There are three types of reports to be submitted annually—the Annual Report (as part of the interim reclamation monitoring report), pesticide application records (PAR), and pesticide use reports (PUR).

8.3 Annual Report

Elk will submit an annual Reclamation Monitoring Report to the BLM-LFO AOR. Weed inventory information is a part of the annual reporting requirements for the GUCO₂ project. Included are percent cover of invasive weeds and the species present, as well as listing of the following: weed treatment contractor, contractor license number and expiration date, date(s) treated, and methods of treatments applied (chemical, biological, mechanical).

8.4 Pesticide Application Records

These records will be filled out within 24 hours of each herbicide application. Completed forms will be submitted to the LFO WMS at the end of each month. The following information will be recorded on each form: date and time of herbicide application; herbicides, adjuvant, and surfactants used; rates applied; weather and site conditions, and monitoring comments on the site.

8.5 Pesticide Use Report

A summary report of all application activity, the Pesticide Use Report (PUR), will be submitted at the end of the treatment season, along with the final months' PARs. PARs are due monthly to the AO/Weed Coordinator at the BLM-LFO for each month that pesticides are applied on BLM lands. A PUR can be submitted with each month's PARs summarizing each month's herbicide usage (preferred BLM method), in lieu of submitting one annual summary at the end of the season. The weed control contractor will be responsible for filling out these reports and

submitting them to Elk or to the BLM-LFO on Elk's behalf. This report will include herbicide usage by trade names, rates, species treated, and acres treated.

9.0 FEDERAL LAWS, REGULATIONS, AND POLICIES AFFECTING BLM WEED CONTROL

- 1) Federal Land Policy and Management Act of 1976, as amended.
- 2) Public Rangelands Improvement Act of 1978.
- 3) Carlson-Foley Act of 1968.
- 4) Federal Noxious Weed Act of 1974, as amended by Sec. 15 - Management of Undesirable Plants on Federal Lands, 1990.
- 5) Final Environmental Impact Statement for Vegetation Treatments on BLM Lands in 17 Western States, 2007.
- 6) Wyoming Weed and Pest Control Act 1973.
- 7) Executive Order 13112 (Invasive Species), signed on February 3, 1999.
- 8) Departmental Manual 517.
- 9) Departmental Manual 609.
- 10) BLM Manual 9011 and Handbook H-9011-1.
- 11) BLM Manual 9014.
- 13) BLM Manual 9015.

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