Appendix A: Scoping Notice and Dear Reader Letter

Release Date: 12/08/11

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307/347-5207

BLM Lander Seeks Input on Proposed Enhanced Oil Recovery Project

The Bureau of Land Management (BLM) Lander Field Office is seeking public comments on a proposed enhanced oil recovery (EOR) project approximately 53 miles west of Casper in Natrona County, Wyo.

Elk Petroleum, Inc., operator of the Grieve Unit in central Wyoming, has submitted a proposal to conduct EOR in the existing oil field. The Grieve Unit has been a producing field since the 1950s. Approximately 77 percent of the surface and minerals are administrated by the BLM and the remaining are state and private holdings.

It is estimated that four new well pads, access roads, CO2 pipeline, power lines and all other new project facility disturbance would result in a maximum initial surface disturbance of approximately 160 acres. All areas of new disturbance not needed for the life of the project would be reclaimed and long term surface disturbance for the proposed project is estimated to be less than 20 acres.

The Lander Field Office will prepare an environmental assessment (EA) to analyze the impacts of the proposed project. Information, including a map of the area, can be found on the website at:www.blm.gov/wy/st/en/info/NEPA/documents/lfo/grieveunit.html.

Public input is valuable early in the process and will enable the BLM to develop a well-informed EA. Comments should be submitted by Jan. 13, 2011, and may be emailed to lander_wymail@blm.gov; please include "Grieve Unit" in the subject line. Comments may also be mailed to Bureau of Land Management, Lander Field Office, Attn: Chris Krassin, 1335 Main Street, Lander, WY 82520.

Before including your address, phone number, email address or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

For more information, please contact BLM Natural Resource Specialist Chris Krassin at 307-332-8400.

SCOPING NOTICE
for
Elk Petroleum, Inc.
GRIEVE UNIT CO_2 ENHANCED OIL RECOVERY PROJECT

Bureau of Land Management
Lander Field Office
October 2011

Background

Elk Petroleum, Inc. (Elk) operator of the existing Grieve Unit in central Wyoming submitted a proposal for enhanced oil recovery (EOR) of existing oil field to the Bureau of Land Management (BLM), Lander Field Office. Elk proposes inject of CO_2 and water in the oil baring zones to increase the amount of recoverable crude oil compared to the current primary recovery of this aging oil field. The EOR is expected to extend the field's productive life while sequestering CO_2 gas. This notice is to inform the public that BLM Lander Field Office will prepare an Environmental Assessment (EA) for this proposed project.

The proposed project is located approximately 53 miles west of Casper in western Natrona County, Wyoming, and within the administrative boundary of the BLM's Lander Field Office. The Grieve Unit comprises approximately 2280 acres of State, Fee and Federal minerals and surface lands within the boundary of the Unit. Approximately 77% of the surface and minerals are administrated by BLM and the remaining 22% are State and Fee holdings.

The Grieve Field began producing crude oil from the Cretaceous Muddy "Grieve Sand" in 1954. In this same year an exploratory agreement was approved and the field became known as the Grieve Unit. Initial developed and production was conventional until 1960 when production rates were enhanced through gas injection. In 1977, the reservoir was "blown down" as the natural gas and oil were depleted. Today, production continues at low rates with only two wells producing. The last well drilled in the unit was in 2009 and it was eventually shut-in.

Description of Proposed Project

Elk proposes to develop an EOR project consisting of the following operations and maintenance activities:

1. Install a CO_2 underground pipeline and meter station,
2. Install an overhead 25 kV three-phase distribution line,
3. Install and overhead 230 kV transmission line,
4. Head Switch Yard,
5. Drill 2 new crude oil producing wells,
6. Drill 8 new alternating CO_2 injection and water disposal wells(2 of these wells are on private or state lands within the Unit),

7. Convert 4 Production wells to CO_2 injection or water disposal wells
8. Install new unit underground gas gathering and distribution lines,
9. Install new underground water disposal line
10. Upgrade and construct new access roads

The proposed number, spacing, and arrangement of the wells are designed to provide maximum recovery of crude oil remaining in place in the unit. Downhole modifications to the existing wells would be permitted through the Sundry Notice process under to BLM regulations. New wells would be permitted through the Application for Permit to Drill process under BLM regulations. For injection wells, Elk would be required to obtain an Underground Injection Control (UIC) permit from the State of Wyoming.

The production infrastructure would include a combination of entrenched CO_2 and water distribution and crude oil gathering lines running either parallel to project roads or the most direct cross country route. Centralized gathering, production, metering and compression facilities will be located at the site of the existing unit facilities.

The overhead 25 kV three-phase distribution line would connect the meter station, located at the tie-in point of the Anadarko CO_2 line and the proposed Grieve Unit CO_2 pipeline, to the field central facility. The proposed power transmission line, connecting the in-field central facility to the WAPA system, would be an overhead, H-brace structured, 230 kV line. A Head Switch yard would be constructed near this connect with the WAPA system.

The project construction activities would begin with the installation of the CO_2 line and meter station, drilling of new wells and the installation of the overhead power distribution line to the CO_2 pipeline tie-in point meter station. The overhead power transmission line would be the final feature completed on the project.

It is anticipated that injection and production will not require enhanced compression or recovery units. However, in the event mechanical injection or production units are needed the existing overhead power system will be used. Additions to the existing in-field power will be underground, where technically feasible.

The crude oil produced from the proposed project would be transported to a Casper area crude oil terminal via the existing crude oil pipeline; this action would be approved through the Sundry Notice process and is not considered in the EA.

It is estimated that the four new well pads, access roads, CO_2 pipeline, power lines and all other new project facility disturbance would result in a potential maximum initial surface disturbance of approximately 160 acres. The construction of all aspects of the proposal is expected to last three to five years. All areas of new disturbance not needed for life of project operations will be reclaimed per BLM, or surface owner, specifications. Long term surface disturbance for the proposed project is estimated to be less than 20 acres.

IDENTIFIED RESOURCE MANAGEMENT ISSUES AND CONCERNS

The following issues and concerns have been identified. This list is not meant to be an all-inclusive list, but rather a starting point for further public input and a means of identifying the resource disciplines needed to conduct the analysis.

- Potential effects to wildlife habitat within the analysis area, including big game, raptors, sage grouse, white-tailed prairie dog, black-footed ferret, and mountain plover.
- Possible effects to listed, proposed, or threatened and endangered plant and animal species.
- Potential effects to wetlands and riparian habitat.
- Potential effects to cultural and historical values within the project area.
- Possible effects to surface and groundwater resources.
- Potential effects to air quality due to increased traffic, emissions, production activities and associated effects on existing county, state, and BLM roads.
- Consistency with the State of Wyoming commitment to CO_2 (Green House Gas) sequestration and enhanced recovery of oil from existing fields.
- Reclamation of disturbed areas and control of noxious weeds.
- Cumulative effects of the proposed project when combined with ongoing crude oil and natural gas drilling and development.
- Possible effects to rangelands.
- Possible effects to commercial outfitters use.
- Possible effects to recreational activities.
- Possible effects to visual resources.

PUBLIC INVOLVEMENT

Public input is important in establishing the level and scope of the analysis. The public is encouraged to participate throughout the environmental analysis process to help in identifying the level of analysis needed, alternatives to the proposed action, other issues or concerns that should be analyzed or mitigated, and any other comments or ideas to help ensure the completeness of the analysis process.

The BLM can best use comments and resource information if submitted before the close of the public scoping period (December 7, 2011 - January 13, 2012). Please submit written comments to:

Bureau of Land Management
Lander Field Office (c/o Chris Krassin)
1335 Main Street
Lander, WY 82520

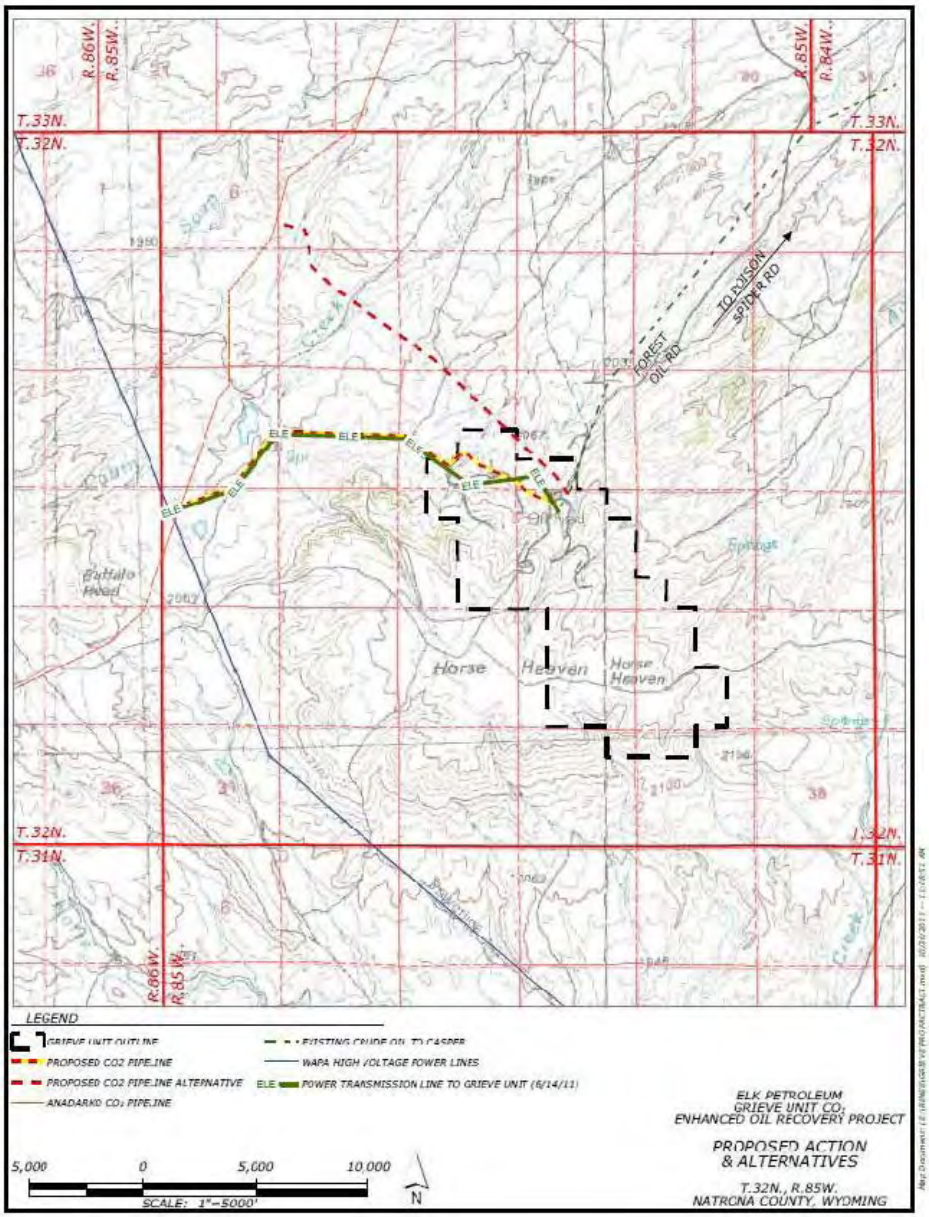
Comments may also be submitted electronically to: lander_wymail@blm.gov

Please note that comments, names, email addresses, and street addresses of the respondents, will be available for public review and disclosure at

the above address during regular business hours (7:45 a.m. to 4:30 p.m.), Monday through Friday, except holidays. Individual respondents may request confidentiality. If you wish to withhold your name, email address, or street address from public review or from disclosure under the Freedom of Information Act, you must state this plainly at the beginning of your comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

If you require additional information regarding this project, please contact Chris Krassin at the above email or street address or phone 307-332-8452.

Figure 1 – Proposed Grieve Unit CO2 Enhanced Oil Recovery Project



Grieve Field Location
Pine
Mountain
Yellowstone Highway US 20-26
Natrona County International Airport
Interstate 25
Emigrant
Zero Road NC 201
NC 201
Poison Spider Road
Poison Spider School
Poison Spider Road NC 201
Poison Spider Road NC 201
Ridge
CASPER
Oil Road NC 320
Forest
Grieve Unit
Casper Mountain
WY 220
Alcova Highway

Appendix B: Grieve Unit CO_2 EOR Project CO_2

Site Specific Reclamation Plan

RECLAMATION PLAN

FOR THE

GRIEVE UNIT CO_2 ENHANCE OIL RECOVERY PROJECT

RECLAMATION PLAN

FOR THE

GRIEVE UNIT CO_2 ENHANCE OIL RECOVERY PROJECT

Submitted By:

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Casper, WY 82601

Prepared By:

BKS Environmental Associates, Inc.

P.O. Box 3467

Gillette, WY 82717

April 6, 2012

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INTRODUCTION

The following reclamation plan was developed for the Elk Petroleum, Inc. (EP) Grieve Unit CO_2 Enhanced Oil Recovery Project ($GUCO_2$). EP proposes to implement enhanced crude oil recovery from the Cretaceous Muddy "Grieve Sand" using a miscible CO_2 flood with water injection to assist with reservoir re-pressurization within the Grieve Unit. Implementation of this project will require use and modification of the existing Grieve Unit infrastructure as well as construction of new infrastructure as outlined below.

<u>Infrastructure</u>

Construction of 3.62 miles of new eight inch CO_2 pipeline connecting the existing Anadarko CO_2 pipeline to the Grieve Unit

Installation of CO_2 handling/recycling equipment at the existing Grieve Unit central facilities

Construction of a 5 acre fenced CO_2 meter station at the tie-in point of the Anadarko and Grieve CO_2 lines

Construction of 3.75 miles of new overhead 230kV power line from the existing Western Area Power Authority (WAPA) system to the Grieve Unit central facilities

Construction of 0.33 miles of 230kV power line right of way (ROW) structure access road

Construction of two electrical sub-stations

- Buffalo Head sub-station located at the interconnect point with WAPA
- Horse Heaven sub-station located at the existing Grieve Unit central facilities

Construction of 3.75 miles of new overhead 25kV power line that generally follows the CO_2 pipeline ROW from the Horse Heaven sub-station to the tie-in point meter station

Existing power structures will be used to the extent possible, and new in-field power will be installed underground to the extent feasible

Crude oil will be transported to market via the existing eight inch crude oil line from the Grieve Unit to the Platte Pipeline terminal in Mountain View/Casper

Construction of a centralized production, separation, and compression facility and a field office at the existing Grieve Unit central facilities

In-field gathering and distribution trunk lines will contain three sets of flow lines: produced fluids, clean CO_2/water injection, and produced water

- Trunk lines will roughly follow the existing natural gas gathering pipeline system and branch off to the individual wells via the most direct route or parallel to the well site access roads
- Construction of 3.7 miles of single line in-field gathering/injection pipeline and 4.5 miles of multiple line in-field gathering/distribution pipeline

Improvement to existing and/or an addition of 3.5 miles of power line and CO_2 line access road

Existing access roads, well sites, gathering lines, and electricity will be used to the maximum extent to minimize surface disturbance

<u>CO_2/Water Injection and Oil Wells</u>

Operation will require 18 CO_2/water injection wells and 10 crude oil wells
Use 10 existing wells and construct 8 new CO_2/water injection wells
Use eight existing wells and construct two new crude oil wells
- An additional 11 existing wells may be utilized as needed

Construction of four new 325ft X 200ft multi-well pads
Construction of two new 325ft X 175ft single well pads
Construction of 0.5 miles of new access road to the new well pads
Existing wells will be worked over or recompleted as necessary
Un-used wells will be plugged and abandoned
Existing monitoring wells will be re-entered

The purpose of this reclamation plan is provide pre-disturbance site characteristics, including soils, vegetation, and wetland data, identify reclamation practices and processes utilized to meet reclamation standards, and document monitoring protocols for evaluation of reclamation compliance and effectiveness, on a site specific level. This document is meant to serve as an adaptive reclamation plan, which may be amended and/or revised, as necessary, to assure short term and long term reclamation goals are achieved, as well as, ensure continued compliance with agency protocols and requirements. All amendments and/or revisions will be submitted to the Bureau of Land Management-Lander Field Office (BLM-LFO) via Sundry Subsequent Report (Form 3160-5). Amendments and/or revisions will be completed and approved by the BLM-LFO Authorize Officer (AO), prior to implementation. EP will develop and submit a Final Reclamation Plan to the BLM-LFO AO prior to receipt of project abandonment.

RECLAMATION GOAL

The reclamation goal of EP and the following plan is to ensure, in the short term, the immediate stabilization of disturbed areas and provide the conditions necessary to, in the long term, facilitate eventual ecosystem reconstruction to maintain a safe and stable landscape and meet the desired outcomes of the land use plan (USDI BLM 2009). In order to meet this long term reclamation goal, the objective of interim reclamation is to re-establish landscape continuity, minimize establishment of invasive plant species, stabilize the soil at disturbed locations, and promote diversified plant communities within the Grieve Unit through reclamation techniques that initiate and accelerate ecological succession to meet wildlife habitat goals including seeding of native plant species and interim reclamation designs that minimize re-disturbance during final

reclamation (USDI BLM-LFO 2011a). If the desired outcomes of interim reclamation have not been determined a success within a five year period, the reclamation plan will be revised to mitigate the project area.

1.0 PRE-DISTURBANCE SITE CHARACTERIZATION

Project Area Description

The $GUCO_2$ is located within a non-Designated Development Area (non-DDA) of the BLM-LFO Gas Hills Management Unit and is comprised of approximately 2,300 acres of State, Fee, and Federal lands. The Grieve Unit encompasses 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; and Sections 15, 16, 21, 22, 23, 26, 27, 34, and 35, T32N R85W.

The project area is situated on the northern flank of the Rattlesnake Range and more specifically in a topographic area locally known as "Horse Heaven". This is an upland area that is generally west of Burnt Wagon Draw, southeast of Cabin Creek, southwest of Austin Creek, east of Buffalo Head, northeast of Keester Basin, east/southeast of Garfield Peak, south of Poison Spider Creek, and generally west of the city of Casper, Wyoming. This area is characterized by gently to moderately undulating uplands dissected by numerous dendritically patterned ephemeral tributaries of Poison Spider Creek including Austin and Cabin Creeks.

Total new disturbance for the proposed $GUCO_2$ project is approximately 163.82 acres. Proposed construction designs and associated disturbance boundaries for the proposed $GUCO_2$ are located in Addendum A on the Site Specific Reclamation Map. Refer to Table 1 for a list of proposed action disturbance assumptions.

Table 1: Proposed Surface Disturbance from $GUCO_2$ Proposed Action.

Category	Proposed Action Components	Proposed Action Disturbance Assumptions	New Short Term (acres)	New Life of Project (acres)
Multi-Well Pads	4	New wells average initial disturbance average 3.3 acres; reduced to 1.5 acres *	13.2	6.0
Single Well Pads	2	New wells initial disturbance average 3.0 acres; reduced to 1.04 acres **	6.0	2.08
Monitoring Well	-0-	Re-enter existing well	-0-	-0-
Well Site Access Roads	0.5 mi	Initial construction 24 ft wide; reduced to 16 ft driving surface	1.45	0.96
Centralized Facility	-0-	Remove unnecessary and antiquated equipment; replace with new and reclaim unused	-0-	-0-

Table 1: Proposed Surface Disturbance from GUCO$_2$ Proposed Action.

Category	Proposed Action Components	Proposed Action Disturbance Assumptions	New Short Term (acres)	New Life of Project (acres)
		areas		
Un-Used Wells	-0-	Plug and abandon; reclaim sites; assume 1.04 acres each	2.08	-0-
In-Field Gathering/ Injection Pipelines (Single Lines)	3.7 mi	Follow alignment of existing infield gathering lines and access roads to extent possible; construction ROW 40 ft wide	18.08	-0-
In-Field Gathering/ Distribution Pipelines (Multiple Lines)	4.5 mi	Follow alignment of existing infield gas line and access roads to extent possible; construction ROW 100 ft wide	54.75	-0-
Buffalo Head Substation (Western Interconnect)	16.0	Locate WAPA breakers and step-down sub-station	16.0	14.0
230 kV Transmission Line ROW	3.75 mi	3.75 mi; pole every 573 ft or 21 to 24 H-brace pole and 6 to 8 three pole structures (average disturbance 0.15 acre per structure)	3.6	0.02
230 kV Transmission Line ROW Structure Access Roads	0.33 mi	16 ft wide unimproved 2-track structure access roads	0.63	0.63
25 kV Overhead Distribution Line	3.75 mi	3.75 miles; pole every 300 ft or 65 poles; 14 ft^2 per pole disturbance	0.02	0.02
CO$_2$ Tie-In Meter Station	5.0	Fenced yard with building containing metering equipment and outside pipeline connections	5.0	2.5
CO$_2$ Connector Line ROW	3.62 mi	75 ft initial construction disturbance width	32.90	-0-
Power Line / CO$_2$ Line Access Road	3.5	24 ft wide construction, reduced to 16 ft driving surface	10.11	6.75

Table 1: Proposed Surface Disturbance from GUCO$_2$ Proposed Action.

Category	Proposed Action Components	Proposed Action Disturbance Assumptions	New Short Term (acres)	New Life of Project (acres)
TOTAL ACRES OF NEW DISTURBANCE			**163.82**	**32.96**

NOTE: Assume No New Disturbance on Existing Well Sites

Pre-Disturbance Site Assessment

To determine baseline conditions, a pre-disturbance site assessment was conducted on August 2 and 3, 2011, by soil scientists, vegetation ecologists, and wetland specialists from BKS Environmental Associates, Inc. (BKS) of Gillette, Wyoming. BKS utilized proposed infrastructure designs and staked locations in the field to ensure the entire extent of the proposed disturbance area, as of August 2011, was evaluated during the pre-disturbance site assessment. United States Department of Agriculture National Aerial Imagery Program (NAIP) 2009 true color ortho aerial imagery (ArcGIS 2011) was used to delineate pre-disturbance plant communities and topsoil/suitable subsoil salvage depths based on field verification of NRCS soil map units and Ecological Site Descriptions (ESDs) during the pre-disturbance site assessment. During the pre-disturbance site assessment, qualitative soils and vegetation data were collected. Identification of wetlands was based on visual assessment of vegetation and hydrology indicators, as well as intrusive soil sampling to determine the presence of wetland criteria indicators. Methodology for the collection of this data and results of the assessments are provided in the appropriate sections below. Changes in disturbance boundary locations following the August 2011 surveys were evaluated based on a review of NAIP true color ortho aerial imagery and known expression of NAIP true color ortho aerial imagery within the project area, NRCS soil and ESD data, NWI data, and field data collected during the August 2011 surveys.

Site specific recommendations were made, as appropriate, during the pre-disturbance site assessment and upon review of the aerial imagery, topography, and data collected during the pre-disturbance site assessment. A site specific reclamation map was created utilizing ArcGIS mapping software to digitize the pre-disturbance site assessment observations. Well pads, substations, and central facilities were mapped based on the disturbance boundaries provided. Roads were mapped based on the construction buffers indicated in Table 1. All proposed pipelines were mapped based on a 150ft buffer as opposed to the actual 100ft construction disturbance, except at wetland locations where the buffer was reduced to 30ft. Power line disturbances were surveyed, but as the exact location of the power poles is unknown were not mapped. Due to the extended area mapped (approximately 259 acres); acreages reported in this document are greater than the actual disturbances (approximately 164 acres) that will occur during construction. The following Soils, Vegetation, and Wetland sections only document pre-

disturbance conditions within the mapped disturbance area. Refer to Addendum B for the Site Specific Reclamation Map. The Site Specific Reclamation Map includes surveyed disturbance boundaries, infrastructure, NRCS ESD and soil map units, pre-disturbance plant communities, topsoil/suitable subsoil salvage depths, BLM-LFO identified limited reclamation potential (LRP) areas, and wetlands within the proposed disturbance boundary overlain on aerial imagery.

Pre-disturbance photo documentation was conducted during the pre-disturbance site assessment. Photographs were taken at each corner of the well pad disturbance boundary looking onto the well pad toward the well locations. Photographs were also taken along the well pad access roads, project access roads, pipelines, and power lines. GPS points were taken at each photo location and general direction was noted. All photographs are located in Addendum A.

The BLM-LFO defines LRP areas as sites characterized by highly sensitive soils and/or erosive soils, with physical or chemical limitations, and landforms with slopes greater than 25%. Characteristics used to identify LRP areas include soil textures with poor water holding capacity or soil textures prone to excessive wind or water erosion; soils with high levels of salts that interfere with plant growth; soils on slopes greater than 25%; soil profiles that limit water holding capacity and/or create rooting-zone limitations; and coarse fragments that limit common reclamation practices (USDI BLM 2011b). Identification of Limited Reclamation Potential (LRP) sites was based on data provided by the BLM-LFO.

Table 2: Factors Evaluated During Pre-Disturbance Site Assessment.

Description	Definition
Ecological Site Description	Ecological Site Descriptions (ESDs), as verified in the field, based on soil and plant community characteristics at the site.
NRCS Map Unit	Based on NRCS soil data and field observations of soil characteristics.
Soil Depth	Depth to paralithic or lithic material. Categories include: very shallow (less than 10 inches to bedrock), shallow (10-20 inches to bedrock), moderately deep (20-40 inches to bedrock), deep (40-60 inches to bedrock), and very deep (greater than 60 inches to bedrock).

Table 2 (Continued): Factors Evaluated During Pre-Disturbance Site Assessment.

Description	Definition
Soil Texture	General texture, of each soil horizon, based on the texture by feel method.
Soil Limiting Factor	Factors that limit how much soil the operator can salvage based on suitability of the material itself rather than equipment limitations. Those limits will either be physical or chemical in nature. Soil limiting factors include: coarse fragments, high $CaCO_3$, erosive, texture, pH, high salinity/sodicity, shallow soils (depth to paralithic or lithic material), or none.

Topsoil/Suitable Subsoil Salvage Depth	Recommended topsoil/suitable subsoil salvage based on soil depth, soil texture, and soil limiting factors.
Soil Movement	Presence of and extent of wind or water erosion including sheet erosion, rills, gullies, pedestalled plants, wind scoured areas, or slope washes.
Soil Amendments	Recommended amendments to add to the replaced soil, prior to reclamation, based on pre-disturbance soil limiting factors.
Plant Community	Plant community that most represent the ESD based on ocular estimation of the dominant plant species.
Dominant Plant Species	Dominant plant species within each observed ESD or plant community, based on ocular estimation.
Noxious and Invasive Plant Species	Observation and documentation of Wyoming state designated noxious weeds and Natrona and Freemont County declared weeds and weeds of concern.
Threatened, Endangered, and Special Status Plant Species	Observation and documentation of individuals, populations, or suitable habitat of U.S. Fish and Wildlife Service Threatened and Endangered and Bureau of Land Management Lander Field Office Sensitive plant species.
Reclamation/Stabilization Category	The potential for erosion hazard and reclamation potential of each site. Categories are based on the plant community, topsoil/suitable subsoil salvage depth, slope, aspect, and soil limiting factors.

Ecological Site Description

The following ESDs are located within the disturbance area according to field verification of NRCS ESD. NRCS ESD boundaries are provided on the Site Specific Reclamation Plan map; however, based on field observations the NRCS boundaries are not accurate for the scale of this analysis. Therefore, appropriate plant communities based on ESD descriptions indicate the field verified boundaries and are outlined in the following ESDs.

Loamy 10-14" Precipitation Zone High Plains Southeast

This ESD occurs in an upland position on relatively flat to moderately sloping land on all exposures. Slopes vary from 1-30%. The soils of this site are deep to moderately deep and well drained with textures ranging from loams to very fine sandy loams (Brazee 2008a). This ESD is represented on the Site Specific Reclamation Map as vegetation communities BS/MG and RW/NT as describe in the vegetation section.

Shallow Loamy 10-14" Precipitation Zone High Plains Southeast

This ESD occurs in an upland position on south and west facing slopes, but may be found on all slopes and positions. Slopes vary from 1-45%. The soils of this site are well drained shallow soils over all types of bedrock except igneous and volcanic. Textures range from very fine sandy loams to clay loams (Brazee 2008b). This ESD is represented on the Site Specific Reclamation Map as vegetation communities BW/RW and LP as describe in the vegetation section.

Saline Subirrigated 10-1 4” P recipi tation Zone Hi gh P lains S
outheast

This ESD occurs on nearly level land along perennial or intermittent streams, near seeps, sloughs, or springs. It is also found on broad, low lake terraces, lake plains, or on alluvial bottoms, and poorly-drained bottomlands adjacent to stream channels. These areas receive additional run-in water from higher sites and from a fluctuating water table, well within the root zone. Slopes vary from 1-10%, but are mostly less than 3%. Soils of this site are mostly deep and somewhat poorly drained. Textures are loamy, sometimes stratified, with a seasonal high water table depth of one to three feet. The soils and soil water have high enough salinity to restrict plant establishment and growth. Mottling or gleying may occur within 40 inches of the surface (Brazee 2008c). This ESD is represented on the Site Specific Reclamation Map as vegetation community AS/BW as describe in the vegetation section.

Subirrigated 10-14” P re c ipi tation Zone Hi gh P lains S
outheast

This ESD occurs on level to nearly level land along perennial or intermittent streams near seeps, springs, and sloughs. Slopes vary from 1-10%. The soils of this site are deep and formed from alluvium. The soils have water tables below the surface for all of the growing season. The water table is non-saline and non-alkaline. The soils are loamy with a seasonal high water table depth of about one to three feet. Mottling or gleying may occur within 40 inches of the surface. Water may be present at the surface from run-in, but only for short periods of time (Brazee 2008d). This ESD is represented on the Site Specific Reclamation Map as vegetation community WW/KB as describe in the vegetation section.

Wetland 10-14” P recipi ta ti on Zone Hi gh P lains S
outheast

This ESD occurs on level or gently sloping bottomlands, near springs, seeps, and sloughs, on nearly level to slightly depressed areas with poor surface drainage. Slopes vary from 1-6%. This site consists of moderately deep organic and deep loamy or silty soils with a seasonal high water table at or near the surface. Subsoils are usually mottled or gleyed (Brazee 2008e). This ESD is represented on the Site Specific Reclamation Map as vegetation community WET.

Soils

Pre-Disturbance Site Assessment Methodology

A hand held probe was used to view the top six to 12 inches of the soil profile. Soil texture, soil limiting factors, soil depth, and topsoil/suitable subsoil salvage depth were determined by the information collected from the probe. This information was then compared to the NRCS soil mapping and available ESD information. Soil texture was determined using the texture by feel method (Norton and Strom 2011), and calcium carbonate content was determined by visually observing the chemical reactions after application of a 10% HCl solution. Soil movement was assessed by visually observing indicators of soil erosion, including but not limited to: sheet

erosion, rills, gullies, and pedestalled plants.

Pre-Disturbance Site Assessment Results

Soil Series

The following NRCS soil map units are located within the disturbance area according to NRCS soil data and field verification (USDA NRCS 1997) (Table 3).

Table 3. NRCS Map Unit Symbols, Map Unit Descriptions, and Associated 10-14" Precipitation Zone High Plains Southeast Ecological Site Descriptions of the Soil Series Present within the $GUCO_2$ Disturbance Area (USDA NRCS 1997).

Map Unit Symbol	Map Unit Description	Associated ESD
104	Alcova - Stunner, 3-15% slopes	Loamy
110	Aquic Ustifluvents, saline, 0-3% slopes	Saline Subirrigated
129	Boettcher - Pinelli - Worfman loams, 3-15% slopes	Loamy
137	Brownsto - Lupinto complex loams, 6-40% slopes	Shallow Loamy
184	Forelle - Diamondville complex, 3-15 % slopes	Loamy
217	Lupinto - Alcova complex, 3-30% slopes	Loamy

Soil series within the disturbance area are shallow to very deep (USDA NRCS 1997) (Table 4). Based on the pre-disturbance site assessment soil surface textures are predominantly loam. Clay loam, sandy loam, clay, sandy clay loam, and silty clay loam surface textures were also observed. Most soil series are well drained and have formed in alluvium and slopewash alluvium derived from various sources (USDA NRCS 1997).

Table 4. Depth, Surface Textural Classes, Drainage Classes, Landform Associations, and Parent Material of the Soil Series Present within the $GUCO_2$ Disturbance Area (USDA NRCS 1997).

Series	Depth	Surface Textural Class	Drainage Class	Landform	Parent Material
Alvoca	Very Deep	Fine sandy loam	Well Drained	Terraces and alluvial fans	Alluvium derived from various sources
Aquic Ustifluvents	Very Deep	Loam	Somewhat poorly drained	Flood plains and in basins	Alluvium derived from various sources
Boettcher	Moderately deep	Loam	Well Drained	Hills	Slopewash, alluvium and residumm derived from sandstone and shale
Brownsto	Very Deep	Cobbly loam	Somewhat excessively drained	Ridges and Hills	Alluvium and colluvium derived from various sources
Diamandville	Moderately	Fine sandy	Well Drained	Hillsides	Slopewash

	deep	loam			alluvium and residumm derived from sandstone, siltstone and shale
Forelle	Very Deep	Loam	Well Drained	Plateaus, fan terraces, foot slopes and alluvial fans	Alluvium derived from various sources
Lupinto	Very Deep - Deep	Gravelly loam	Well Drained	Alluvial fans, terraces, ridges, hills, and foot slopes of terrace breaks	Alluvium derived from various sources
Pinelli	Very Deep	Loam	Well Drained	Alluvial fans, plateaus, and foot slopes	Alluvium derived from various sources
Stunner	Very Deep	Sandy loam	Well Drained	Terraces and plateaus	Alluvium derived from various sources
Worfman	Shallow	Loam	Well Drained	Ridge crests, dip slopes and hills	Residumm and slopewash alluvium derived from sandstone, siltstone and shale

Hydric Soils

Hydric soils are defined by the National Committee for Hydric Soils as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register 1994). No soils series found within the project area are considered as hydric by the Natrona County NRCS; however, hydric soils were identified during wetland delineation field work and were located mainly in drainage bottoms and flood plains. NRCS Map Unit 185-Tisworth sandy loam, 0-5% slopes is found near the project area and may contain the minor inclusion of the hydric Typic Fluvaquents series on floodplains. The Typic Fluvaquent series is hydric criteria code 4 which means that the soil is frequently flooded for long durations or very long durations during the growing season. It meets hydric flooding criteria but does not meet saturation or ponding criteria.

The majority of soil series found within the project area are in Hydrologic Soil Group B (Table 5). Soils in this group have moderately low runoff potential when thoroughly wet and water transmission through the soil is unimpeded (USDA NRCS 1997).

Table 5. NRCS Hydrologic Soil Groups of the Soil Series Present within the $GUCO_2$ Disturbance Area (USDA NRCS 1997).

Series	Hydrologic Soil Group
Alvoca	B
Aquic Ustifluvents	N/A
Boettcher	C
Brownsto	B
Diamandville	C
Forelle	B
Lupinto	B
Pinelli	C
Stunner	B

Soil Limiting Factors

Based on the pre-disturbance site assessment, physical and/or chemical soil limiting factors within the disturbance area include coarse fragments, high erosion potential, shallow soils, high salinity/sodicity, and high calcium carbonate content. Generally, coarse fragments are a soil limiting factor throughout the disturbance area within Shallow Loamy and Loamy ESDs, but were less common or at lesser density within the Loamy ESD. Pedestalled plants indicating high erosion potential were primarily located in the Shallow Loamy ESD. Steep slopes in both the Shallow Loamy and Loamy ESDs are at risk for high erosion potential during construction activities. Surface horizon texture also indicates the majority of the disturbance area is susceptible to compaction as sandy loam, loam, and sandy clay loam soils compact more easily than other textures (USDA NRCS 2001a). Visual observation of rock outcrops indicating shallow soils were primarily occurred within the Shallow Loamy ESD, but were also observed in the Loamy ESD. High salinity/sodicity potential was only observed within the Saline Subirrigated ESD and within the Loamy ESD surrounding the Saline Subirrigated ESD. The NRCS soil map unit within the Saline Subirrigated ESD is Aquic Ustifluvent a soil series that has excess salts or high sodium concentrations. Calcium carbonate content issues were observed in both the Loamy and Shallow Loamy ESDs.

The NRCS rating for the construction of roads is moderate to severe which means soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possible increased maintenance are required (USDA NRCS 1997) (Table 6). Soils are generally limited for road construction by slope, flooding, frost action, shrink-swell, low strength, depth to rock, and large stones. Source of roadfill is generally rated as poor and is limited by wetness, depth to rock, shrink-swell, low strength, thin layer, slope, and large stones. These soils may have layers of suitable material, but the material is less than 3 feet thick (USDA NRCS 1997). The shallow excavation rating includes trenches dug for the proposed CO_2 pipeline and holes dug for the power line poles. Most soil series found within the disturbance area are rated as severe and are limited by cutbank caving, wetness, depth to rock, high clay content, slope, and large stones. The ratings are based on soil properties, site features, and observed performance of the soils (USDA NRCS 1997).

Soil Movement and Erosion Potential

Soil series within the disturbance area generally have moderate surface runoff, and moderate water and wind erosion hazard (Table 7). The primary indicator of soil movement observed during the pre-disturbance site assessment was pedestalled plants within the Loamy and Shallow Loamy ESDs. Rills, gullies, and sheet erosion were not observed.

Table 6. Ratings and Limitations for Road Construction, Shallow Excavation, Source of Roadfill, and Source of Topsoil of the Soil Series Present within the $GUCO_2$ Disturbance Area (USDA NRCS 1997).

Series	Roads	Limitation	Source of Roadfill	Limitation	Shallow Excavation	Limitation	Source of Topsoil	Limitation
Alvoca	Slight/ Moderate	Slope	Good	N/A	Severe	Cutbanks Cave	Poor	Small stones - Area reclaim
Aquic Ustifluvents	Severe	Flooding - Frost action	Fair	Wetness	Severe	Wetness	Good*	N/A*
Boettcher	Severe	Shrink swell - Low strength	Poor	Depth to rock- Shrink swell - Low strength	Moderate	Depth to rock - Too clayey	Poor	Too clayey - Small stones
Brownsto	Severe	Slope	Poor	Slope	Severe	Slope	Poor	Small stones - Area reclaim - Slope
Diamandville	Severe	Low strength	Poor	Depth to rock - Low strength	Moderate	Depth to rock - Slope	Fair	Depth to rock - Too clayey - Small stones
Forelle	Moderate	Frost action	Good	N/A	Slight	N/A	Fair	Too clayey
Lupinto	Moderate/ Severe	Slope	Good/ Fair	Depth to rock - Thin layer - Slope	Moderate/ Severe	Slope	Poor	Small stones - Area reclaim - Slope
Pinelli	Severe	Shrink swell - Low strength	Poor	Low strength	Moderate	Too clayey	Poor	Too clayey
Stunner	Moderate	Low strength - Slope	Good	N/A	Severe	Cutbanks Cave	Fair	Small stones - Area reclaim - Slope
Worfman	Moderate		Poor	Depth to rock	Severe	Depth to rock	Poor	Depth to rock - Small stones

* NRCS does not account for the saline modifer. According to the 110 - Aquic Ustifluvents, saline, 0-3% slopes soil map unit, most uses are limited by the wetness, flooding, salinity, and alkalinity.

Table 7: Surface Runoff and Wind and Water Erosion Potential Hazards of the Soil Series Present within the $GUCO_2$ Disturbance Area (USDA NRCS 1997).

Series	Surface Runoff	Water Erosion	Wind Erosion
Alvoca	Medium	Moderate	Severe
Aquic Ustifluvents	Slow	Slight	N/A
Boettcher	Medium	Moderate	Moderate
Brownsto	Rapid	Severe	Slight
Diamandville	Medium	Moderate	Severe
Forelle	Slow - Medium	Slight - Moderate	Moderate
Lupinto	Rapid	Severe	Slight
Pinelli	Slow	Slight	Moderate
Stunner	Medium	Moderate	Moderate
Worfman	Rapid	Severe	Moderate

Topsoil/Suitable Subsoil Salvage Depths

The NRCS rating for the suitability of soil series within the disturbance area as a source of topsoil is generally rated as poor and is limited by small stones, slope, high clay content, depth to rock, excess salt, excess sodium and reclamation difficulty (USDA NRCS 1997) (Table 6). Topsoil/Suitable subsoil depths within the disturbance area were determined based on NRCS data and field observations. Topsoil/suitable subsoil salvage depths were generally 1-2 inches for the Shallow Loamy and Saline Subirrigated ESD, 2-6 inches for the Loamy ESD, 6 inches or greater for the Subirrigated ESD (Table 8). The approximate 7 acres of previously reclaimed land within the disturbance are was determined to have 1-2 inches of suitable salvageable material. Disturbed areas, totaling approximately 36 acres were determined to have no suitable salvage material available.

Table 8: Topsoil/Suitable Subsoil Salvage Depths by ESD.

ESD (Map Units)	Plant Community	Topsoil/Suitable Subsoil Salvage Depth	Acres
Loamy (104, 129, 184, 217)	Big Sagebrush/Mixed Grass	1-2”	21.6
		2-6”	54.6
		6”+	0.3
	Rhizomatous Wheatgrass/Needle-and-thread	2-6”	2.3
		6”+	1.7
Shallow Loamy (137)	Bluebunch Wheatgrass/Rhizomatous	1-2”	66.0
		2-6”	45.7
	Limber Pine	1-2”	4.2
Saline Subirrigated	Alkali Sacaton/Basin Wildrye	1-2”	16.7
Subirrigated	Western Wheatgrass/Kentucky	6”+	1.1
Reclaimed	N/A	1-2”	7.1
Disturbed	N/A	0”	36.2

Limited Reclamation Potential

The following NRCS soil map units are considered LRP based on BLM-LFO data:

Map Unit 110 – Aquic Ustifluvents, saline, 0-3% slopes and
Map Unit 137 -Brownsto - Lupinto complex loams, 6-40% slopes.

NRCS map unit 110 is located in the NW ¼ of Section 19, T33N R85W and the SE ¼ of Section 18, T33N R85W. NRCS map unit 137 is located throughout the disturbance area. There are approximately 148 acres of LRP within the disturbance area based on BLM-LFO LRP data. However, based on field observations, LRP areas are estimated to be 132 acres and are represented on the Site Specific Reclamation Map by the AS/BW and BW/RW designations that indicate Saline Subirrigated and Shallow Loamy ESDs, respectively. The Saline Subirrigated ESD is associated with NRCS map unit 110 and the Shallow Loamy ESD is associated with NRCS map unit 137.

Vegetation

Pre-Disturbance Site Assessment Methodology

Plant communities were determined based on ESD and ocular estimation of dominant vegetation species. Dominant and sub-dominant plant species encountered in all plant communities were recorded (Appendix A). Abundance of these species was not quantitatively determined.

Potential habitat and species surveys for U.S. Fish and Wildlife Service (USFWS) threatened and endangered (T&E) and BLM-LFO designated sensitive plant species were conducted during the pre-disturbance site assessment. Potential habitat and/or individuals or populations of T&E or BLM-LFO designated sensitive plant species were recorded, photographed, and marked by GPS points.

Pre-Disturbance Site Assessment Results

The proposed $GUCO_2$ 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) (USDA 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 (USDA 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 ESD (Brazee 2008 a-e) and field observations, uplands within the proposed disturbance area of the $GUCO_2$ 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 (Table 9). 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 comprised of Alkali Sacaton/Basin Wildrye plant communities. Non-saline drainages and lowlands are dominated by Western Wheatgrass/Kentucky Bluegrass or wetland plant communities. Limber Pine is common on the southern hills of the $GUCO_2$ project area, but occurrence is limited within the proposed disturbance area.

Big Sagebrush/Mid-Grass Plant Community

The Big Sagebrush/Mid-Grass plant community is found on Loamy ecological sites primarily on level plains, slopes, and along drainage edges with shallow to moderately deep soils in the western portion of the proposed disturbance area. Big sagebrush (*Artemisia tridentata*) dominates the site. The understory is composed primarily of western wheatgrass (*Elymus smithii*), needle-and-thread (*Hesperostipa comata*), green needlegrass (*Nassella viridula*), blue grama (*Bouteloua gracilis*) prairie junegrass (*Koeleria macrantha*), Sandberg bluegrass (*Poa secunda*), and threadleaf sedge (*Carex filifolia*). Other shrub species include birdfoot sagebrush (*Artemisia pedatifida*), green rabbitbrush (*Chrysothamnus viscidiflorus*), and rubber rabbitbrush (*Ericameria nauseosa*). Total ground cover for this plant community is typically 80-90% (Brazee 2008a).

Bluebunch Wheatgrass/Rhizomatous Wheatgrass Plant Community

The Bluebunch Wheatgrass/Rhizomatous Wheatgrass plant community is found on Shallow Loamy ecological sites on rolling slopes or rough, broken topography with shallow soils primarily in the eastern portion of the proposed disturbance area. Dominant grasses within this community include bluebunch wheatgrass (*Elymus spicata*), western wheatgrass, blue grama, threadleaf sedge, and Sandberg bluegrass. Big sagebrush, birdfoot sagebrush, and green rabbitbrush are common. Total ground cover for this plant community is typically 40-60% (Brazee 2008b).

Rhizomatous Wheatgrass/Needle-and-thread Plant Community

The Rhizomatous Wheatgrass/Needle-and-thread plant community is found on Loamy ecological sites on nearly level to gentle slopes with moderately deep soils in isolated locations in the western portion of the disturbance area. This site is dominated by western wheatgrass, needle-and-thread, bluebunch wheatgrass, green needlegrass, prairie junegrass, blue grama, and Sandberg bluegrass. Shrub cover within this community is less than 25% and composed primarily of big sagebrush and rubber rabbitbrush. Total ground cover for this plant community is typically 80-90% (Brazee 2008a).

Alkali Sacaton/Basin Wildrye Plant Community

The Alkali Sacaton/Basin Wildrye plant community is found on Saline Subirrigated ecological sites located primarily in the southwestern portion of the proposed overhead electric and CO_2 pipeline corridor and access road. Common plant species within the community include alkali sacaton (*Sporobolus airoides*), Sandberg bluegrass, Nuttall's alkaligrass (*Puccinellia*

nuttalliana), western wheatgrass, tufted hairgrass (*Deschampsia caespitosa*), bluejoint reedgrass (*Calamagrostis canadensis*), and Baltic rush (*Juncus balticus*). Basin wildrye (*Elymus cinereus*) was absent in this community within the proposed disturbance area. Shrubs are a minor component of this plant community and consist of big sagebrush and rubber rabbitbrush. Total ground cover for this plant community is typically 80-90% (Brazee 2008c).

Western Wheatgrass/Kentucky Bluegrass Plant Community

The Western Wheatgrass/Kentucky Bluegrass plant community is found on Subirrigated ecological sites within ephemeral drainages with moderately deep to deep soils throughout the proposed disturbance area. Western wheatgrass, Kentucky bluegrass (*Poa pratensis*), and green needlegrass dominate. Low growing sedges and forbs are common. Silver sagebrush (*Artemisia cana*), big sagebrush, and rubber rabbit brush are present. Total ground cover for this plant community is typically greater than 95% (Brazee 2008d).

Limber Pine Plant Community

The Limber Pine plant community is isolated primarily to the steeper slopes located in the southern portion of the project area; however, isolated stands are located throughout the project area and within the proposed disturbance area on Very Shallow and Shallow Loamy ecological sites. The canopy of this community is dominated by limber pine (*Pinus flexilis*). The understory is dominated by low growing shrubs and grasses. Shrub species include birdfoot sagebrush, common snowberry (*Symphocicarpus albus*), and big sagebrush. Western wheatgrass is the dominant grass species. Total ground cover for this plant community is typically 60-80%.

Table 9: Plant Community Acreages, by ESD.

ESD	Plant Community	Acres
Loamy	Big Sagebrush/Mixed Grass	76.5
	Rhizomatous Wheatgrass/Needle-and-thread	4.1
Shallow Loamy	Bluebunch Wheatgrass/Rhizomatous Wheatgrass	111.6
	Limber Pine	4.2
Saline Subirrigated	Alkali Sacaton/Basin Wildrye	16.7
Subirrigated	Western Wheatgrass/Kentucky Bluegrass	1.1
Previously	N/A	7.1
Disturbed	N/A	36.2

Threatened, Endangered, and Special Status Plant Species

Blowout Penstemon (*Penstemon haydenii*)

Habitat suitability for blowout penstemon, within the proposed disturbance area, was evaluated based on the presence of the following characteristics: eolian sand deposits or sand deposits greater than three feet in depth, fine sandy textured soils absent of rocks and coarse fragments, wind or gravity erosion versus water erosion, slopes greater than 25%, slope elevation changes of 60 to 120 feet, vegetation cover of less than 40%, and associated plant species. Based on NRCS

soil data, soils derived from eolian sources or deep sandy soils were not present within the $GUCO_2$ proposed project area. No individuals or populations of blowout penstemon were found during field surveys and based on the lack of suitable habitat characteristics; local habitat was confirmed unsuitable for blowout penstemon. A data request from the Wyoming Natural Diversity Database (WYNND) indicates there have been no known occurrences of blowout penstemon within or near the proposed project area (WYNDD 2011).

Ute ladies'-tresses (*Spiranthes diluvialis*)

Habitat suitability for Ute ladies'-tresses, within the proposed disturbance area, was evaluated based on the presence of the following characteristics: late season perennial water source, associated vegetation species, sandy or loamy textured soils, gradual transitions between uplands and water bodies or drainages, vegetation density between 75% and 90%, vegetation height less than 18 inches, non-alkaline soils. Based on field evaluations during the appropriate timeframe, late season perennial water sources were found present within the proposed disturbance area. However, where late season perennial water sources were present, associated vegetation species, appropriate soil textures, gradual transitions, vegetation cover and density, and non-alkaline soils were not present or not present in sufficient combination to provide suitable habitat. No individuals or populations of Ute ladies'-tresses were found during field surveys, and based on the lack of suitable habitat characteristics, local habitat was confirmed unsuitable for Ute ladies'-tresses. A data request from the WYNND indicates there have been no known occurrences of Ute ladies'-tresses within or near the proposed project area (WYNDD 2011).

BLM-LFO Sensitive Plant Species

Of the eleven BLM LFO sensitive species (USDI BLM 2010), two sensitive plant species were determined to have potential habitat or were present within or in close proximity to the proposed disturbance area: Rocky Mountain twinpod (*Physaria saximontana* var. *saximontana*) and limber pine (Table 10).

Rocky mountain twinpod

Rocky Mountain twinpod is found on sparsely vegetated rocky slopes of limestone, sandstone or clay (BLM 2010). This habitat was very limited within the proposed project area (0.6 acres); only occurring at one location between the proposed CO_2 pipeline corridor and access road in the NW ¼ SW ¼ of Sec. 17, T32N R85W. A *Physaria* spp. was found at this location; however, due to the timing of the survey (after the flowering period), the plant was not identified beyond genus. This species has not been previously documented within or near the proposed project area (WYNDD 2010).

Limber pine

Limber pine occurs at timberline and lower elevations with sagebrush, usually on western slopes and isolated on eastern slopes of the Rocky Mountains (BLM 2010). Populations of this species were present within the proposed disturbance and project areas, covering approximately 90.9

acres of the project area. Of these 90.9 acres, approximately 86.7 acres occur outside of the proposed disturbance area. Isolated stands within the proposed disturbance area occur in the SE ¼ SW ¼ Sec. 15, T32N R85W; SE ¼ NE ¼ of Sec. 21, T32N R85W; and SW ¼ NE ¼, NW ¼ NW ¼, and SW ¼ NW ¼ of Sec. 22, T32N R85W encompassing approximately 4.16 acres (based on expanded disturbance boundaries). A small isolated stand of five mid-sized trees and approximately five saplings is also present between the proposed CO_2 pipeline corridor and access road in NW ¼ SW ¼ of Sec. 17, T32N R85W near the proposed 230kV distribution line. Results of the WYNDD data request did not include information for limber pine occurrences within the proposed project area (WYNDD 2011).

Table 10: BLM Sensitive Plant Species List for the Lander Field Office.

Common Name	Scientific Name	Preferred Habitat	Potential Habitat Present within Proposed Project Area	Likely to Occur
Meadow pussytoes	*Antennaria arcuta*	Moist, hummocky meadows, seeps or springs surrounded by sage/grasslands	No	No
Porter's sagebrush	*Artemisia porteri*	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes	No	No
Dubois milkvetch	*Astragalus gilviflorus* var. *purpureus*	Barren shale, badlands, limestone, and redbed slopes and ridges	No	No
Cedar rim thistle	*Cirsium aridum*	Barren, chalky hills, gravelly slopes, and fine textured, sandy-shaley draws	No	No
Owl Creek miner's candle	*Cryptantha subcapitata*	Sandy-gravelly slopes and desert ridges on sandstones of the Wind River	No	No
Fremont bladderpod	*Lesquerella fremontii*	Rocky limestone slopes and ridges	No	No
Beaver rim phlox	*Phlox pungens*	Sparsely vegetated slopes on sandstone, siltstone, or limestone substances	No	No
Rocky Mountain twinpod	*Physaria saximontana* var. *saximontana*	Sparsely vegetated rocky slopes of limestone, sandstone, or clay	Yes	Unknown

Table 10 (Continued): BLM Sensitive Plant Species List for the Lander Field Office.

Common Name	Scientific Name	Preferred Habitat	Potential Habitat Present within Proposed Project Area	Likely to Occur
Limber pine	*Pinus flexilis*	Timberline and at lower elevation with sagebrush	Yes	Yes
Persistent sepal yellowcress	*Rorippa calycina*	Riverbanks and shorelines, usually on sandy soils near high-water line	No	No
Barneby's clover	*Trifolium barnebyi*	Ledges, crevices, and seams on reddish-cream Nugget Sandstone	No	No

Weed Inventory

Pre-Disturbance Site Assessment Methodology

Surveys for Wyoming State Designated Noxious Weeds, Natrona and Fremont County Declared Weeds, and Natrona and Fremont County Weeds of Concern were conducted within the $GUCO_2$ (Wyoming Weed and Pest Council 2010a, 2010b, and Fremont County Weed and Pest 2011). Survey areas included current and proposed disturbance areas. Surveyed weed species observed during the weed inventory were GPS located or marked on aerial imagery maps. Refer to Appendix B for a list of species included in the survey efforts.

Pre-Disturbance Site Assessment Results

Three Wyoming State Designated Noxious Weeds were observed: diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*Centaurea maculosa*), and Canada thistle (*Cirsium arvense*). Six Natrona County Declared Weeds were observed: showy milkweed (*Asclepias speciosa*), cheatgrass (*Bromus tectorum*), wild licorice (*Glycyrrhiza lepidota*) (also listed as Wyoming Weed of Concern), curlycup gumweed (*Grindelia squarrosa*), halogeton (*Halogeton glomeratus*), and foxtail barley (*Hordeum jubatum*). 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. Refer to the Weed Management Plan for the $GUCO_2$ project for locations of weed species observed within the proposed project area.

Wetlands

Pre-Disturbance Site Assessment Methodology

Wetland surveys were conducted in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0). All other waters of the

United States (OWUS) were also assessed in conjunction with the wetland surveys. The routine wetland delineation approach with onsite inspection was utilized, and the survey was conducted by pedestrian reconnaissance and review of orthophotography maps.

Cabin Creek and the tributaries to Cabin Creek and Soap Creek were evaluated using pedestrian reconnaissance. The remaining small drainages, draws, and stock ponds affected by the proposed disturbances were evaluated based on combination of pedestrian reconnaissance and review of orthophotography mapping.

Identification of potential wetlands was based on visual assessment of vegetation and hydrology indicators, as well as intrusive soil sampling to determine the presence of wetland criteria indicators. United States Army Corps of Engineers (USACE) Wetland Determination Data Forms-Arid West Region (Version 2.0), were utilized for each observation point. Hydrology and soils were evaluated whenever a plant community met hydrophytic vegetation parameters based on the Dominance Test and Prevalence Index (as defined by the USACE Arid West Regional Supplement), or whenever indicators suggested the potential presence of a seasonal wetland under normal circumstances.

NRCS soil mapping for Natrona County, Wyoming were reviewed for general soils information. Potential wetlands (WoUS) and OWUS were initially identified via review of USFWS digital National Wetland Inventory (NWI) mapping. No flow data, stream gauge information or historical information of flow was reviewed or gathered for the purposes of wetland determination.

Wetland indicator categories were identified for each dominant plant species noted through use of the National List of Vascular Plant Species that Occur in Wetlands, 1988 National Summary. Region 9 (Northwest) indicator categories were utilized for the project area. Field sample locations and resulting wetland boundaries were recorded with a hand-held Garmin GPSmap 60Cx GPS unit or a Garmin III Plus GPS unit in NAD 1927 Wyoming State Plane east FIPS 4901 feet.

Pre-Disturbance Site Assessment Results

Total acreage of wetlands within the disturbance area is approximately 2.10 acres (Table 11). Dominant vegetation species include; Nebraska sedge, Baltic rush, common threesquare (*Schoenoplectus pungens*), and common spikerush (*Eleocharis palustris*). Field observations indicated that there was not the presence of wetlands at the proposed CO2 injector well pad locations. These areas were dominated by upland vegetation and hydric soils were not present. Refer to Appendix C and the Site Specific Reclamation Map for wetland locations.

Table 11: Total Wetland Acreages Affected by Disturbance Activities.

Pipeline	Road	Over Head Power	Total
1.50	0.03	0.57	2.10

Approximately 0.14 acres are classified as Palustrine Emergent, seasonally flooded (PEMC) wetlands, and approximately 1.97 acres are classified as Palustrine Emergent, saturated (PEMB) wetlands (Cowardin 1978) (Table 12). These wetlands were located within intermittent and ephemeral drainages or either natural or manmade open water. Hydrology for most wetlands within the disturbance area is dependent upon spring runoff and precipitation. However, the hydrology of some wetlands located within the disturbance area, is potentially maintained by seeps or is groundwater fed. Although the majority of the wetlands were found along and within existing drainage bottoms, the wetlands generally were not continuous along the entire length of the drainages.

Table 12: Total Wetland Acreages and Total Linear Feet of OWUS within the Disturbance Area.

PEMC	PEMB	OWUS
0.14 Acres	1.97	1252.64

The road placement located in the NW ¼ of section 19, T33N R85W was not surveyed during the 2011 fieldwork. The alignment of this road segment was altered after fieldwork was conducted and field conditions prohibited any additional surveying to be carried out at this time. The majority of the road placement follows an existing two-track; however, there are two seceding sections that differ from the existing route. These two segments are located on potential wetlands based on aerial photography, proximately to historical NWI mapping, and field observations. Additional fieldwork on this road segment may be conducted at the USACE's request.

Reclamation Potential, Mitigation Measures for Soil Limiting Factors, and Erosion Control Practices

Reclamation Potential

Reclamation potential was determined utilizing the data collected during the pre-disturbance site assessment as outlined in Table 13 as well NRCS ESD and soil data. Each ESD and/or NRCS Map Unit was designated as having low, fair, or good reclamation potential based upon the dominate plant community, topsoil/suitable subsoil salvage depth, soil limiting factors, and LRP designation.

Table 13: Reclamation Potential Based on Pre-Disturbance Site Assessment Data

Reclamation Potential	Low or Limited	Fair	Good
Topsoil/Suitable Subsoil Salvage Depth	1-2"	2-6"	6"+
Slope	Steep (>25%)	Moderately Steep (6-24%)	Relatively Flat (0-5%)

Aspect	South	West	North or East
Soil Texture	Sandy or Clay	Loam or Silt	Loam
Soil Limiting Factors	High Salinity/ Sodicity, pH, High % Coarse Fragments,	Moderate % Coarse Fragments, $CaCO_3$ content	None
Wind and Water Erosion Potential	Severe	Moderate	Slight
Success without Mitigation Measures	Low	Fair	Good
Success with Mitigation Measures	Fair	Good	Good
Suggested Reclamation and Stabilization Practices	Seed, Velocity Controls, and Soil Stabilization/ Hydro-Mulch/Erosion Control Blankets	Seed, Straw Mulch, Velocity Controls, and Soil Stabilization Products	Seed, Straw Mulch, and Velocity Controls as necessary dependent of slope

All areas designated as Shallow Loamy or Saline Subirrigated are indicated by BW/RW, LP, or AS/BW vegetation community labels on the Site Specific Reclamation Map and are designated as LPR based on the BLM-LFO (Table 14). Subirrigated ESD areas designated as WW/KB on the Site Specific Reclamation Map have good reclamation potential. Loamy ESD areas designated as BS/MG and RW/NT on the Site Specific Reclamation Map have low to good reclamation potential depending on topsoil/suitable subsoil salvage depths. Previously reclaimed areas have low reclamation potential and are designated on the Site Specific Reclamation Map as RECA. Disturbed areas, indicated as D on Site Specific Reclamation Map, have low reclamation potential. Wetlands, indicated by WET on the Site Specific Reclamation Map were not assigned reclamation potential as these areas will be minimally disturbed during the construction process.

Table 14: Reclamation Potential Classification.

ESD	Soil Map Unit	Plant Community	Topsoil/Suitable Subsoil		
			1-2”	2-6”	6”+
Loamy	104, 129, 184, 217	BS/MG or RW/NT	Low	Fair	Good
Shallow Loamy	137	BW/RW or LP	Limited	Limited	N/A
Saline Subirrigated	110	AS/BW	Limited	N/A	N/A
Subirrigated	Map Unit	WW/KB	N/A	N/A	Good
Previously Reclaimed	Map Unit	N/A	Low	N/A	N/A

Reclamation potential of these areas will remain at their designated reclamation potential without incorporation of mitigation measures other than seeding. However, with the addition of the recommended mitigation measures, based on the soil limiting factors, the reclamation potential rating can increase one step, i.e., low and limited reclamation potential areas can achieve fair

reclamation success with the incorporation of the following mitigation measures and erosion control practices.

Mitigation Measures for Soil Limiting Factors

Due to the presence of shallow soils and high coarse fragment content in the Shallow Loamy ESD and high salinity/sodicity potential in the Saline Subirrigated ESD, appropriate equipment will be utilized during the topsoil/suitable subsoil salvage process to ensure the appropriate amount of material is removed and salvaged. Mixing of suitable and undesirable material will be avoided. Gypsum application is recommended to mitigate potentially high salinity/sodium within the Saline Subirrigated ESD and portions of the Loamy ESD directly adjacent to the Saline Subirrigated ESD. Species within the recommended reclamation seed mix are adapted to coarse or droughty soils; however, weed free straw mulch or a similar product should also be applied to the soil surface to increase soil moisture retention the success of reclamation seeding practices. Straw mulch additions will increase surface organic matter; however, organic soil amendments, such as Biosol/Sustane, are recommended to increase soil fertility within the areas designated as LRP, previously reclaimed areas, and disturbed areas. Appropriate erosion control measures will be implemented to reduce wind and water erosion potential in all ESDS. Refer to Table 15 for a tabular presentation of mitigation measures for soil limiting factors.

Table 15: Mitigation Measures for Soil Limiting Factors

Soil Limiting Factor	**Mitigation Measure**
$CaCO_3$ (strong to violent reaction with HCl)	Use of seeded species adapted to soils with high lime content or salt tolerant species.
Coarse Fragments/Droughty	Weed free straw mulch addition to increase soil moisture retention and use of seeded species adapted to coarse soils.
Erosive	Stabilize erosive material with the use of the appropriate erosion control practices.
High Clay Content	Reduce soil compaction caused by construction activities prior to seeding with ripping or similar techniques based on the degree of compaction. Weed free straw mulch addition to increase soil moisture retention and increase organic matter content of the soil.
High Sand Content	Addition of soil organic amendments to increase soil fertility, use of seeded species adapted to coarse soils, and erosion control practices to reduce wind and water erosion.
Low Organic Matter Content	Straw mulch to increase soil organic matter at the surface and use of soil organic amendment (Biosol/Sustane) to increase soil fertility.
pH (<5.5 or >8.4)	Addition of soil chemical amendments - Gypsum for high pH associated with sodium and lime for low pH.
Salinity	Use of seeded species adapted to soils with high salt content.

Sodium (high pH or >10 dS/m)	Addition of soil chemical amendments - Gypsum.
Shallow (depth to bedrock is < 20 inches)	Use of appropriate equipment and extreme care during the topsoil/suitable subsoil salvage process to avoid mixing of suitable and undesirable material.

2.0 SURFACE DISTURBING ACTIVITIES

Management of Waste Materials

Waste management for this area is addressed in the Master Surface Use Plan, Surface Use Plan of Operations, or Waste Management Plan for this project area.

Subsurface Integrity, Surface and Ground Water Protection

Rat holes and/or mouse holes will be backfilled and compacted from bottom to top immediately upon release of the completion rig from the drilling location to ensure surface integrity. Drill cuttings and mud, including any drilling additives utilized in the mud system, will remain in the reserve pit until dry or until fluids have been removed and disposed of properly. Reserve pits will be designed to prevent the collection of surface runoff and will be constructed entirely in cut on the uphill side of the well location. Reserve pit will be lined with reinforced synthetic liner (plastic/vinyl) with a permeability less than or equal to 10^{-7} cm/second and will be chemically compatible with all substances which may be put into the pit. Pit liners will be installed with sufficient bedding (either straw or dirt) to cover any rocks, will overlap the pit walls, extend under the mud tanks, and be covered with dirt and/or rocks to hold it in place. No material that could puncture the liners s (i.e., trash, scrap pipe, etc.) will be disposed of in the reserve pit.

The reserve pit will not be "squeezed", "crowded", or "cut" until dry and typically will be backfilled within 180 days after first production, unless weather or wildlife stipulations preclude such activities. If the reserve pit does not dry, alternate methods of drying, such as removal of fluids or other treatment will be developed. When the pit is backfilled, cuttings and drilling mud will be covered with a minimum depth of three feet of suitable material, prior to reclamation.

Containment structures sufficiently impervious to prevent unwanted discharge will be utilized, as necessary. Types of containment structures may include containment dikes or walls, or drip pans. A containment dike will be constructed completely around those production facilities designed to hold fluids (i.e., production tanks, produced water tanks and/or heater/treater). These dikes will be constructed of compacted subsoil, be impervious, hold 110% of the capacity of the largest tank, and be independent of the back cut. Topsoil or coarse spoil material would not be used for the construction of containment dikes.

Pits will be reclaimed to a safe and stable condition and restored to a condition that blends with the rest of the reclaimed well pad area. To prevent contamination of surface water or ground water, pits will not be constructed in areas of shallow groundwater or natural water courses. Pits

will be properly constructed to prevent leaks. Synthetic pit liners will be buried on site. A minimum of three feet of suitable material will be placed over the buried pit liner, prior to reclamation. When other materials such as bentonite or clay are used, liners will be treated to prevent reemergence to the surface or to prevent long-term successful re-vegetation. Unsuitable soil material will be slightly mounded over the pit to account for subsidence and positive surface drainage.

Management of Topsoil/Suitable Subsoil and Undesirable Subsoil

Salvage of topsoil and suitable subsoil is an important component of the reclamation process. Topsoil is the most fertile portion of the soil profile as it contains the most organic matter. Suitable subsoil can provide additional plant growth medium that is adequate from chemical and/or physical characteristics. Its salvage and use is essential since actual topsoil depth is limited in arid/semi-arid environments. Disturbance will be limited, wherever possible, to minimize disturbance of the soil resource.

Topsoil/suitable subsoil will be handled separately from unsuitable subsoil. Depth of topsoil/suitable subsoil to be removed from this site is typically one to six inches. During topsoil/subsoil removal, extreme care will be taken to prevent the mixing of soil from different ESDs to avoid mixing of productive and less productive soils types. Contractors will be briefed and/or trained to carry out the engineering design for this site, including removal of topsoil/suitable subsoil of varying depths. Where possible, EP will use brush-hogging to facilitate topsoil/suitable subsoil removal by reducing vegetation growth that would limit or hinder salvage by equipment. All limber pine or other trees within the construction disturbance boundary will be cut prior to topsoil removal.

Topsoil/suitable subsoil will be removed as prescribed on the Site Specific Reclamation Map and clearly segregated from undesirable subsoil and paralithic or lithic material during construction. Topsoil/suitable subsoil stockpiles will be no deeper than 13 feet. Slopes will not exceed 5:1 to allow for seeding, if necessary, and to minimize erosion. Topsoil/suitable subsoil salvage piles will have signs designating the material as “topsoil” for easy identification. At a minimum, topsoil/suitable subsoil piles will be separated by three feet from undesirable material to prevent contamination of the topsoil/suitable subsoil material and provide enough space for the movement of equipment between piles. If the work area allows, topsoil will be segregated from suitable subsoil, each pile will be treated in the same manner described above for “topsoil” piles.

To minimize the surface disturbance, only equipment that is appropriate to the scope and scale of the work will be used. Access to construction work will be suspended when excessive rutting or resource damage will occur, and construction activities will not occur when soils are frozen. All soil material (i.e., topsoil/suitable subsoil and undesirable subsoil) disturbed will be placed in an area where it can be retrieved and where the material does not impede watershed and drainage flows.

Topsoil/suitable subsoil will not be stockpiled for longer than 10 months, unless wildlife stipulations preclude topsoil/suitable subsoil replacement within this timeframe. In general, topsoil stockpiles will be protected from water and wind erosion within 30 days of construction completion. Topsoil/suitable subsoil stockpiles are anticipated to be small, short-term stockpiles. Due to the anticipated size of the new stockpiles, the side slopes of the stockpiles will not be significant and, therefore, will not be seeded unless the soil is stored longer than one growing season. Ditches or berms will be constructed around the stockpiles to prevent soil loss during high-intensity rain events. In the event the 30 day time frame cannot be met at a given site, this will be communicated with and approved by the BLM-LFO AO before being implemented and further measures will be conducted to stabilize stockpiled topsoil/suitable subsoil, if necessary. Measures will be taken to mitigate prevailing wind erosion, water erosion, sloughing due to gravity, and temperature impacts during stockpiling to ensure topsoil/suitable subsoil stabilization and ultimate reclamation success at disturbed sites. Topsoil/suitable subsoil may be stockpiled for longer than 10 months if wildlife stipulations limit the amount of activity that can occur at the site. In this event, topsoil/suitable subsoil stop piles will be seeded with annual ryegrass (*Lolium multiflorum*) at the rate of 10 lbs/acre.

If disturbance occurs within a wetland, approximately 12 inches of topsoil/suitable subsoil will be salvaged. Salvaged topsoil/suitable subsoil will be stored within the wetland to prevent mixing of wetland and upland soils. Only tracked equipment will be used to remove topsoil/suitable subsoil from wetland areas. Topsoil/suitable subsoil will not be stored for more than 30 days.

Re-establishment of Slope and Surface Stability and Topographic Diversity

Disturbed areas not required for ongoing production will be reconstructed to approximate the original contours that are consistent with the land use plan leaving a safe work area for well maintenance. Disturbance of previously reclaimed areas may be required, during final reclamation, to recontour the remaining disturbance area to approximately the original contours or consistent with the land use plan. Geomorphic stability and topographic diversity of the reclaimed topography will be maximized with recontouring techniques appropriate to the site, based on pre-disturbance characteristics. No highwalls, cut slopes and/or topographic depression will be left, unless otherwise approved by the BLM-LFO AO.

Soil compaction is addressed in section 3.0 Site Preparation and Seeding – Site Preparation of this document.

Re-establishment of Visual Composition

The reclaimed landscape features will blend into the adjacent undisturbed area, to the extent possible, and conform to the land use plan. Scenic quality of the area will not be degraded in the long term. The recommended seed mix for this area was based on pre-disturbance site assessment observations and qualitative vegetation data collection. Recommended seeding rates

compliment pre-disturbance plant community composition; in addition, native species should encroach into the reclaimed area to increase visual composition similarity between disturbed and undisturbed plant communities.

Erosion Control Practices

Soil erosion and sediment controls will be implemented as soon as practical and safe to do so during the construction phase of the project. Soil stabilization will be completed within 30 days from the start of construction unless otherwise identified as such to the BLM-LFO AO. This includes the salvaging and storage of topsoil/suitable subsoil during construction and replacement of such topsoil/suitable subsoil during reconstruction.

When determining the need and type of erosion controls and stabilization methods, EP will use the criteria outlined in the BLM Gold Book or the Wyoming Department of Environmental Quality (WDEQ) storm water standards.

Due to the flat to moderately steep slopes (0-20%) and wind and water erosion potential at this site, the following velocity controls/sediment filtration devices are recommended.

Slope breakers including straw wattles or fiber rolls are generally utilized on roadside ditches and ditch turn outs, as well as on roadsides, well pads or corridor slopes, as a means to reduce the slope length, redistribute any concentrated flow, reduce the velocity of flow, and hold seed in place so vegetation can become permanently established. On 4:1 slopes, wattles should be placed approximately 40 feet apart along the contour with a slight downward angle at the end of each row to prevent ponding. Wattles should be installed in shallow trenches dug two to five inches deep.

Surface roughening scarifies the ground surface to increase soil moisture retention and avoid smooth, hard-packed surfaces which decrease water retention, and accelerate surface runoff. Disking or other scarifying techniques can be utilized. Equipment tracking can be used to create furrows or benches across the grade contours. This is generally completed on slopes of 2:1 or less.

Weed free straw mulch can be used to provide erosion control and promote germination on recently seeded areas. Properly anchored straw mulch simulates a root system providing wind and surface erosion control by stabilizing the soil. Germination is enhanced through increased soil moisture retention.

Soil stabilization polymers (e.g., PAM12, Flexterra FGM, or CONWED 1000) are generally utilized to control erosion and promote site stabilization in areas that are highly susceptible to erosion.

Vegetative buffers, such as grasses and shrubs, diversion ditches, or earthen berms are generally utilized to control sheet and rill erosion, trap sediment, distribute water flow over a broader area, and divert run-off from undisturbed areas. These methods can be used to divert water from work areas, as well as, reclaimed areas.

Snow fences may be used to prevent erosion of soils by wind prior to vegetation establishment and to increase snow capture.

Berms may be used as a run-on control above disturbed areas.

Straw bale barriers may be used to surround stockpiles or as a perimeter control below disturbed areas.

Erosion control, jute, or excelsior matting will be used on steeper slopes to prevent soil loss by stabilizing and protecting disturbed soil from raindrop impact and surface erosion, increase infiltration, decrease compaction and soil crusting, and conserve soil moisture.

Silt fences may be placed between the disturbed and reclaimed areas and small drainages.

Water bars will be constructed on the reclaimed portions of the producing well location at least one foot deep, on the contour, with approximately two feet of drop per 100 feet of water bar to ensure drainage, and extended into established vegetation. All water bars will be constructed with the berm on the downhill side to prevent soft material from silting in the trench. The initial waterbar will be constructed at the backslope with a subsequent waterbar constructed at the top of the fill slope.

Sediment traps will be installed below the fill slope of constructed well pads. Sediment traps will be maintained until the fill slope has been reduced and re-seeded.

Installed culverts may be rock armored and sediment filtration devices will be used to reduce the velocity of flow.

Slash barriers (utilizing the cut limber pine trees) may be used as a filter berm on revegetated areas along steep slopes within this community, within constructed drainages, or as perimeter control below disturbed areas and will be installed according to similar erosion control measures.

Guidance for drainage features such as culverts and wing ditches will be completed in accordance with BLM Manual 9113 – Roads and the Gold Book, Chapter 4 – Construction and Maintenance.

Reconstruction and Stabilization of Water Courses and Drainage Features

Drainage features and water courses will be avoided to the maximum extent possible. However, if disturbed, drainages will be reclaimed in a manner that maintains the drainage pattern, profile, and dimension to approximate the natural features found in nearby naturally functioning basins and to reconstruct and stabilize stream channels, drainages, and impoundments to exhibit similar hydrologic characteristics found in stable naturally functioning systems (USDI BLM 2009). Wetlands within drainages or water courses will be bored under on the pipeline and avoided by power line construction. Wetland disturbances associated with road construction are small and will be minimized to the extent possible.

3.0 SITE PREPARATION AND SEEDING

Site Preparation

Seedbed preparation will be conducted, whenever possible, when soil conditions are appropriate, i.e., a weak ball can be formed from soil two to three inches below the surface (Strom et al. 2010) and immediately prior to seeding to avoid off-site loss of replaced soil. Areas determined to have high levels of soil compaction, based on soil testing or visual observation (USDA NRCS 2001) will be ripped or chisel plowed, dependent on the level of soil compaction, prior to or in conjunction with seedbed preparation. Ripping will only be necessary in areas where topsoil/suitable subsoil has been removed and the undesirable subsoil has been severely compacted (i.e., water infiltration and holding attributes of the soil have been significantly reduced). In these cases, the area should be ripped 12-24 inches prior to respreading topsoil/suitable subsoil. Areas with moderate soil compaction will require chisel plowing to a depth of 10-24 inches and areas with minor soil compaction will require disking to a depth of 6-12 inches. These treatments will relieve unsuitable subsoil compaction to promote the downward growth of new seedlings roots, increase root penetration, and increase water infiltration. Sandy or silty textured soils will not be ripped due to potentially detrimental effects to soil structure and is unnecessary.

After the area site has been initially prepared and recontoured, the topsoil/suitable subsoil will be respread in a manner similar to the original vertical profile and additional tillage practices may be necessary (i.e., chisel plowing and disking). If topsoil and suitable subsoil are stockpiled separately (based on work area allowances), suitable subsoil will be replaced prior to the replacement of topsoil. Additional tillage practices will be done to a depth that will not incorporate underlying material that could potentially degrade respread topsoil/suitable subsoil (generally no more than 4-6 inches). Areas should be chisel plowed or disked parallel to the contour of the land to reduce erosion potential. Finish tillage with a cultipacker, roller harrow, spring tooth harrow, or clod buster should be conducted after plowing or disking to develop a firm seedbed. If a no-till range drill is used, finish tillage will not be necessary since the press wheels of the no-till drill firm the seedbed directly over the seed. Leaving the surface rough after disking/plowing or roughening of the surface with scarification techniques also provide an initial deterrent to soil erosion by wind and water, enhance water infiltration, and capture snow. Ideal seedbeds should have clods no greater than two inches in diameter and a 170 pound person should leave a footprint no deeper than ½ inch. (Strom et al. 2010)

Pre-Seeding Soil Analysis

Pre-seeding soil analysis may be utilized to ensure suitable surface and subsurface physical, chemical, and biological properties are present to support the long term establishment and viability of a desired plant community (USDI BLM 2009). Soil sampling would be conducted, after topsoil/suitable subsoil replacement and prior to seeding. The addition and incorporation of soil amendments would be based on results of the soil analysis. Methods for incorporation of

soil amendments into the respread topsoil/suitable subsoil would be provided to the BLM-LFO AO.

Seeding

The short-term goal of seeding is to re-vegetate and stabilize the disturbed site. The long-term goal is to establish species composition, diversity, structure, and total ground cover appropriate for the desired plant community (USDI BLM 2009), ecological site, or current soil characteristics. Seeding should result in a self-sustaining plant community that meets both short and long term goals. Where appropriate, critical resource value will be enhanced by augmenting plant community composition, diversity, and/or structure (USDI BLM 2009).

Seeding will take place the first appropriate season following topsoil/suitable subsoil replacement. Seeding between October 15 and April 15 is the most effective throughout Wyoming because late winter/early spring is the most reliable period for moist soil conditions (Strom et al. 2010). In general, fall seeding (between September 15 and when the frost line is deeper than four to six inches) in central Wyoming has been more successful than spring seeding (when the frost has left the ground but prior to June 1). EP will seed conduct fall seeding where possible. If necessary spring seeding will be conducted after the frost has left the ground and prior to May 15. In order to remain compliant with wildlife timing stipulations, seeding dates may be adjusted from the optimal timing stated above.

Due to the relatively flat slopes, drill seeding with a no-till drill is recommended for this site. Drill seeding is recommended for most grasses and large-seeded shrubs and forbs that need to be planted at least ¼ inch deep and where the seedbed is fairly smooth and flat. Drill seeding is preferred for soil to seed contact, positive depth control, proper seeding rate (once calibrated), and minimum amount of seed usage. Broadcast seeders are recommended for very small, fluffy, or uneven seeds that need to be planted 1/16 to 1/8 inches deep. Modern range drills may be capable of drill and broadcast seeding (i.e., Brillion).

Seed Mix and Rate of Seeding

The following seed mixes and rate of seeding is only recommended, due availability of seed or changes in soil quality due to salvage, the seed mix and rate of seeding may change. Any changes to the following seed mix and/or seeding rates will be submitted for approval by the BLM-LFO AO as an amendment and/or revision to this document, prior to seeding.

Wherever possible, seed will be certified weed free or “blue tag. Seed that is over six months from the last test for germination and viability on the seed tag will not be used. Source of each seed species will be locally adapted based on the overall climate in the area, and site and ecological setting, as well as, genetically-appropriate (USDI BLM 2009).

The drill seeding rate for the recommended Shallow Loamy/Loamy seed mix is suggested at approximately 10 PLS lbs/acre (Table 16), and the Saline Subirrigated seed mix is suggested at

approximately 14 PLS lbs/acre (Table 17), based on recommendations from Granite Seed Company. Although drill seeding is the preferred method of seeding for this site, if the seed is broadcasted, then this seeding rate should be doubled. Refer to Tables 18-19 for the recommended seed mix and seeding rate for drill seeding.

Table 16: Shallow Loamy/Loamy Seed Mix.

Common Name	Scientific Name	PLS lbs/acre
Western wheatgrass	*Elymus smithii*	3.00
Bluebunch wheatgrass	*Elymus spicata* ssp. *spicata*	2.00
Needle-and-thread	*Hesperostipa comate* ssp. *comata*	2.00
Prairie junegrass	*Koeleria macrantha*	0.15
Green needlegrass	*Nassella viridula*	1.00
Sandberg bluegrass	*Poa secunda* ssp. *sandbergii*	0.25
Blue grama	*Bouteloua gracilis*	0.25
Western yarrow	*Achillea millefolium* var. *occidentalis*	0.10
Hairy false golden aster	*Chrysopsis villosa*	0.10
Silverleaf lupine	*Lupinus argenteus*	1.00
Scarlet globemallow	*Sphaeralcea coccinea*	0.10
Wyoming big sagebrush	*Artemisia tridentata* ssp. *wyomingesis*	0.10
	Total	10.05

Table 17: Saline Subirrigated Seed Mix.

Common Name	Scientific Name	PLS lbs/acre
Great basin wildrye	*Leymus cinereus*	4.00
Alkali sacaton	*Sporobolus airoides*	0.50
Western wheatgrass	*Elymus smithii*	4.00
Bluebunch wheatgrass	*Elymus spicata* ssp. *spicata*	3.50
Prairie junegrass	*Koeleria macrantha*	0.25
Tufted hairgrass	*Deschampsia cespitosa*	0.50
Sandberg bluegrass	*Poa secunda* ssp. *sandbergii*	0.50
Little bluestem	*Schizachyrium scoparium*	1.00
	Total	14.25

As no disturbance will occur within 500 feet of wetlands, re-seeding within wetlands will not occur. Subirrigated seed mixes were not developed as this ESD was most commonly present along wetland edges, it is assumed that this ESD and associated plant communities will not be affected by the disturbance and therefore not require re-seeding. Limber pine seedlings are available for purchase, and will be acquired if necessary for final reclamation. Limber pine will not be re-seeding during interim reclamation.

Seedling Protection

Appropriate measures will be implemented after seeding to increase seeding establishment. Due to the textures of the topsoil/suitable subsoil salvage material and moderate to severe wind erosion potential, a soil stabilization product is recommended to stabilize the potentially erosive material. Weed free straw mulch application, recommended to mitigate coarse fragments/soils, will provide temporary protection from erosion by holding the seed and replaced topsoil/suitable subsoil in place, as well as, increase soil moisture retention, and moderate soil temperatures providing conditions conducive to plant establishment. Roughening of the soil surface during seed bed preparation will also increase soil moisture retention by capturing moisture and slowing water and wind erosion. If necessary, additional erosion control measures will be implemented to ensure the establishment of a self-sustaining plant community after disturbance. Additional measures may include velocity controls, snow fence, or erosion control matting. The site will only be fenced off, if livestock or wildlife grazing impede establishment of the plant community.

4.0 MANAGEMENT OF INVASIVE SPECIES

Post Construction Management and Reporting

Weed species, including state designated noxious weeds as well as Fremont and Natrona County declared weeds and weeds of concern were mapped as indicated above.

Annual monitoring results, pesticide application records, and pesticide use reports will be filed in accordance with the BLM-LFO requirements as stated in the Weed Management Plan. Unpredicted weed issues, that may arise during the reclamation process, not covered under the current Weed Management Plan will be addressed through an amendment and/or revision the either the Weed Management Plan or this document. Any changes will be submitted for approval by the BLM-LFO AO, prior to implementation.

5.0 MONITORING PLAN

The purpose of monitoring is to assess and ensure re-vegetation is progressing toward final reclamation success criteria. As this project crosses four ESDs and six plant communities, six reference areas will be established for purposes of determining successful interim and final reclamation. These reference areas will be determined by EP and the BLM-LFO AO prior to initiation of construction. Each reference area will be located adjacent to the disturbance and be representative of the disturbed area with regard to aspect, soils, vegetation, and ESD.

Qualitative data will be collected as part of the WDEQ Storm Water Pollution Prevention Plan (SWPPP) and may be used to supplement reclamation monitoring that would be required by the BLM-LFO. During construction, qualified personnel will inspect disturbed areas, control measures, and locations where vehicles enter or exit the site, at least once every 14 calendar days

and within 24 hours of any precipitation and/or snow melt even with exceeds 0.5 inches. Inspection reports will determine if erosion practices are functioning properly or if erosion control devices are in need of repair. Corrective action will be taken to repair and correct deficiencies recorded by inspectors. EP will keep a record of all inspections completed for the $GUCO_2$ SWPPP reports. Inspection reports will be available for review at the EP office.

Following construction completion, but prior to return of the project area to "stabilized" conditions, reclamation and erosion control monitoring will be completed monthly by qualified personnel. Inspection reports will determine if erosion controls are functioning properly of if erosion control devices are in need of repair and if reclamation is successful. Corrective action will be taken to repair and correct deficiencies recorded by inspectors. Inspection reports will be available for review at the EP office. Both qualitative and quantitative methods will be used to monitor the revegetation success of the project until it is deemed "stabilized". A site will be considered "stabilized" when the area has uniform perennial vegetation cover that is 70% or greater than the adjacent background cover (Sahl 2006).

Quantitative vegetation monitoring will be conducted annually, during the second growing season, in conjunction with or in addition to monthly SWPPP monitoring. Annual monitoring will be conducted during the growing season (May 15-August 31) to provide the most accurate vegetation data. Sampling will occur within a two week time frame each year, based on the date of the first year of monitoring. Sampling dates will be submitted within an annual report to the BLM-LFO (the annual report). Monitoring methodology will be in accordance with a BLM approved monitoring protocol (Refer to Appendix D for recommended methodology). Monitoring methodology will be submitted within the annual report. Quantitative basal cover data collected will compare disturbed area to adjacent reference areas. At a minimum cover data will be reported as percent grasses, forbs, shrubs, invasive species, noxious weeds, bare ground, litter, rock, as well as, total vegetation cover and total ground. Quantitative data will be collected for soil movement/erosion and grazing. Photo reference points will be established and photos will be submitted within the annual report.

The following criteria, according to Appendix D – Reclamation Objectives and Standards of the LFO Resource Management Plan (USDI BLM LFO 2011b), must be met to attain reclamation success:

Percent Ground Cover

- 90% of the Erosion Indicator as listed on the NRCS ESD Reference Sheet

Plant Species Composition

- At least 75% of the total plant species cover must be major grasses, forbs, and shrubs for the desired ESD plant community or BLM-LFO authorized seed mix
- At least 5% of the total plant species cover must be woody plants for the desired ESD plant community

- At least 5% of the total plant species cover must be forbs for the desired ESD plant community
- No greater than 15% of the total reclaimed area will be composed of declared or invasive weed species
- No greater than 35% of a 500 square foot contiguous reclaimed area will be composed of declared or invasive weed species
- No state of federal designated noxious weeds present

Site Stability, Erosion Potential, and other Variables

- Meet NRCS Reference Sheet Indicators for the desired ESD with the following exceptions:
  - Soil surface structure and soil organic matter content
  - Average percent of liter cover and depth
  - Expected annual production

All reclamation monitoring data will be tracked in a geo-spatially referenced database. This database will contain both reclamation data and surface disturbance data (feature class). Feature classes will be updated as disturbance occurs. Refer to Table 18 for a list of common reclamation database attributes. The annual report will be submitted to BLM-LFO annually, no later than December 31 of each year after one full growing season following seeding; the database will be submitted upon request by the BLM-LFO. The following will be addressed in the annual report:

10 requirements of the Wyoming Reclamation Policy

Requirements of the BLM-LFO RMP reclamation objectives and standards

Requirements of the Onshore Oil and Gas Orders

Identify if BLM-LFO RMP reclamation objectives and standards are likely to be achieved in the near future without additional actions

Identify actions that have been or will be taken to meet the BLM-LFO RMP reclamation objectives and standards

Initial disturbance acreages

Successful interim reclamation acreages

Successful final reclamation acreages

After final reclamation has met the standards for successful reclamation, pertinent reclamation data will be presented to the BLM-LFO AO for further review. EP will then file a final abandonment notice and request that the bond be released from the location.

Table 18: List of Common Geo-database Features.

Location Information	Seeding Information (cont.)
Project Name	Seed Mix
Reporting Year	Seeding Date
Project Type	Seeding Method
WYW#	Copy of Certified Seed Tag
API #	Seeding Rate
Township	Seeded Area
Range	Interseeding or Reseeding Date
Section(s)	General Reclamation Information
QtrQtr	Erosion Control Measures
Coordinate System	Mitigation Measures
Surface Ownership	Methods for Livestock Exclusion
Mineral Ownership	Weed Information
Pre-Disturbance Information	PUP Number
Site Assessment Date	Contractor Information
Ecological Site Description	Treatment Date
Sampling Method	Species Treated
% Grasses	Method of Treatment
% Forbs	Chemical Used
% Shrubs	Application Rate
% Succulents	Area Treated
% Invasive Species	Monitoring Information
% Noxious Weeds	Contractor Information
% Total Vegetation	Type of Reclamation
% Litter	Monitoring Date
% Rock	Monitoring Method
% Cryptograms	Growing Season
% Total Ground Cover	% Grasses
% Bare Ground	% Forbs
Construction Information	% Shrubs
Contractor Information	% Succulents
Construction Start Date	% Invasive Species
Construction Completion Date	% Noxious Weeds
Disturbance Area	% Total Vegetation
Earthwork Information	% Litter
Contractor Information	% Rock
Earthwork Completion Date	% Cryptograms
Soil Preparation Ripping Depth	% Total Ground Cover
Reclaimed Area	% Bare Ground
Seeding Information	Erosion Features
Contractor Information	Grazing
Seedbed Preparation Methods	Reclamation Successful
Soil Amendments	General Comments

REFERENCES

ArcGIS Online True Color Ortho World Imagery. 2011. Available online at http://services.arcgisonline.com/arcgis/services. Accessed [05/14/2011].

Brazee, B. 2008a. Ecological Site Description: Loamy (Ly) 10-14" P.Z., High Plains Southeast. U.S. Department of Agriculture, Natural Resource Conservation Service.

Brazee, B. 2008b. Ecological Site Description: Shallow Loamy (SwLy) 10-14" P.Z., High Plains Southeast. U.S. Department of Agriculture, Natural Resource Conservation Service.

Brazee, B. 2008c. Ecological Site Description: Saline Subirrigated (SS) 10-14" P.Z., High Plains Southeast. U.S. Department of Agriculture, Natural Resource Conservation Service.

Brazee, B. 2008d. Ecological Site Description: Subirrigated (Sb) 10-14" P.Z., High Plains Southeast. U.S. Department of Agriculture, Natural Resource Conservation Service.

Brazee, B. 2008e. Ecological Site Description: Wetland (WL) 10-14" P.Z., High Plains Southeast. U.S. Department of Agriculture, Natural Resource Conservation Service.

Cowardin, L.M., V. Carter, F.C. Goblet and E.T. LaRoae. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, OBS-79/31, Washington, D.C.

Federal Register July 13, 1994. Changes in Hydric soils of the United States. Washington, DC.

Fremont County Weed and Pest. 2011. Designated and Declared Noxious Weeds. Available online at: http://fcwp.org/DesignatedNoxiousWeeds/DesignatedNoxiousWeed.htm

Independent Petroleum Association of America. 2009. Reasonable and Prudent Practices for Stabilization (RAPPS) of Oil and Gas Construction Sites. Independent Petroleum Association of America, Washington, D.C.

Norton, J., and C. Strom. 2011. Successful Restoration of Severely Disturbed Lands: Identifying Suitable Soil for Salvage Prior to Disturbance. University of Wyoming, Laramie, Wyoming. B-1222.

Sahl, Barb. 2006. Fact Sheet State of Wyoming Large Construction General Permit for Storm Water Discharges Associated With Large Construction Activities. Wyoming Department of Environmental Quality, Land Quality Division reclamation guidelines.

Strom, Calvin, J. Norton, and T. Loubsky. 2010. Successful Restoration of Severely Disturbed Lands: Seeding Essentials for Reclaiming Disturbed Lands. University of Wyoming, Laramie, Wyoming. B-1204.

U.S. Department of Agriculture, Natural Resource Conservation Service. 1997. Soil Survey of Natrona County Area, Wyoming.

U.S. Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

U.S. Department of Agriculture, Natural Resource Conservation Service. 2001. Rangeland Soil Quality – Compaction (Rangeland Sheet 4). Available online at http://soils.usda.gov/sqi/management/files/RSQIS4.pdf. Accessed [06/01/2011].

U.S. Department of Interior, Bureau of Land Management. 2009. Instruction Memorandum WY-2009-022 – Wyoming Reclamation Policy. U.S. Department of the Interior, Wyoming.

U.S. Department of the Interior, Bureau of Land Management. 2010. BLM Wyoming Sensitive Species Policy and List. Wyoming Bureau of Land Management, Cheyenne, WY.

U.S. Department of Interior, Bureau of Land Management, Lander Field Office. 2011a. Draft Resource Management Plan and Environmental Impact Statement for the Lander Field Office Planning Area – Appendix D: Reclamation Objectives and Standars. Bureau of Land Management, Lander Field Office, Lander, WY.

U.S. Department of the Interior, Bureau of Land Management. 2011b. Draft Resource Management Plan and Environmental Impact Statement for the Lander Field Office Planning Area. Bureau of Land Management, Lander Field Office, Lander, WY.

Wyoming Natural Diversity Database. 2011. Data Compilation for BKS Environmental Associates, Inc. Unpublished Report. Dated July 1, 2011. Wyoming Natural Diversity Database, University of Wyoming. Laramie, Wyoming.

Wyoming Weed and Pest Council. 2010a. Weed and Pest Declared List (By County) Amended February 2011. Wyoming Department of Agriculture.

Wyoming Weed and Pest Council. 2010b. Wyoming Weed and Pest Control Act Designated List. Wyoming Department of Agriculture.

APPENDIX A

Pre-Disturbance Site Assessment List of Plant Species Observed

Scientific Name	Common Name	ESD/Plant Community						
		Loamy		Shallow Loamy		Saline Subirrigated	Subirrigated	Wetland
		BS/MG	RW/NT	BW/RW	LP	AS/BW	WW/KB	WET
Native Annual Grasses								
Muhlenbergia filiformis	Pullup muhly					X	X	X
Introduced Annual Grasses								
Bromus japonicus	Japanese brome						X	X
Native Cool Season Perennial Grasses								
Achnatherum hymenoides	Indian ricegrass						X	X
Calamagrostis canadensis	Bluejoint					X	X	X
Elymus lanceolatus	Thickspike wheatgrass	X					X	X
Elymus smithii	Western wheatgrass	X	X	X	X	X	X	X
Elymus spicatus	Bluebunch wheatgrass	X		X	X	X	X	X
Glyceria striata	Fowl mannagrass						X	X
Hesperostipa comata	Needle-and-thread	X	X	X			X	
Koeleria macrantha	Prairie junegrass	X	X	X	X	X	X	X
Muhlenbergia asperifolia	Alkali muhly					X		
Nassella viridula	Green needlegrass	X	X	X			X	X
Phalaris arundinacea	Reed canarygrass						X	X
Poa juncifolia	Alkali bluegrass						X	X
Poa secunda	Sandberg bluegrass	X	X	X	X	X	X	X
Puccinellia nuttalliana	Alkaligrass					X		
Native Warm Season Perennial Grasses								
Bouteloua gracilis	Blue grama	X		X	X			
Deschampsia cespitosa	Tufted hairgrass					X		
Distichlis stricta	Inland saltgrass							
Schizachyrium scoparium	Little bluestem					X		
Spartina pectinata	Prairie cordgrass					X		X
Sporobolus airoides	Alkali sacaton	X					X	X

Scientific Name	Common Name	ESD/Plant Community						
		Loamy		Shallow Loamy		Saline Subirrigated	Subirrigated	Wetland
		BS/MG	RW/NT	BW/RW	LP	AS/BW	WW/KB	WET
Introduced Perennial Grasses								
Agropyron cristatum	Crested wheatgrass						X	X
Agrostis stolonifera	Carpet bent					X	X	X
Bromus inermis	Smooth brome						X	X
Phleum pratense	Timothy					X	X	X
Poa pratensis	Kentucky bluegrass					X	X	X
Native Grass-likes								
Carex filifolia	Threadleaf sedge	X	X	X	X	X		
Carex nebrascensis	Nebraska sedge					X	X	X
Carex praegracilis	Silver sedge					X	X	X
Carex scirpoidea	Northern singlespike sedge					X		X
Eleocharis palustris	Common spikerush					X	X	X
Juncus balticus	Baltic rush					X	X	X
Juncus torreyi	Torrey rush							X
Schoenoplectus acutus	Hardstem bulrush							X
Schoenoplectus americanus	Chairmakers rush							X
Schoenoplectus pungens	Common threesquare							X
Schoenoplectus sp.	Rush					X		
Schoenoplectus tabernaemontani	Softstem bulrush							X
Introduced Annual Forbs								
Camelina microcarpa	Littleseed falseflax							
Chenopodium glaucum	Oakleaf goosefoot					X		X
Polygonum aviculare	Prostrate knotweed							
Polygonum persicaria	Spotted ladysthumb						X	X

Scientific Name	Common Name	ESD/Plant Community						
		Loamy		Shallow Loamy		Saline Subirrigated	Subirrigated	Wetland
		BS/MG	RW/NT	BW/RW	LP	AS/BW	WW/KB	WET
Native Perennial Forbs								
Achillea millefolium	Western yarrow	X	X	X			X	X
Allium textile	Textile onion	X						
Antennaria corymbosa	Flat-top pussytoes						X	X
Antennaria microphylla	Littleleaf pussytoes	X	X	X	X	X	X	X
Astragalus drummondii	Drummond's milkvetch	X	X			X		
Cirsium undulatum	Wavyleaf thistle	X		X				
Equisetum arvense	Field horsetail							X
Equisetum laevigatum	Smooth horsetail					X	X	X
Eremogone hookeri	Hooker sandwort	X		X	X	X		
Gaura coccinea	Scarlet gaura	X						
Heterotheca villosa	Hairy golden aster	X						
Lupinus argenteus	Silvery lupine	X		X	X			
Maianthemum stellatum	Starry false lily of the valley							X
Mentha arvensis	Wild mint						X	X
Oxytropis campestris	Field locoweed							X
Oxytropis sp.	Locoweed	X						
Penstemon sp.	Penstemon	X		X				
Phlox andicola	Prairie phlox	X		X				
Phlox hoodii	Hoods phlox	X	X	X				
Physaria sp.	Twinpod				X			
Plantago eriopoda	Redwool plantain					X	X	X
Potentilla anserina	Silverweed cinquefoil					X		X
Rumex salicifolius	Willowleaf dock					X		X
Sphaeralcea coccinea	Scarlet globemallow	X						
Symphyotrichum falcatum	White prairie aster	X				X		X

Scientific Name	Common Name	ESD/Plant Community						
		Loamy		Shallow Loamy		Saline Subirrigated	Subirrigated	Wetland
		BS/MG	RW/NT	BW/RW	LP	AS/BW	WW/KB	WET
Native Perennial Forbs (continued)								
Thermopsis rhombifolia	Golden banner	X	X	X	X		X	
Trifolium sp.	Clover						X	X
Urtica dioica	Stinging nettle							
Viola macloskeyi	Small white violet							X
Introduced Perennial Forbs								
Mentha spicata	Spearmint							X
Taraxacum officinale	Common dandelion							
Native Sub-Shrubs								
Artemisia frigida	Fringed sagewort	X	X	X				
Artemisia pedatifida	Birdfoot sagebrush	X	X	X	X	X	X	
Gutierrezia sarothrae	Broom snakeweed	X		X				
Juniperus horizontalis	Creeping juniper							X
Krascheninnikovia lanata	Winterfat	X						
Yucca glauca	Yucca				X			
Native Full Shrubs								
Artimisia cana	Silver sagebrush						X	X
Artemisia tridentata	Big sagebrush	X	X	X	X	X	X	
Chrysothamnus viscidiflorus	Green rabbitbrush	X	X	X		X	X	X
Ericameria nauseosa	Rubber rabbitbrush	X	X	X				
Ribes cereum	Western red currant							X
Rosa woodsii	Woods rose						X	X
Sarcobatus vermiculatus	Greasewood							
Symphocicarpus albus	Common snowberry				X			

Scientific Name	Common Name	ESD/Plant Community						
		Loamy		Shallow Loamy		Saline Subirrigated	Subirrigated	Wetland
		BS/MG	RW/NT	BW/RW	LP	AS/BW	WW/KB	WET
Native Trees								
Juniperus virginiana	Eastern red cedar				X			
Juniperus scopulorum	Rocky Mountain juniper							X
Pinus flexilis	Limber pine				X			
Salix amygdaloides	Peachleaf willow							X
Native Succulents								
Opuntia polyacantha	Plains pricklypear	X		X				
Noxious and Invasive Weeds								
Asclepias speciosa	Showy milkweed	X						
Bromus tectorum	Cheatgrass				X	X	X	X
Centaurea diffusa	Diffuse knapweed							
Centaurea macrocephala	Bighead knapweed							
Cirsium arvense	Canada thistle	X	X				X	X
Glycyrrhiza lepidota	Wild licorice	X						
Grindelia squarrosa	Curlycup gumweed		X		X	X	X	X
Halogeton glomeratus	Halogeton							
Hordeum jubatum	Foxtail barley	X			X	X	X	X

APPENDIX B

Pre-Disturbance Site Assessment Survey List of Weed Species

Scientific Name	Common Name	Status
Agropyron repens	Quackgrass	WY Noxious
Arctium minus	Common burdock	WY Noxious
Carduus acanthoides	Plumeless thistle	WY Noxious
Cardaria draba	Hoary cress (White top)	WY Noxious
Carduus nutans	Musk thistle	WY Noxious
Cardaria pubescens	Hoary cress (White top)	WY Noxious
Centaurea diffusa	Diffuse knapweed	WY Noxious
Centaurea maculosa	Spotted knapweed	WY Noxious
Centaurea repens	Russian knapweed	WY Noxious
Chrysanthemum leucanthemum	Ox-eye daisy	WY Noxious
Cirsium arvense	Canada thistle	WY Noxious
Convolvulus arvensis	Field bindweed	WY Noxious
Cynoglossum officinale	Houndstongue	WY Noxious
Elaeagnus angustifolia	Russian olive	WY Noxious
Euphorbia esula	Leafy spurge	WY Noxious
Franseria discolor	Skeletonleaf bursage	WY Noxious
Hypericum perforatum	Common St. Johnswort	WY Noxious
Isatis tinctoria	Dyers woad	WY Noxious
Lepidium latifolium	Perennial pepperweed	WY Noxious
Linaria dalmatica	Dalmatian toadflax	WY Noxious
Linaria vulgaris	Yellow toadflax	WY Noxious
Lythrum salicaria	Purple loosestrife	WY Noxious
Onopordum acanthium	Scotch thistle	WY Noxious
Sonchus arvensis	Perennial sowthistle	WY Noxious
Tamarix spp.	Saltcedar	WY Noxious
Tanacetum vulgare	Common tansy	WY Noxious
Euphorbia myrsinites	Myrtle spurge	Natrona County Weed of Concern
Rumex crispus	Curly dock	Natrona County Weed of Concern
Xanthium strumarium	Common cocklebur	Natrona County Weed of Concern
Asclepias speciosa	Showy Milkweed	Natrona County Declared
Bromus tectorum	Cheatgrass	Natrona County Declared
Centaurea solstitialis	Yellow starthistle	Natrona County Declared
Grindelia squarrosa	Curlycup gumweed	Natrona County Declared
Halogeton glomeratus	Halogeton	Natrona County Declared
Hordeum jubatum	Foxtail barley	Natrona County Declared
Medicago lupulina	Black medic	Natrona County Declared
Solanum rostratum	Buffalobur	Natrona County Declared
Glycyrrhiza lepidota	Wild licorice	Fremont County Weed of Concern, Natrona County Declared

Scientific Name	Common Name	Status
Hyoscyamus niger	Black henbane	Fremont County Weed of Concern, Natrona County Declared
Tribulus terrestris	Puncturevine	Fremont County Weed of Concern, Natrona County Declared
Artemisia absinthium	Absinth wormwood	Fremont County Weed of Concern
Bassia sieveriana	Russian thistle	Fremont County Weed of Concern
Cirsium vulgare	Bull thistle	Fremont County Weed of Concern
Polygonum cuspidatum	Japanese knotweed	Fremont County Weed of Concern
Potentilla recta	Sulphur cinquefoil	Fremont County Weed of Concern
Sonchus arvensis	Marsh sowthistle	Fremont County Weed of Concern
Verbascum thapsus	Common mullein	Fremont County Weed of Concern
Sphaerophysa salsula	Swainsonpea	Fremont County Declared

APPENDIX C

Pre-Disturbance Site Assessment Wetland Location

Drainage	Sample Point (SP) ID/Map ID*	Legal Description	2010/2011 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Comments	Jurisdictional Recommendation
Tributary to Poison Spider Creek	W1	Section 21 T32N R85W	Wetland	PEMC	0.06	---	Jurisdictional
Tributary to Poison Spider Creek	W2	Section 21 T32N R85W	Wetland	PEMC	0.07	---	Jurisdictional
Tributary to Poison Spider Creek	W3	Section 15 T32N R85W	Wetland	PEMC	0.36	---	Jurisdictional
Tributary to Poison Spider Creek	W4	Section 16 T32N R85W	Wetland	PEMC	0.20	---	Jurisdictional
Tributary to Poison Spider Creek	W5	Section 16 T32N R85W	Wetland	PEMC	0.06	---	Jurisdictional
Tributary to Poison Spider Creek	W6	Section 27 T32N R85W	Wetland	PEMB	0.14	---	Jurisdictional
Tributary to Poison Spider Creek	W7	Section 27 T32N R85W	Wetland	PEMC	0.05	---	Jurisdictional
Tributary to Poison Spider Creek	W8	Section 22 T32N R85W	Wetland	PEMC	0.21	---	Jurisdictional
Tributary to Poison Spider Creek	W9	Section 22 T32N R85W	Wetland	PEMC	0.19	---	Jurisdictional
Tributary to Cabin Creek	W10	Section 19 T32N R85W	---	---	---	---	---
Tributary to Cabin Creek	W11	Section 19 T32N R85W	Wetland	PEMC	0.13	---	Jurisdictional
Tributary to Cabin Creek	W12	Section 19 T32N R85W	Wetland	PEMC	0.01	---	Jurisdictional
Tributary to Cabin Creek	W13	Section 19 T32N R85W	Wetland	PEMC	0.05	---	Jurisdictional

Drainage	Sample Point (SP)	Legal Description	2010/2011 Delineation	Cowardin Classification	Acreage of Cowardin	Comments	Jurisdictional Recommendation
Tributary to Cabin Creek	W14	Section 19 T32N R85W	Wetland	PEMC	0.12	---	Jurisdictional
Tributary to Cabin Creek	W15	Section 18 T32N R85W	OWUS	---		---	---
Tributary to Cabin Creek	W16	Section 18 T32N R85E	---	---	---	---	---
Tributary to Cabin Creek	W17	Section 17 T32N R85W	---	---	---	---	---
Tributary to Poison Spider Creek	W18	Section 16 T32N R85W	Wetland	PEMC	0.20	---	Jurisdictional
Tributary to Poison Spider Creek	W19	Section 16 T32N R85E	---	---	---	---	---
Tributary to Poison Spider Creek	W20	Section 16 T32N R85W	Wetland	PEMC	0.07	---	Jurisdictional
Tributary to Poison Spider Creek	W21	Section 16 T32N R85W	Wetland	PEMC	0.14	---	Jurisdictional
Tributary to Poison Spider Creek	W22	Section 16 T32N R85W	Wetland	PEMC	0.04	---	Jurisdictional
Tributary to Poison Spider Creek	W23	Section 27 T32N R85W	OWUS	---		---	---
Tributary to Poison Spider Creek	W24	Section 26 T32N R85W	OWUS	---		---	---
Tributary to Poison Spider Creek	W25	Section 15 T32N R85W	---	---	---	---	---
Tributary to Poison Spider Creek	W26	Section 22 T32N R85W	---	---	---	---	---

APPENDIX D

Vegetation Monitoring Methodology

Protocol for Vegetation Sampling

A point-intercept vegetation monitoring method will be utilized to collect quantified pre-disturbance baseline and reclamation monitoring vegetation data.

Data will be collected at 50 or 100 sample points on selected well pads and 0.5 mile Right-of-Way (ROW) segments. Professional judgment will be used to determine the number of sample points required to provide a representative sample.

Using a sighting device points are collected at 0.5 or 1 meter intervals along a 50 meter transect.

- The number of transects, transect start points, and transect orientation will be determined in the field and will provide a representative sample of the entire disturbance or reclaimed area.
- Points will be collected from at least one 50-meter transect in each ESD within the disturbance or reclaimed area at non-linear features or at 0.5 mile intervals within in each ESD for linear features.

At each point, canopy and basal cover "hits" will be recorded.

- Canopy cover is determined by the first species or life form intersected by the sighting device (above ground plant or ground cover material if not above ground canopy cover exists).
- At the same point, basal cover is determined by following the sight to the ground surface and recording what life form or species is intersected.

Canopy and basal cover categories include: grass, forb, shrub, weed, noxious weed, bare ground, litter, rock, and cryptograms (Wyoming Rangeland Monitoring Guide 2008).

- Litter includes all non-living organic material and fecal matter, does not include standing dead vegetation from the current year's growth.
- Rock includes both rock (> 2 inches at the intermediate axis) and gravel (< 2 inches at the intermediate axis)
- Cryptogram can be recorded as algae, moss, lichen, or fungi.
- Refer to Appendix B for a list of weed species.

The point-intercept method is repeated in the adjacent undisturbed area (reference area).

Point data will be used to calculate total or percent cover values for: total vegetation cover, vegetation cover by lifeform, ground cover, litter, bare ground, rock, or cryptogram cover values

- Total vegetation cover: percent of the ground surface which is covered by vegetation growth produced during the current growing season. Vegetation cover data will be recorded by species.
- Total ground cover: sum of the cover values for total vegetation, total cryptograms, total litter, and total rock.
- Points collected on the 50 meter point-intercept transects contribute 2% of the total cover value on 50 point transects and 1% of the total cover value on 100 point transects.

Species Diversity

- All vegetation species observed within the pre-disturbance area or reclaimed area not "hit" during the survey are recorded.

- A summary table of species will be provided. Species will be listed by ESD and life form whenever possible.
- This summary can be used for comparative analysis.

State and County listed noxious weed species and ocular estimation of their cover will be recorded, photographed, and GPS located.

One photograph will be taken of each transect.

General notes will be recorded

- Proper functioning properly of erosion control devices
- Signs of erosion: rills, gullies, gullies, pedestalled plants
- Grazing conditions

Appendix C: Grieve Unit CO_2 EOR Project CO_2 Example Application for Permit to Drill and Master Surface Use Plan of Operations

Form 3160-3
(August 2007)

FORM APPROVED
OMB No. 1004-0137
Expires July 31, 2010

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.
WYW-015814

6. If Indian, Allotee or Tribe Name

1a. Type of work: ☑ DRILL ☐ REENTER

7. If Unit or CA Agreement, Name and No.
Grieve Unit WYW109538X

1b. Type of Well: ☑ Oil Well ☐ Gas Well ☐ Other ☑ Single Zone ☐ Multiple Zone

8. Lease Name and Well No.
Grieve Unit #55

2. Name of Operator Elk Petroleum, Inc

9. API Well No.

3a. Address 123 West 1st Street, Suite 550
Casper, WY 82601

3b. Phone No. *(include area code)*
307-265-3326

10. Field and Pool, or Exploratory
Grieve Exploratory Unit, Muddy

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*
At surface 1768' FNL, 2067' FEL (SWNE), Section 27, T32N, R85W
At proposed prod. zone 247' FNL, 1199' FEL (NENE), Section 27, T32N, R85W

11. Sec., T. R. M. or Blk. and Survey or Area
Sec. 27, T32N, R85W

14. Distance in miles and direction from nearest town or post office*
Approximately 19 miles south of Powder River, Wyoming

12. County or Parish
Natrona

13. State
WY

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) 247'

16. No. of acres in lease
640

17. Spacing Unit dedicated to this well
40 acres

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. ≈1250'

19. Proposed Depth
7000'

20. BLM/BIA Bond No. on file
800346757

21. Elevations (Show whether DF, KDB, RT, GL, etc.)
7322' GL

22. Approximate date work will start*
02/01/2012

23. Estimated duration
20 days

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, must be attached to this form:

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office).
4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification
6. Such other site specific information and/or plans as may be required by the BLM.

25. Signature

Name *(Printed/Typed)*
Ralph Schulte

Date
6/8/2011

Title
Engineering Manager, Elk Petroleum

Approved by *(Signature)*

Name *(Printed/Typed)*

Date

Title

Office

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.
Conditions of approval, if any, are attached.

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Continued on page 2)

*(Instructions on page 2)

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(August 2007)

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3b. Phone No. *(include area code)*
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4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*
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19. Proposed Depth
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20. BLM/BIA Bond No. on file
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25. Signature

Name *(Printed/Typed)*
Ralph Schulte

Date
6/8/2011

Title
Engineering Manager, Elk Petroleum

Approved by *(Signature)*

Name *(Printed/Typed)*

Date

Title

Office

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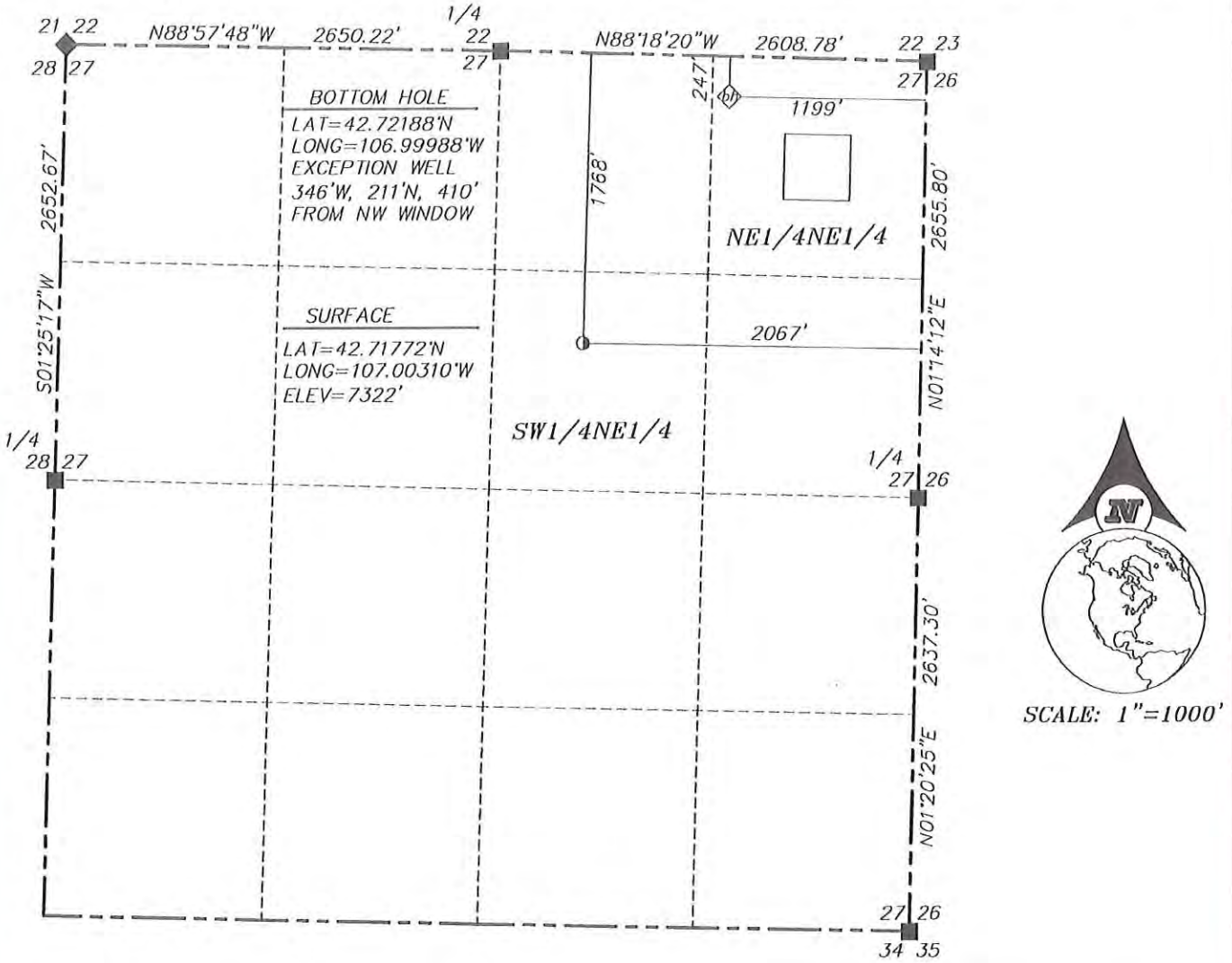
(Continued on page 2)

*(Instructions on page 2)

SECTION 27, T. 32 N., R. 85 W., 6TH P.M., NATRONA COUNTY, WYOMING



LEGEND

- WELL STAKE
- BOTTOM HOLE LOCATION
- SET MARKED STONE
- STONE MOUND
- SECTION LINE
- INTERIOR SECTION LINE

I, THONE STEWART, A DULY REGISTERED LAND SURVEYOR IN THE STATE OF WYOMING, DO HEREBY STATE, BASED ON MY KNOWLEDGE AND INFORMATION, THE ABOVE PLAT IS A VALID REPRESENTATION OF A SURVEY MADE BY ME, OR UNDER MY DIRECT SUPERVISION.

THE SURFACE WELL STAKE IS:
1788' FROM NORTH LINE
2067' FROM EAST LINE.
THE PROPOSED BOTTOM HOLE LOCATION IS NOT LOCATED WITHIN THE SPACING WINDOW AND IS:
247' FROM NORTH LINE
1199' FROM EAST LINE.
DISTANCES ARE PERPENDICULAR TO SECTION LINE.

Professional Land Surveyor
THONE STEWART
5369
Thone Stewart
Date: June 3, 2011
WYOMING

BASIS TABLE

BEARINGS ARE BASED ON UTM ZONE 13. DISTANCES ARE US Feet ADJUSTED TO SURFACE USING THE COMBINED SCALE FACTOR OF 1.0003770695. ELEVATIONS ARE UNGRADED GROUND (NAVD88) BASED ON CORS POINT CASPER AND GEOID03. Lats. AND Longs. ARE NAD83.

PLAT SHOWING DRILLING LOCATION
GRIEVE UNIT #55
(OIL PRODUCTION WELL)

PRESTFELDT SURVEYING
PO BOX 3082
SHERIDAN, WY 82801
307-672-7415
FAX 674-5000

JN: 25004
DF: EPIC/328527
JUNE, 2011
TGO: T2005004 ElkHorseCreek

ELK PETROLEUM, INC.
Lease #WW-WYW-015814, Grieve #55
NE¼,NE ¼, Section 27, T32N, R85W
Natrona County, Wyoming

DRILLING PROGNOSIS

1.ESTIMATED TOPS OF IMPORTANT GEOLOGIC MARKERS

Parkman	636'	Carlile Sh	5607'	Thermopolis	6855'
Phayles	1229'	2nd Frontier	6047'		
Shannon	3372'	Mowry Shale	6495'		
Niobrara	5263'	Muddy SS	6798'		
Total Depth	7000'				

2.ESTIMATED DEPTHS OF ANTICIPATED WATER, OIL, GAS OR MINERAL FORMATIONS

A. Tops: Muddy 6798' Oil/Gas – Primary Objective

Any usable water zones encountered will be adequately protected and reported. All usable water zones, potential hydrocarbon zones, and valuable mineral zones will be isolated.

B.Directional Directional tools are anticipated for this well.

Azimuth	29.7°	See Attached Plan & Vertical Section View
Build Rate	.55°/100 ft	
Inclination	33.5° at total depth	

3. PRESSURE CONTROL EQUIPMENT- Schematic Attached

A. Type: Eleven (11) Inch Double Gate Hydraulic BOP with Eleven (11) Inch Well Head.

The Blow-Out Preventer will be equipped as follows:

1. One (1) blind ram (above).
2. One (1) pipe ram (below).
3. Kill line (2-inch minimum).
4. One (1) kill line valve (2-inch minimum)
5. One (1) choke line valve.
6. Two (2) adjustable chokes (2-inch minimum).
7. Upper kelly cock valve with handle available.
8. Full opening internal blowout preventer or drill pipe safety valve able to fit all connections.
9. 2-inch (minimum) choke line.
10. Fill-up line above the uppermost preventer.
11. Rotating Head on top of stack, if desired

B. Pressure Rating: 2,000 psi

C. Testing Procedure:

At a minimum, the BOP, choke manifold, and related equipment will be pressure tested to the approved working pressure of the BOP stack (if isolated from the surface casing by a test plug) or to 70% of the internal yield strength of the surface casing (if the BOP is not isolated from the casing by a test plug).

Pressure will be maintained for a period of at least 10 minutes or until the requirements of the test are met, whichever is longer. At a minimum, the above pressure test will be performed:

I. When the BOP is initially installed;
2. Whenever any seal subject to test pressure is broken;
3. Following related repairs; and
4. At thirty (30) day intervals.

In addition to the above, the pipe and blind rams will be activated each trip, but not more than once each day. All BOP drills and tests will be recorded in the IADC driller's log.

D. Choke Manifold Equipment:

All choke lines will be straight lines unless turns use tee blocks or are targeted with running tees, and will be anchored to prevent whip and vibration.

E. Accumulator:

The accumulator will have sufficient capacity to close all BOP's and retain 200 psi above precharge. Nitrogen bottles which meet the manufacturer's specifications will be used as the backup to the required independent power source. The accumulator precharge pressure test will be conducted prior to connecting the closing unit to the BOP stack and at least once every six (6) months thereafter. The accumulator pressure will be corrected if the measured precharge pressure is found to be above or below the maximum or minimum limits specified in *Onshore Oil and Gas Order Number 2.*

A manual locking device (i.e., hand wheels) or automatic locking device will be installed on all systems of 2M or greater. A valve will be installed in the closing line as close as possible to the annular preventer to act as a locking device. This valve will be maintained in the open position and will be closed only when the power source for the accumulator system is inoperative.

F. Miscellaneous Information:

The Blow-Out Preventer and related pressure control equipment will be installed, tested and maintained in compliance with the specifications in and requirements of *Onshore Oil & Gas Order Number 2.*

The choke manifold and BOP extension rods with hand wheels will be located outside the rig sub-structure. The hydraulic BOP closing unit will be located at least twenty-five (25) feet from the well head but readily accessible to the driller. Exact locations and configurations of the hydraulic BOP closing unit will depend upon the particular rig contracted to drill this hole.

A flare line will be installed after the choke manifold, extending 125 feet (minimum) from the center of the drill hole to a separate flare pit, if necessary or required by the Authorized Officer, Bureau of Land Management.

4. THE PROPOSED CASING AND CEMENTING PROGRAM

A. Casing Program: All New

Hole Size.	Casing Size	Wt./Ft	Grade	Joint	Depth Set
20"	16"	Conductor			60'
12.250"	9.625"	36.0#	J-55	ST&C	0- 1000'
8.5"	7.00"	26#	J-55	LT&C	0- 88'
8.5"	7.00"	23#	J-55	LT&C	88'- 5000'
8.5"	7.00"	26#	J-55	LT&C	5000'- 7000'

The surface casing will have one (1) centralizer in the middle of the first joint, on the 2nd collar, and then every third collar thereafter to the conductor pipe.

The production casing will have a DV tool at approximately 1,175 ft above the shoe for a two stage cement job.

Casing string(s) will be pressure tested to 0.22 psi/foot of casing string length or 1500 psi, whichever is greater (not to exceed 70% of the internal yield strength of the casing), after cementing and prior to drilling out from under the casing shoe.

B. Cementing Program:

Surface Casing — Set with approximately 170 sx Light Premium Lead with additives (yield=2.28 cu ft/sk) and 205 sx Premium Class G Tail cement with additives (yield = 1.15 cu ft/sk), circulated back to surface with 100% excess. Top of Cement (TOC) at surface.

Production Casing

Stage 1: Set with approximately 75 sx 50/50 Poz Lead with additives (yield=1.51 cu ft/sk) and 175 sks Premium Class G Tail cement with additives (yield = 1.15 cu ft/sk).

Stage 2: Set with approximately 385 sx 50/50 Poz Lead with additives (yield=1.51 cu ft/sk) and 50 sks Premium Class G Tail cement with additives (yield = 1.15 cu ft/sk).

Top of Cement (TOC) estimated at 3850 assuming a 10 inch hole above stage tool.

The above cement volumes are approximate. Actual cement volumes may vary due to variations in the actual hole gauge and will be determined by running a caliper log on the drilled hole.

All waiting on cement (WOC) times will be adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drilling out.

5. MUD PROGRAM- Visual Monitoring

Interval	Mud Type	Weight, ppg	Viscosity, sec/qt	Fluid Loss cc/30 min
0- 1000'	Native Mud	8.4-8.8	26-38	No Control
1000'- 4600'	Gel/Chemical	8.4- 8.6	28-38	8-10
4600'- 7000'	Gel/Chemical	8.6- 8.9	34-50	6-8
Logs		8.9- 9.0	50-60	6-8

Sufficient mud material(s) to maintain mud properties, control lost circulation and contain a blowout will be available at the well site during drilling operations.

6. EVALUATION PROGRAM

Logs AIT/Density/Neutron - from 7000' to surface casing
GR-Sonic from 7000' to surface casing

DST's None anticipated.

Cores None anticipated.

* Pull Gamma Ray Log Back to Surface

The evaluation program may change at the discretion of the well site geologist, with prior approval from the Authorized Officer, Lander Field Office, Bureau of Land Management.

Stimulation : No stimulation or frac treatment has been formulated for this test at this time. The drill site, as approved, will be of sufficient size to accommodate all completion activities.

Whether the well is completed as a dry hole or as a producer, *Well Completion and Recompletion Report and Log* (form #3160-4) will be submitted to the Lander Field Office not later than thirty (30) days after the completion of the well or after completion of operations being performed, in accordance with 43 CFR 3164.

Two (2) copies of all Logs, core descriptions, core analyses, well test data, geologic summaries, sample description, and all other surveys or data obtained and compiled during the drilling, workover, and/or completion operations, will be filed with form #3160-4. Samples (cuttings, fluids, and/or gases) will be submitted when requested by the Authorized Officer, Lander Field Office, Bureau of Land Management, P.O. Box 589, Lander, Wyoming 82520-0589, Telephone (307) 332-8400.

7. ABNORMAL CONDITIONS

No abnormal temperatures or pressures are anticipated. No H2S has been encountered in or known to exist from previous wells drilled to similar depths in the general area.

Maximum anticipated bottom hole pressure equals approximately 1000 psi (calculated at 0.50 psi/foot) and maximum anticipated surface pressure equals approximately 560 psi (bottom hole pressure minus the pressure of a partially evacuated hole calculated at 0.22 psi/foot). Pressure calculated at 2000 ft in depth. Muddy reservoir pressure is known to be approximately 800 psi at 6500 ft.

8. ANTICIPATED STARTING DATES AND NOTIFICATION OF OPERATIONS

A. Anticipated Starting Dates:

Anticipated Commencement Date	: June 1, 2012
Drilling Days	: Approximately 20 Days
Completion Days	: Approximately 10 Days

B. Notification of Operations:

Bureau of Land Management
Lander Field Office
1335 Main Street
Lander, Wyoming 82520
Phone: 307-332-8400

Contact Title	Contact Name	Office Telephone
Petroleum Engineer	Stephen Coursey	307-332-8400
Petroleum Engineering Technician	Darci Nation	307-332-8421
Petroleum Engineering Technician	Laura Lozier	307-332-8400
Natural Resource Specialist	Chris Krassin*	307-332-8452

* **Primary Contact**

C. General Conditions of Approval:
*

1. All lease and/or unit operations are to be conducted in such a manner to ensure full compliance with the applicable laws, regulations (43 CFR, Part 3160), Onshore Orders, Notices to Lessees, and the approved plan of operations.

2. The spud date will be reported orally to the Lander Field Office ***24 Hours Prior to Spudding***, unless otherwise required in the site specific conditions of approval.

3. All wells, whether drilling, producing, suspended or abandoned shall be identified in accordance with 43 CFR 3162.6. There shall be a sign or marker with the name of the operator, the lease serial number, the well number and the surveyed description of the well.

4. No well abandonment operations will be commenced without the prior approval of the Authorized Officer. In the case of newly-drilled dry holes or failures, and in emergency situations, oral approval will be obtained from the Field Office Petroleum Engineer. A *Notice of Intention to Abandon* (form #3160-5) will be filed with the Authorized Officer within fifteen (15) days following the granting of oral approval to plug and abandon.

5. Upon completion of approved plugging, a regulation marker will be erected in accordance with 43 CFR 3162.6 The following information will be permanently placed on the marker with a plate, cap, or beaded-on with a welding torch: Company Name, Well Name and Number, Location by Quarter/Quarter, Section, Township, Range, and the Federal Lease Number.

6. A *Subsequent Report of Abandonment* (form #3160-5) will be submitted within thirty (30) days following the actual plugging of the well bore. This

report will indicate where plugs were placed and the current status of surface restoration operations. If surface restoration has not been completed at that time, a follow-up report on form #3160-5 will be filed when all surface restoration work has been completed and the location is considered ready for final inspection.

7. Not later than the 5th business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, or resumes production in the case of a well which has been off production for more than ninety (90) days, the operator shall notify the Authorized Officer by letter or sundry notice, of the date on which such production has begun or resumed. The notification shall provide at a minimum, the following informational items:

   a. Operator name, address, and telephone number.
   b. Well name and number.
   c. Well location "¼, ¼, Section, Township, Range, P.M.".
   d. Date well was placed in a producing status.
   e. The nature of the wells production (i.e.: crude oil casing gas, or natural gas and entrained liquid hydrocarbons).
   f. The OCS, Federal or Indian lease prefix and number on which the well is located. Otherwise, the non-federal or non-Indian land category (i.e. state or private).
   g. As appropriate, the communitization agreement number, the unit agreement name, number and participating area name.

8. Within sixty (60) days following construction of a new tank battery, a site facility diagram of the battery showing actual conditions and piping must be submitted to the Authorized Officer. Facility diagrams shall be filed within sixty (60) days after existing facilities are modified. For complete information as to what is required on these diagrams, please refer to 43 CFR 3162.7-4(d).

9. Pursuant *to Onshore Oil & Gas Order Number 1,* lessees and operators have the responsibility to see that their exploration, development, production, and construction operations are conducted in such a manner which conforms with applicable federal laws and regulations and with state and local laws and regulations to the extent that such state and local laws are applicable to operations on federal and Indian lands.

Elk Petroleum

PROFESSIONAL DIRECTIONAL LTD
EXPERIENCE ENHANCES PERFORMANCE

Project: Natrona County, WY
Site: Grieve Unit T32N-R85W
Well: Grieve Unit 55
Wellbore: Original Hole
Plan: Plan 2
Rig: TBD

SECTION DETAILS
Plan 2

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1000.00	0.00	0.00	1000.00	0.00	0.00	0.00	0.00	0.00	
1200.00	0.00	0.00	1200.00	0.00	0.00	0.00	0.00	0.00	
7344.14	33.50	29.71	7000.00	1516.09	865.25	0.55	29.71	1745.62	PBHL

Surface Location:
SHL 1768' FNL & 2067' FEL Sec 27-T32N-R85W

US State Plane 1983
Wyoming East Central Zone
Elevation: 7322' GL + 15' KB @ 7337.00ft (TBD)

Northing	Easting	Latitude	Longitude
1136319.35	1401078.76	42° 43' 3.792 N	107° 0' 11.160 W

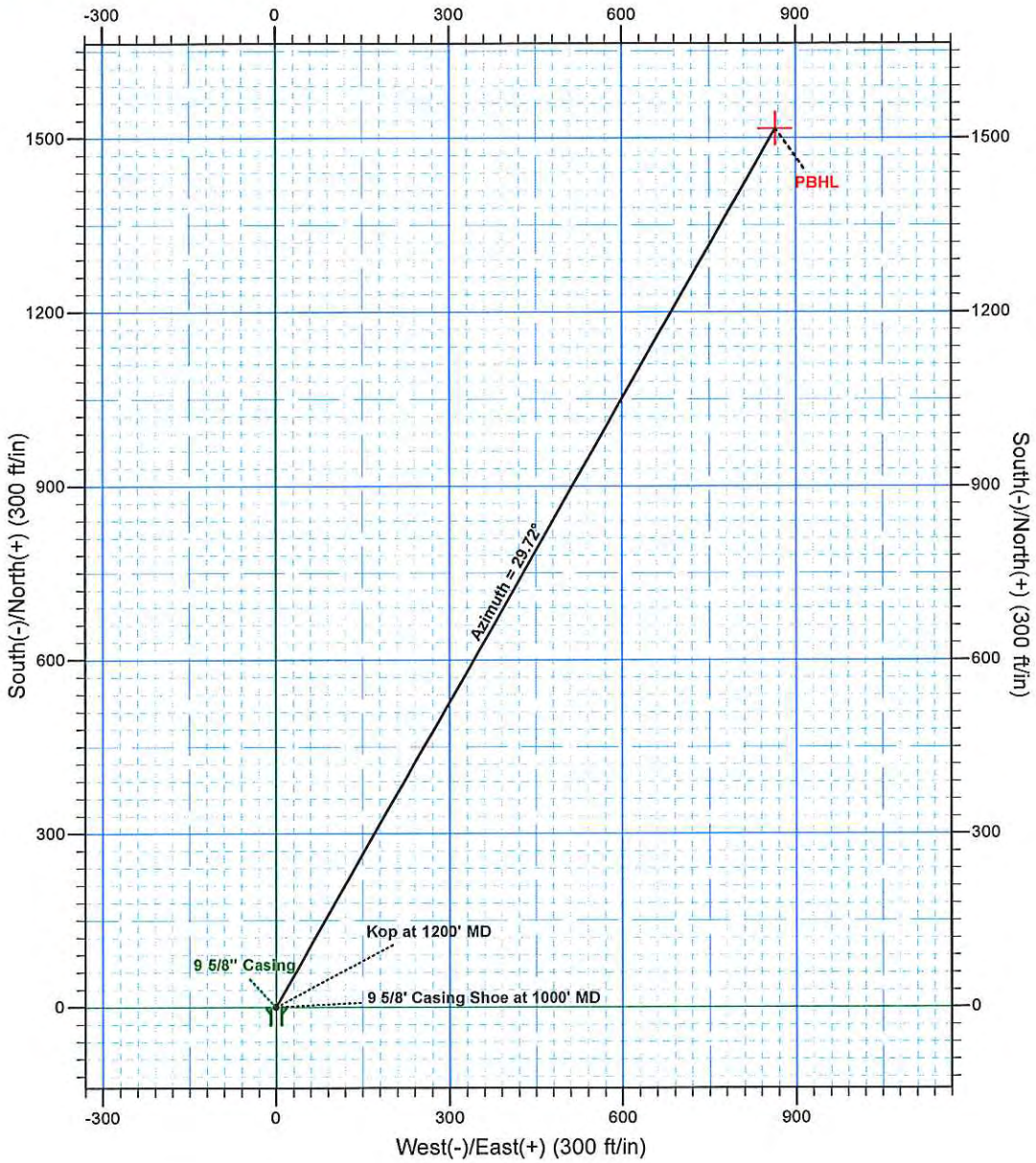
WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
PBHL	7000.00	1516.09	865.25	42° 43' 18.768 N	106° 59' 59.568 W

To convert a Magnetic Direction to a True Direction, Add 10.15° East

Magnetic Model: IGRF2010 Date: 26-May-12
Azimuths & Coordinates to True North

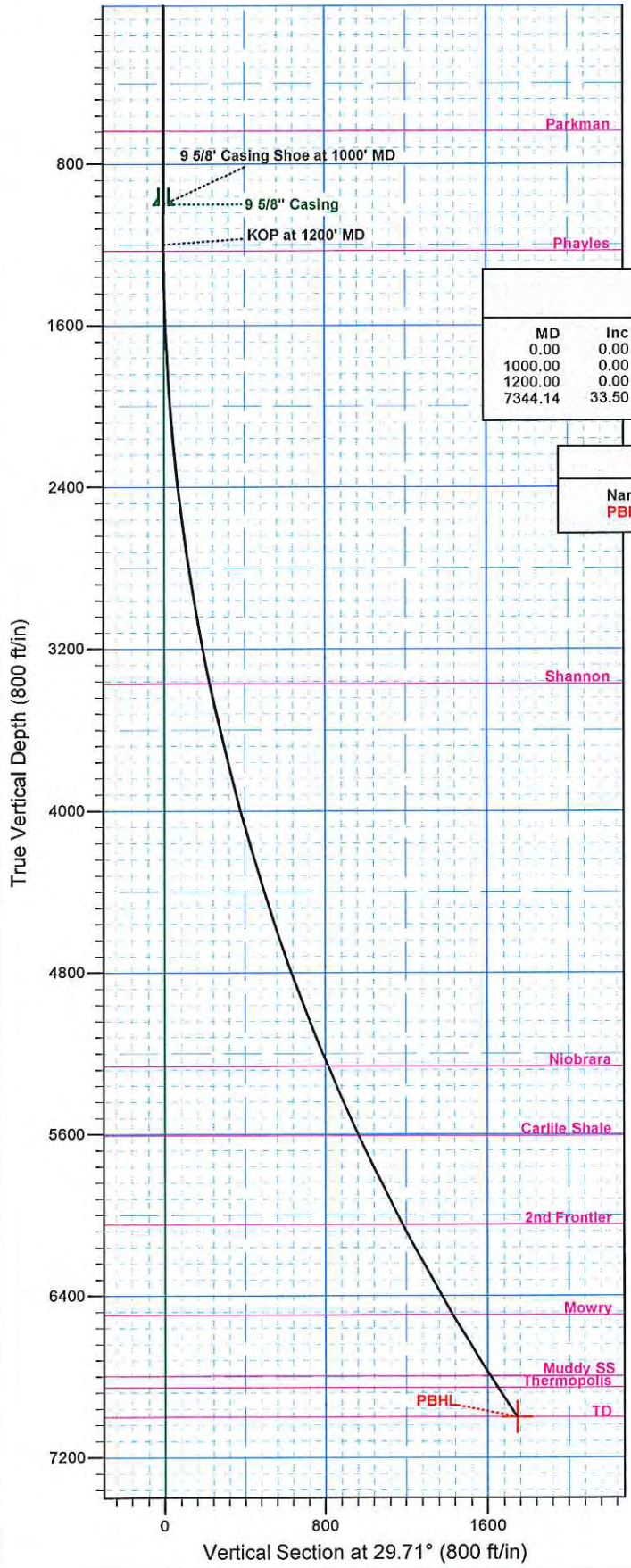
ELK PETROLEUM



Created By: Bob Hays Date: 13:45, February 16 2012

Elk Petroleum

PROFESSIONAL DIRECTIONAL LTD
EXPERIENCE ENHANCES PERFORMANCE



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1000.00	0.00	0.00	1000.00	0.00	0.00	0.00	0.00	0.00	
1200.00	0.00	0.00	1200.00	0.00	0.00	0.00	0.00	0.00	
7344.14	33.50	29.71	7000.00	1516.09	865.25	0.55	29.71	1745.62	PBHL

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Magnetic Model: IGRF2010 Date: 26-May-12
Azimuths & Coordinates to True North

ELK PETROLEUM

Created By: Bob Hays Date: 13:45, February 16 2012

ISSUE	BLM REVIEW
REV.	A
REV. DATE	3 JUNE 2011
BY	LWB - P.E.
APPROVED	

CLIENT: ELK PETROLEUM
PROJECT NAME: GRIEVE UNIT CO2
PROJECT No.: 40-0238
DRAWING NAME.: GRIEVE UNIT 54 & 55 WELL
WELL PAD: GRIEVE UNIT # 54 & 55
LOCATION: SEE NOTES BELOW FOR LOCAITON INFROMATION
LAT./LONG.: SEE NOTES BELOW FOR LAT / LON OF EACH WELL
COUNTY, STATE.: NATRONA COUNTY, WYOMING

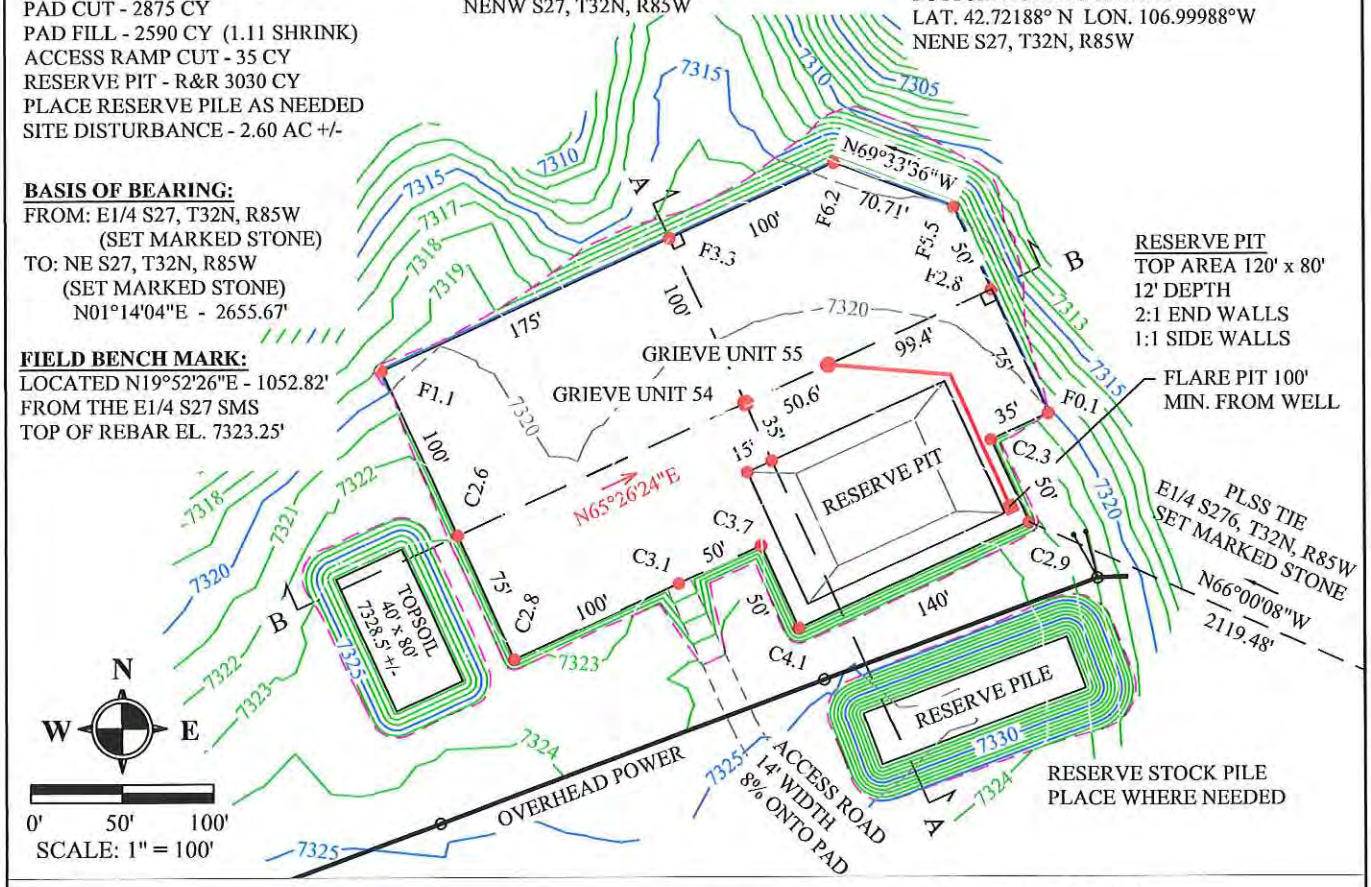
DIRT WORK:
PAD @ EL. 7320.3 (FLAT)
REMOVE 4" DEPTH TOPSOIL:
TOPSOIL UNDER PAD 905 CY
TOPSOIL UNDER RESERVE PILE 145 CY
TOTAL TOPSOIL 1050 CY
PAD CUT - 2875 CY
PAD FILL - 2590 CY (1.11 SHRINK)
ACCESS RAMP CUT - 35 CY
RESERVE PIT - R&R 3030 CY
PLACE RESERVE PILE AS NEEDED
SITE DISTURBANCE - 2.60 AC +/-

BASIS OF BEARING:
FROM: E1/4 S27, T32N, R85W
(SET MARKED STONE)
TO: NE S27, T32N, R85W
(SET MARKED STONE)
N01°14'04"E - 2655.67'

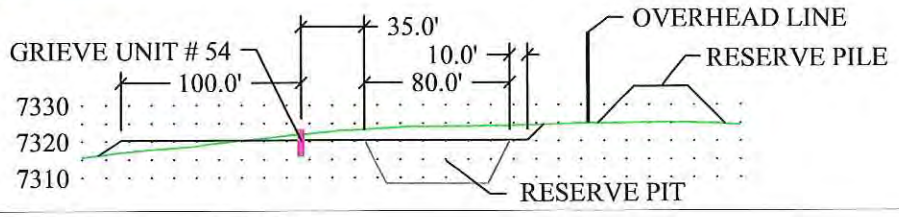
FIELD BENCH MARK:
LOCATED N19°52'26"E - 1052.82'
FROM THE E1/4 S27 SMS
TOP OF REBAR EL. 7323.25'

GRIEVE UNIT # 54 CO2 INJECTION WELL
SURFACE LOCATION- GROUND EL. 7322'
LAT. 42.71766° N LON. 107.00327°W (NAD83)
SWNE S27, T32N, R85W
BOTTOM HOLE LOCATION:
LAT. 42.71990° N LON. 107.00791°W
NENW S27, T32N, R85W

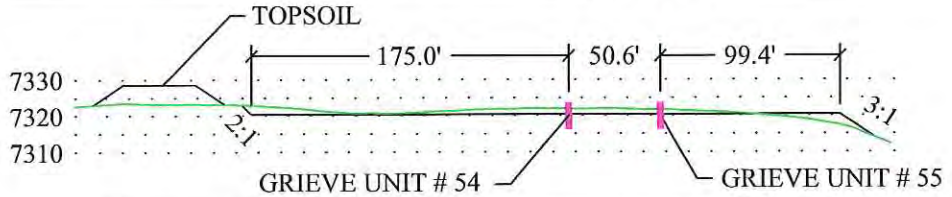
GRIEVE UNIT # 55 OIL PRODUCTION WELL
SURFACE LOCATION - GROUND EL. 7322'
LAT. 42.71772° N LON. 107.00310°W
SWNE S27, T32N, R85W
BOTTOM HOLE LOCATION:
LAT. 42.72188° N LON. 106.99988°W
NENE S27, T32N, R85W

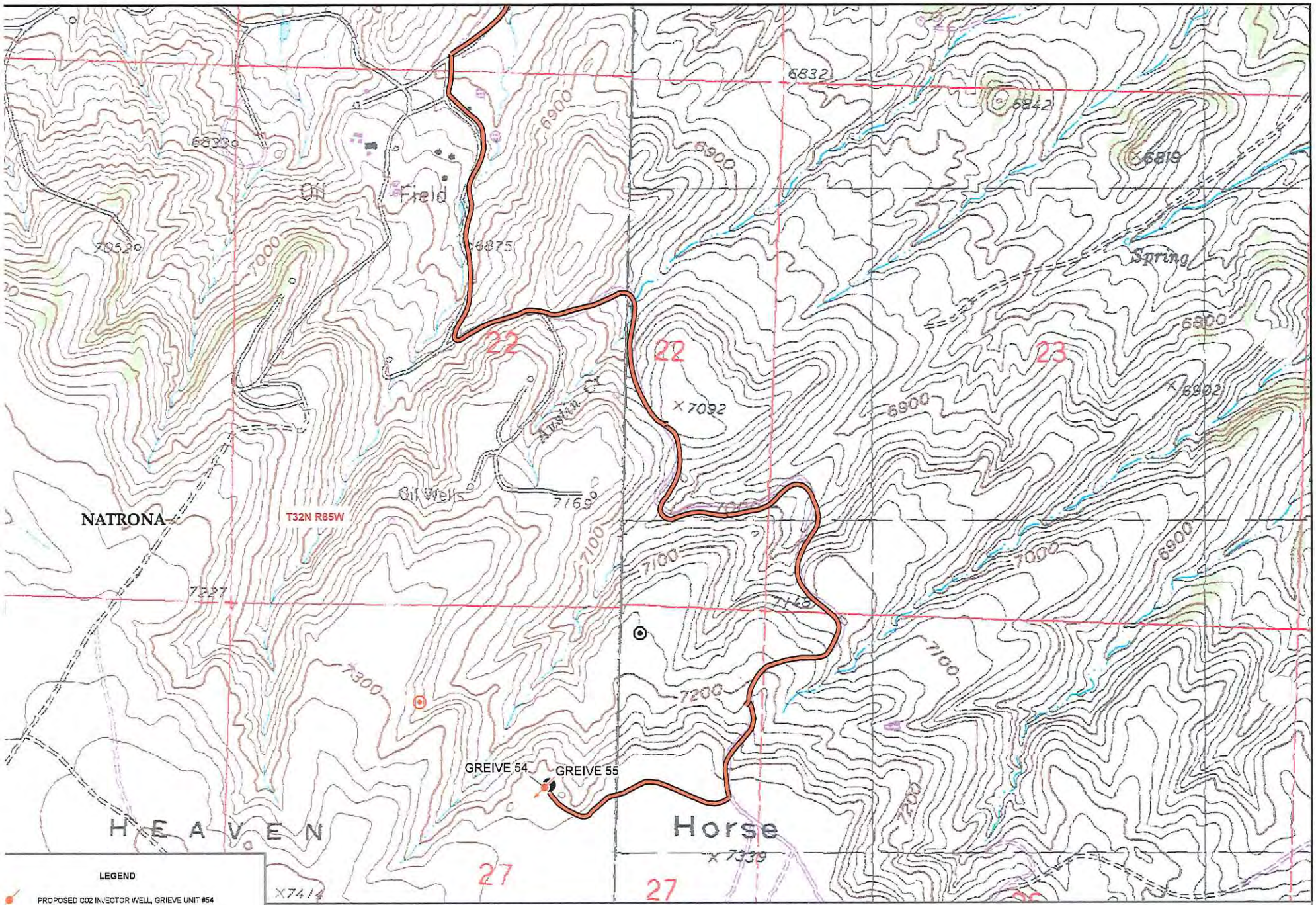


SECTION A-A:
SCALE AS SHOWN
PAD @ EL. 7320.3 (FLAT)
PAD CUT SLOPES 2H:1V
PAD FILL SLOPES 3H:1V
TOPSOIL SLOPES 3H:1V



SECTION B-B:
SCALE AS SHOWN





LEGEND

- PROPOSED CO2 INJECTOR WELL, GRIEVE UNIT #54
- PROPOSED BOTTOM HOLE CO2 LOCATION, GRIEVE UNIT #54
- PROPOSED OIL PRODUCER, GRIEVE UNIT #55
- PROPOSED BOTTOM HOLE OIL LOCATION, GRIEVE UNIT #55
- ACCESS ROAD TO GRIEVE #54 AND #55

THE DATA CONTAINED ON THIS WORK PRODUCT IS DERIVED FROM DIFFERENT SOURCES THAT MAY HAVE BEEN DIGITIZED AND/OR REDIGITIZED PROJECTED. EPIC MAKES NO ADJUSTMENT TO DATA WHEN NECESSARY FOR CLARIFICATION AND HAS NOT PERFORMED LAND SURVEY OR TITLE WORK TO VERIFY ACCURACY

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DATE	REFERENCE DOCUMENTS	REV NO	REVISIONS	BY	DATE
JUNE11	EPIC & STERLING PETROLEUM				
JUNE11	ELK PETROLEUM				
APRIL11	NATRONA COUNTY GIS				
APRIL11	TAYLOR ENVIRONMENTAL CONSULTING LLC				
APRIL11	QGA INC				
APRIL11	USGS				
JUNE08	WYO DOT	A	ISSUED FOR APPROVAL	TKD	JUNE11

1 Inch = 1,250 feet

0 0.05 0.1 0.2 Miles

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FROM PROJECT CONCEPTION TO OPERATING REALITY

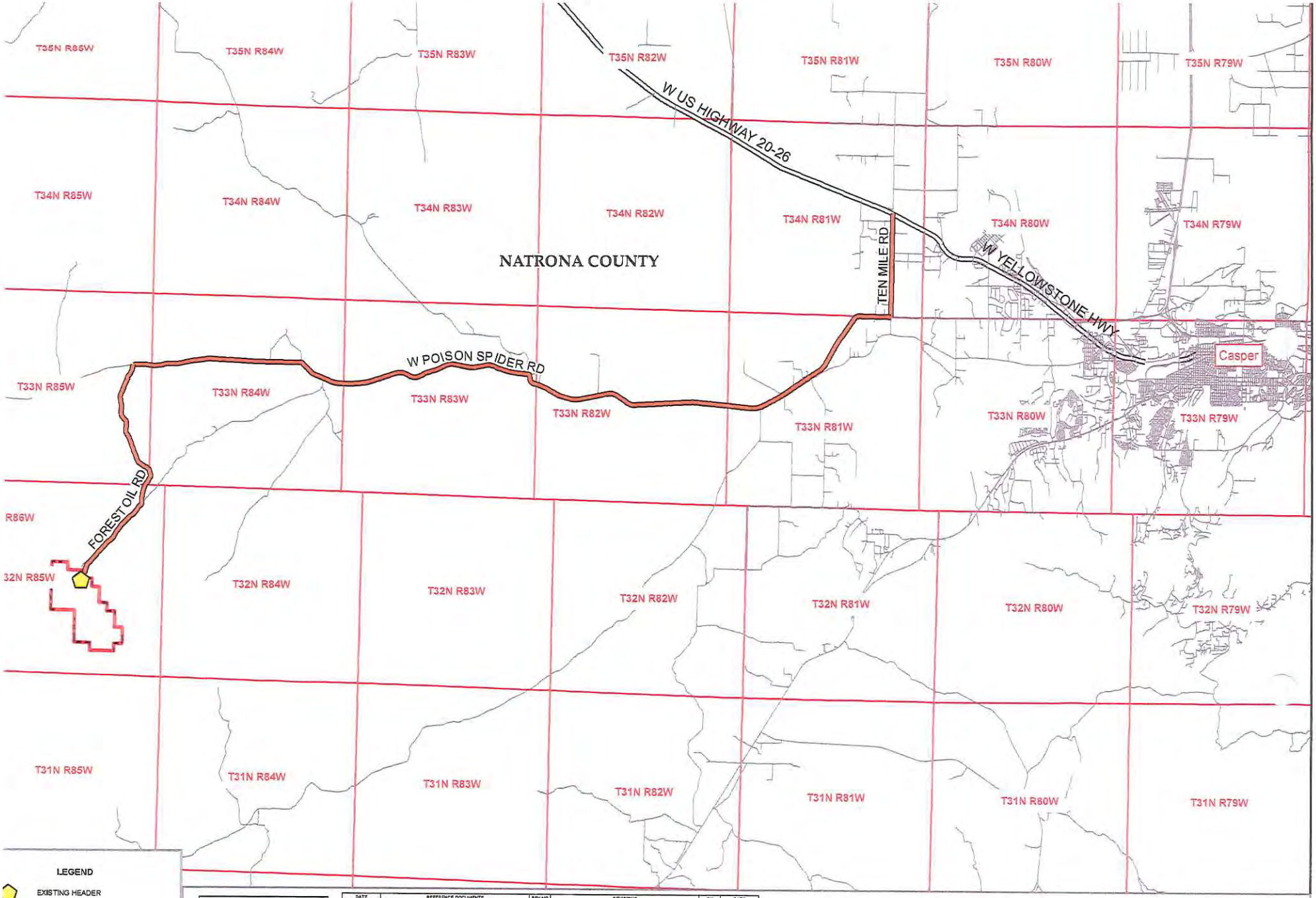
N W E S

ELK PETROLEUM

123 WEST 1ST STREET, SUITE 550
CASPER, WY 82601

GRIEVE UNIT CO2
ACCESS TO GRIEVE #54 AND #55

PROJECT	MAP	SCALE	DATE	REVISION
40-0238	EP-1303	1:15,000	07 JUNE 11	A



LEGEND

- EXISTING HEADER
- ACCESS ROAD TO GRIEVE #53 WELL
- WY US HIGHWAY 20/26
- NATRONA ROADS
- GRIEVE UNIT BOUNDARY

THE DATA CONTAINED ON THIS WORK PRODUCT IS DERIVED FROM DIFFERENT SOURCES THAT MAY HAVE USED DIFFERENT COORDINATE PROJECTIONS. EPIC HAS MADE ADJUSTMENT TO DATA WHEN NECESSARY FOR CLARIFICATION AND HAS NOT PERFORMED LAND SURVEY OR TITLE WORK TO VERIFY ACCURACY

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DATE	REFERENCE DOCUMENTS	REV NO	REVISIONS	BY	DATE
JUNE11	EPIC 2-STEELE, PETROLEUM				
JUNE11	ELK PETROLEUM				
APRIL11	NATRONA COUNTY GIS				
APRIL11	TAYLOR ENVIRONMENTAL CONSULTING LLC				
APRIL11	GGA INC				
APRIL11	BLM				
JUNE09	WYO DOT	A	ISSUED FOR APPROVAL	TKD	JUNE11

1 inch = 20,833 feet

0 1.25 2.5 5 Miles

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FROM PROJECT CONCEPTION TO OPERATING REALITY

N W E S

ELK PETROLEUM

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CASPER, WY 82601

GRIEVE UNIT CO2
ACCESS TO GRIEVE UNIT

PROJECT	MAP	SCALE	DATE	REVISION
40-0238	EP-1301	1:250,000	08 JUNE 11	A

Revised August 2011

ELK PETROLEUM, INC.
Grieve Unit (WYW109538X)
CO_2 Enhanced Oil Recovery Project
T32N, R85W
Natrona County, Wyoming

MULTI-POINT MASTER PLAN OF DEVELOPMENT

Description of Area

The Grieve Unit lies within the Gas Hills Management Unit of the Lander Field Office (LFO) of the Bureau of Land Management. The Unit comprises 2280 acres of State, Fee and Federal lands located in Sections 15, 16, 21, 22, 23, 26, 27, 34 and 35, T-32N-R85W of Natrona County, Wyoming. A breakdown of surface and subsurface ownership is provided in Table 1.

Proposed Action

In order to implement the proposed Grieve Unit CO_2 ($GUCO_2$) enhanced oil recovery (EOR) operations Elk Petroleum would need to drill 8 additional federal wells from four new well locations in the Unit. This Master Plan of Development (MDP) is provided as an alternative to developing a Surface Use Plan of Operations for each well individually. The wells covered by this MPD are listed in Table 2.

Table 1 - Surface and Subsurface Ownership within the Grieve Unit

	State	Fee	Federal	Total
Mineral Ownership	280	240	1760	2280
Surface Ownership	200	320	1760	2280

Table 2 – Grieve Unit Proposed Well Locations (all are located in T32N-R85W, Natrona County)

Well Name	Surface Location	Bottom Hole Location	Well Type
Grieve Unit #53*	SWSE Sec. 16	NWNE Sec. 21	CO_2/H_2O Injection
Grieve Unit #54*	SWNE Sec. 27	NENW Sec. 27	CO_2/H_2O Injection
Grieve Unit #55*	SWNE Sec. 27	NENE Sec. 27	Oil Production
Grieve Unit #56	SESW Sec. 15	Fee surface and minerals	CO_2/H_2O Injection
Grieve Unit #57*	SWNE Sec. 22	SENE Sec. 22	CO_2/H_2O Injection
Grieve Unit #58*	NENW Sec. 26	SWSW Sec. 23	CO_2/H_2O Injection
Grieve Unit #59 *	NENW Sec. 26	SENW Sec. 26	CO_2/H_2O Injection
Grieve Unit #60*	SWNE Sec. 22	NWNE Sec. 22	CO_2/H_2O Injection

Grieve Unit #61*	SWSE Sec. 16	NWNE Sec. 21	Oil Production
Grieve Unit #62	NWSE Sec. 16	State surface and minerals	CO_2/H_2O Injection
* shared surface locations			

1) **EXISTING ROADS-** Refer to Maps "A" and "B" and well specific Maps "C."

   a) Each of the four proposed well sites and eight wells are staked as indicated on the well specific cut and fill diagrams.

   b) To reach the field and well locations from the city of Casper, Wyoming take either Poison Spider or Zero Road to Poison Spider School. Continue westerly 9.4 miles to the end of the pavement and a split in the road. Stay left at the split on Natrona County Road 201 for 7.6 miles to the next Y. Stay left continuing on NC 201 for another 5.4 miles to the Elk Petroleum sign. Turn left at the sign onto NC 320. At 6.5 miles stay right and continue another 1.1 miles to the Elk Petroleum Main Office sign. Stay left and continue another 0.5 miles to the next Y. Stay right and continue another 0.1 miles to the "cross". Turn left to the large compressor building (central facility). Refer to each well specific Access Road map for well specific directions refer to Maps A, B and C.

   c) Access roads within a one (1) mile radius- refer to Map B.

   d) The existing roads will be maintained in the same or better condition as existed prior to the commencement of operations and said maintenance will continue until final abandonment and reclamation of each well location.

2) **NEW OR RECONSTRUCTED ACCESS ROADS**

Some amount of new road construction will be required for access to all the proposed Grieve Unit wells with the exception of #54 and 55 which share an existing reclaimed well location. Refer to the individual well maps for new access road detail.

   a) Width- fourteen (14) foot running surface with a sixteen (16) foot subgrade crowned and ditched for both drilling and completion operations.

   b) **Construction standard:** The proposed access roads will be constructed in accordance with roading guidelines established for oil & gas exploration and development activities as referenced in the joint BLM/USFS publication: Surface Operating Standards for Oil and Gas Exploration and Development, Fourth Edition and/or BLM Manual Section 9113 concerning road construction standards on projects subject to federal jurisdiction.

      The access roads will be designed and constructed to meet the standards of the anticipated traffic flow and all-weather requirements. Construction will include ditching, draining, graveling, crowning, and capping the roadbed as necessary to provide a well constructed and safe roadway.

Approximately six (6) inches of topsoil will be stripped from any new access road route prior to performing any further construction activities thereon.

If soils along the access road route*s* are dry during road construction, water will be applied to the road surface to facilitate soil compaction and minimize soil loss as a result of wind erosion.

c) **Maximum grade:** Ten (10) percent or less.

d) **Turnouts:** We do not anticipate the need for turnouts on/along the short segments of proposed access roads.

e) **Drainage design:** Access roads will be upgraded and maintained as necessary to prevent soil erosion and accommodate all-weather traffic. Roads will be crowned and ditched with water turnouts installed as necessary to provide for proper drainage along the access road route.

f) **Culverts, cuts and fills:** Culverts will be installed on/along the access road route as necessary or required by the Authorized Officer, Bureau of Land Management in accordance with roading guidelines contained in the joint BLM/USFS publication: Surface Operating Standards for Oil and Gas Exploration and Development, Fourth Edition and/or BLM Manual Section 9113 concerning road construction standards on projects subject to federal jurisdiction.

There are no major cuts and/or fills on/along the proposed access road routes.

g) **Surfacing material**: Access roads will be surfaced to an average minimum depth (after compaction) of four (4) inches with two (2) inch minus pit run gravel or crushed rock purchased from a local contractor having a permitted source of materials within the general area, if and/or as required by the Authorized Officer, Bureau of Land Management.

h) **Gates, cattle guards or fence cuts:** No gates, cattle guards or fence cuts will be required on/along the proposed access road right-of-way. Existing cattle guards will be cleaned and re-set as necessary prior to the commencement of construction and drilling operations on the proposed wells.

i) **Road maintenance:** During both the drilling and production phases of operations, the road surfaces and shoulders will be kept in a safe and useable condition and will be maintained in accordance with the original construction standards.

All drainage ditches and culverts will be kept clear and free-flowing, and will also be maintained in accordance with the original construction standards.

The access road rights-of-way will be kept free of trash during all operations.

3) LOCATION OF EXISTING WELLS WITHIN A ONE-MILE RADIUS

Location of Existing Wells in the Grieve Unit and Within a one – mile radius

	Well Label	TWNSHP	RANGE	SECTION	QTR-QTR
Water Wells	UNIT 6	32N	85W	I6	SE-SE
Abandoned Wells					
	GRIEVE UNIT 39	32N	85W	15	SW-SW
	8-A MORTON 8A	32N	85W	22	NE-NW
	FOREST-BURNS 17-2	32N	85W	17	NW-NE
	17-1 GRIEVE UNIT 45	32N	85W	17	NE-SE
	GOVT 1-34	32N	85W	34	NW-NE
	GOVT 1-35	32N	85W	35	SW-SW
	GOVT 34	32N	85W	26	SW-SE
	GOVT-2I-3 UNIT 40	32N	85W	21	SE-NW
	GRIEVE 42	32N	85W	27	NE-SW
	Grieve Shallow 31-21	32N	85W	21	NW-NE
	STATE 1	32N	85W	36	NW-NW
	UNIT I4	32N	85W	16	SE-SW
	UNIT 15	32N	85W	22	NE-SE
	UNIT 24	32N	85W	35	NE-NW
	GRIEVE MORTON-8	32N	85W	22	NE-NW
Temporarily Abandoned					
	GRIEVE 48	32N	85W	27	SW-NE
	GRIEVE UNIT 12	32N	85W	2I	SE-NE
	GRIEVE W-015815 23	32N	85W	26	SE-SW
	GRIEVE 0-12931 I6	32N	85W	16	NE-SE
	GRIEVE 18	32N	85W	22	SE-SE
	GRIEVE 20	32N	85W	27	NE-NE
	GRIEVE 6A	32N	85W	16	SE-SE
	GRIEVE UNIT 2	32N	85W	22	NW-NW
	GRIEVE UNIT 21	32N	85W	26	SW-NW
	GRIEVE UNIT 22	32N	85W	26	NW-SW
	GRIEVE UNIT 29	32N	85W	26	NE-SW
	GRIEVE UNIT 31	32N	85W	26	SE-NW
	GRIEVE UNIT 32	32N	85W	26	NE-NW
	GRIEVE UNIT 4	32N	85W	22	NW-SE
	GRIEVE UNIT 41	32N	85W	22	NE-NW
	GRIEVE UNIT 43	32N	85W	22	SW-NE
	GRIEVE UNIT 5	32N	85W	22	SW-SE
	GRIEVE UNIT 7	32N	85W	22	SW-NW
	GRIEVE W-015815 I0	32N	85W	22	NE-SW

Location of Existing Wells in the Grieve Unit and Within a one – mile radius

	GRIEVE W-015815 19	32N	85W	26	NW-NW
	GRIEVE W-015824 44	32N	85W	22	NW-SE
	W-015815 GRIEVE UNIT	32N	85W	22	SE-SW
Disposal Wells					
Drilling Wells					
Producing Wells					
	GRIEVE UNIT 9	32N	85W	21	NE-NE
Shut-in Wells					
	GRIEVE 30	32N	85W	27	NE-SE
	GRIEVE UNIT 50	32N	85W	27	NW-SE
	GRIEVE UNIT 51	32N	85W	21	SE-SE
	GRIEVE 49	32N	85W	27	SW-NE
	GRIEVE UNIT I1	32N	85W	16	SW-SE
	GRIEVE UNIT 17	32N	85W	16	NW-SE
	MUSTANG 1	32N	85W	27	SW-NW
	GRIEVE UNIT 39A	32N	85W	15	SW-SW
Injection Wells					
	MORTON 1-22-I	32N	85W	22	SE-NW
Monitoring Wells					

4) LOCATION OF EXISTING AND/OR PROPOSED FACILITIES OWNED BY ELK PETROLEUM, INC. WITHIN A ONE (1) MILE RADIUS

a) Existing Facilities

i) Tank batteries:	NENW Section 22 T32N R85W
ii) Production facilities:	NENW Section 22 T32N R85W
iii) Oil gathering lines:	Throughout the field, connecting the wells to central tank battery.
iv) Gas gathering lines:	None known.

b) New Facilities Contemplated

All production facilities will be located at the central facility located in the NENW Section 22 T32N R85W. A CO_2 header and metering station will be placed in conjunction with infield CO_2 distribution, and located in SENE Section 27, as provided in the Sundry Notice for infield gathering and distribution systems.

c) In the event a production (emergency) pit is required on a location, it will be fenced "sheep-tight" with woven wire mesh having two (2) top strands of barbed wire held in place by metal side posts and wooden comer "H" braces in order to protect both

livestock and wildlife. Please refer to Item 9F for additional information concerning these fencing specifications.

d) During drilling and subsequent operations, all equipment and vehicles will be confined to the access roads and any additional areas that may be specified in the approved Application for Permit to Drill.

e) Reclamation of disturbed areas no longer needed for operations will be accomplished by grading, leveling and seeding as recommended in a project specific Reclamation Plan and approved by the Authorized Officer, Bureau of Land Management.

5) LOCATION AND TYPE OF WATER SUPPLY

a) Water needed for drilling operations will be produced water from the Muddy formation.

b) Water for cementing purposes will either be hauled from fresh water sources in Casper or taken from the existing water well and reservoir owned and operated by Elk Petroleum, Inc. within the Grieve Unit. The existing water well is the Grieve Unit #6 located in the NE Section 15-T32N-R85W, State of Wyoming Permit Number PI3567P.

c) Water will be hauled via tank truck over existing roads from the point of diversion to the proposed Grieve well locations. No additional new construction will be required on/along the proposed water haul routes and no off-lease federal lands will be crossed on/along the proposed water haul routes.

d) Elk Petroleum, Inc. has no plans to drill additional water wells for the proposed Grieve CO_2 EOR project.

6) CONSTRUCTION MATERIALS

a) Any construction materials (gravel) that may be required for surfacing of drilling pads and access roads will be obtained from a private contractor having a previously approved source of materials within the general area. Please refer to Item 2g for additional information regarding the need for surfacing materials in conjunction with operations in the Grieve Unit.

b) No construction materials will be taken from federal or Indian lands without prior approval from the appropriate Surface Management Agency.

c) No new access roads for transportation of these construction materials will be required.

7) METHODS OF HANDLING WASTE

a) **Cuttings:** The drilled cuttings will be deposited in the reserve pit.

b) **Drilling fluids:** Any drilling additives utilized in the mud system will be contained in the reserve pit. The reserve pits will be designed to prevent the collection of surface runoff and will be constructed entirely in cut on the uphill side of the well locations.

c) **Produced fluids:** Liquid hydrocarbons produced during completion operations will be placed in test tanks on the location. Produced water will be placed in the reserve pits for a period not to exceed ninety (90) days after initial production. During this ninety (90) day period, in accordance with Onshore Oil & Gas Order Number 7, an application for approval of a permanent disposal method and location, along with the required water analysis, shall be submitted to the Authorized Officer for review and approval.

Any spills of oil, gas, salt water or any other potentially hazardous substance will be cleaned up and immediately removed to an appropriate, approved disposal site.

d) **Sewage:** Portable, self-contained chemical toilets will be provided for human waste disposal. Upon completion of operations, or as required, the toilet holding tanks will be pumped and the contents thereof disposed of in an approved sewage disposal facility. Sewage disposal will be in strict accordance with Wyoming Department of Environmental Quality (DEQ) rules and regulations regarding sewage treatment and disposal.

e) **Garbage and other waste material:** All garbage and non-flammable solid waste materials will be contained in a self contained, portable dumpster or trash cage. Upon completion of operations, or as needed, the accumulated trash will be hauled off-site to a Wyoming DEQ approved sanitary landfill. Used motor oil (change oil) will be placed in closed containers and disposed of at an authorized disposal site.

No trash will be placed in the reserve pit.

f) Immediately after removal of the drilling rig, all debris and other waste materials not contained in the trash cage will be cleaned up and removed from the well locations. No potentially adverse materials or substances will be left on the location.

Any open pits will be fenced during the drilling operation and said fencing will be maintained until such time as the pits have been backfilled.

g) **Hazardous Materials:** Elk Petroleum, Inc. maintains a file, per 29 CFR 1910.1200 (g) containing current Material Safety Data Sheets (MSDS) for all chemicals, compounds, and/or substances which are used during the course of construction, drilling, completion, and production operations for this project. Hazardous materials which may be found at the site include drilling mud and cementing products which are primarily inhalation hazards, fuels (flammable and/or combustible), materials that may be necessary for well completion/stimulation activities, such as flammable or combustible substances and acids/gels (corrosives).

The opportunity for Superfund Amendments and Reauthorization Act (SARA) listed Extremely Hazardous Substances (EHS) at the site is generally limited to proprietary treating chemicals. All hazardous and Extremely Hazardous Substances and commercial preparation will be handled in an appropriate manner to minimize the potential for leaks or spills to the environment.

8) ANCILLARY FACILITIES

None anticipated.

9) LAYOUT

a) Figure 1, of each attached well specific data package, shows the drill site layout as staked. Cross sections have been drafted to visualize the planned cuts and fills across each proposed well location (Figure 2).

A minimum of six (6) inches of topsoil will be stripped from each location (including areas of cut, fill, and/or subsoil storage) and stockpiled for future reclamation of the well site. Please refer to Figure # 1 of each well specific well package for the location of the topsoil and subsoil stockpiles.

b) A typical rig layout diagram is attached to this MDP. No permanent living facilities are planned in the Grieve Unit project area; however, there could be up to a maximum of two (2) trailers on each drilling location during drilling operations. These trailers would serve as both offices and housing for the mud logger, geologist and toolpusher.

c) All equipment and vehicles will be confined to those areas identified on the well specific cur and fill and layout diagrams included in this MDP package (e.g., access road, well pad, spoil and topsoil storage areas).

d) No production facilities are anticipated outside the central facility in the NENW Section 22; refer to Item 4b for additional information in this regard.

e) Reserve pits will be lined with a reinforced synthetic liner in order to prevent drilling water loss through seepage. The liner will have a permeability less than or equal to 1×10^{-7} cm/sec, will be chemically compatible with all substances which may be put into the pit; the liner will be installed so that it will not leak. Liners made of any man-made synthetic material will be of sufficient strength and thickness to withstand normal installation and pit use.

Pit liners will be installed with sufficient bedding (either straw or dirt) to cover any rocks, will overlap the pit walls, extend under the mud tanks, and be covered with dirt and/or rocks to hold it in place.

No trash, scrap pipe, etc. that could puncture the liners will be disposed of in the reserve pit.

f) Prior to the commencement of drilling operations, reserve pits will be fenced "sheep tight" on three (3) sides according to the following minimum standards:

i) 32-inch net wire shall be used with two (2) strands of barbed wire on top of (above) the net wire.
ii) The net wire shall be no more than four (4) inches above the ground. The first strand of barbed wire shall be approximately three (3) inches above the net wire. Total height of the fence shall be at least forty-two (42) inches.
iii) Corner posts shall be cemented and/or braced in such a manner to keep the fence tight at all times.
iv) Standard steel, wood, or pipe posts shall be used between the corner braces. The maximum distance between any two (2) posts shall be no greater than sixteen (16) feet.
v) All wire shall be stretched, by using a stretching device, before it is attached to the corner posts.

The fourth (4th) side of the reserve pit will be fenced immediately upon removal of the drilling rig and the fencing will be maintained until the pit is backfilled.

g) Any hydrocarbons on the pit will be removed as soon as possible after drilling operations are completed.

10) PLANS FOR SURFACE RECLAMATION

a) Rat and mouse holes will be backfilled and compacted from bottom to top immediately upon release of the completion rig from the drilling locations.

b) If any oil accumulates on the pits and is not immediately removed after operations cease, the pit containing oil or other adverse substance(s) will be flagged overhead or covered with wire mesh to protect migrating waterfowl. According to Wyoming Oil and Gas Conservation Commission regulations, oil must not be allowed to accumulate in reserve pits.

c) **Producing Operations:**

i) Backfilling, leveling and re-contouring are planned as soon as possible after cessation of drilling and completion operations. Waste and spoil materials will be disposed of immediately upon cessation of drilling and completion activities.
ii) For production, the fill slopes will be reduced from a 1.5: 1 slope to a 3:1 slope and the cut slopes will be reduced from a 2:1 slope to a 3:1 slope by pushing the fill material back up into the cut.
iii) Waterbars will be constructed on the reclaimed portions of the producing well location at least one foot deep, on the contour, with approximately two feet of drop per 100 feet of waterbar to ensure drainage, and extended into established vegetation. All waterbars will be constructed with the berm on the downhill side to prevent soft material from silting in the trench. The initial waterbar will be

constructed at the top of the backslope with a subsequent waterbar constructed at the top of the fill slope.

iv) Upon completion of backfilling, leveling and re-contouring, all disturbed surfaces (access road and well pad areas) will be scarified to a depth of one (1) foot and the stockpiled topsoil will be evenly redistributed to a depth of six (6) inches over the reclaimed area(s).

v) Prior to commencement of seeding operations, the seedbed will be prepared by disking on the contour to a depth of four (4) to six (6) inches, leaving no depressions that would trap water or form ponds.

All disturbed surfaces (including the access road, gathering or CO_2 distribution lines and well pad areas) will be reseeded using the following seed mixture (or a different mixture to be recommended in the project Reclamation Plan and approved by the Authorized Officer, Bureau of Land Management):

Species	Pounds PLS/Acre *
Streambank wheatgrass	3.0
Thickspike wheatgrass	3.0
Western wheatgrass	4.0
Green needlegrass	2.0
Smooth brome	2.0
Bottlebrush squirreltail	2.0
Winterfat	1.0
* Pounds of Pure Live Seed per Acre	

vi) Seed will be drilled on the contour with a seed drill equipped with a depth regulator in order to ensure even depths of planting. Seed will be planted between one-quarter (1/4) to one-half (1/2) inches deep.

vii) Fall seeding will be completed after September 15th and prior to ground frost. If applicable, spring seeding will be completed after the frost has left the ground and prior to May 15th. The seeding will be repeated until a satisfactory stand, as determined defined in the project Reclamation Plan and approved by the Authorized Officer, is achieved. The first evaluation of growth will be made following the completion of the first growing season.

viii) Re-seeding activities are considered best in the fall of the year the well is drilled, unless requested otherwise by the Authorized Officer, Bureau of Land Management.

ix) All soil material that will be stockpiled for ten (10) months or longer will be signed and stabilized with vegetation. These soil stockpiles will be seeded with annual ryegrass (*Lolium multiflorum*) at a rate of ten pounds per acre.

d) Abandoned Well Location:

i) Upon final abandonment of each well location, gravel will be removed from the access road surface and well location (as directed by either the Authorized Officer,

Bureau of Land Management), water diversion installed as needed, and both the access road and well location restored to approximately the original ground contour(s) by pushing the fill material back into the cut and up over the backslope.

ii) Prior to commencement of reseeding activities on/along the reclaimed well location and access road route, waterbars are to be constructed at least one (1) foot deep, on the contour with approximately two (2) feet of drop per 100 feet of waterbar to ensure drainage, and extended into established vegetation. All waterbars will be constructed with the berm on the downhill side to prevent the soft material from silting in the trench.

The initial waterbar should be constructed at the top of the backslope with subsequent waterbars installed in accordance with the general spacing guidelines presented below:

%Slope	Spacing Interval (feet)
2% or <	200'
2% - 4%	100'
4% - 5%	75'
5% or >	50'

iii) Prior to commencement of seeding operations, the seedbed will be prepared by disking on the contour to a depth of four (4) to six (6) inches. No depressions will be left that would trap water or form ponds. All disturbed surfaces (including the access road and well pad areas) will be reseeded as recommended in Item #10 C v-viii, above.

11) SURFACE OWNERSHIP

The well location and proposed access road route are situated on surface estate owned by the United States of America and administered in trust by:

Field Manager
Lander Field Office
Bureau of Land Management
1335 Main Street
Lander, Wyoming 82520
Telephone: 307-332-8400

Portions of some access roads and/or locations needed for drilling and operations for the eight proposed federal wells are located on private or state lands. None of the proposed wells are located on split estate; ownership is indicated on Map B.

List all Land Owners by Name, phone number and address:

State Of Wyoming
Office of State Lands and Investments
122 W. 25th St, 3rd Floor West
Cheyenne, WY 82002
307-777-7331

Mark Murphy
Murphy Ranch
35520 Oregon Trail
Casper, WY
307-266-1320

Western Star Ag Resources
Attn: Jack Vanier
P.O. Box 1393
Salina, KS 67403-1393
785-823-3794

Elk Petroleum, Inc. certifies they have either provided a copy of this Surface Use Plan of Operations to each affected land owner or made a good faith effort to provide documentation to the affected surface owners.

12) OTHER INFORMATION

a) General Description of the Project Area:

The project area is situated on the northern flank of the Rattlesnake Range and more specifically in a topographic area locally known as "Horse Heaven". This is an upland area that is generally west of Burnt Wagon Draw, southeast of Cabin Creek, southwest of Austin Creek, east of Buffalo Head, northeast of Keester Basin, east/southeast of Garfield Peak, south of Poison Spider Creek, and generally west of the city of Casper, Wyoming. This area is classified as a "High Plains Steppe" (cold desert) and is characterized by gently to moderately undulating uplands dissected by numerous dendritically patterned ephemeral tributaries of Poison Spider Creek including Austin and Cabin Creeks.

Local flora consists primarily of western wheatgrass, prairie junegrass, needle-and- thread grass, Indian ricegrass, threadleaf sedge, and sagebrush with both juniper and limber pine at the higher elevations and on north facing slopes. Local fauna consists primarily of mule deer, antelope, coyotes, badgers, skunks, rabbits, raptors, and various smaller vertebrate and invertebrate species.

There are no known threatened or endangered species (currently listed) that would be directly affected by implementation of operations in the Grieve Unit.

b) **Surface Use Activities:**

The primary surface use is for livestock grazing.

c) **Proximity of Water, Occupied Dwellings, Archaeological, Historical or Cultural Sites:**

i) The closest source of semi-permanent water is Austin Creek, which is located approximately to the east/northeast of the Grieve Unit.
ii) The closest occupied dwellings are located at the Diamond Ring Livestock Company ranch headquarters located approximately in the SESW of Section 13-T33N-R84W.
iii) Elk Petroleum, Inc. will be responsible for informing all persons associated with this project that they will be subject to prosecution for damaging, altering, excavating or removing any archaeological, historical, or vertebrate fossil objects or site(s).

If archaeological, historical or vertebrate fossil materials are discovered, Elk Petroleum, Inc. will suspend all operations that further disturb such materials and immediately contact the Authorized Officer. Operations will not resume until written authorization to proceed is issued by the Authorized Officer.

Within five (5) working days the Authorized Officer will evaluate the discovery and inform Elk Petroleum, Inc. of actions that will be necessary to prevent loss of significant cultural or scientific value.

Elk Petroleum, Inc. will be responsible for the cost of any mitigation required by the Authorized Officer. The Authorized Officer will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the Authorized Officer that the required mitigation has been completed, Elk Petroleum, Inc. will be allowed to resume operations.

d) **Additional Requirements for Operations on Lands Administered by the Bureau of Land Management:**

i) Elk Petroleum, Inc. will be responsible for weed control on disturbed areas within the exterior limits of this permit and will consult with the Authorized Officer and/or local authorities for acceptable weed control measures.

A "Pesticide Use Proposal" (Form #WY-04-9222-1) and pesticide labels will be submitted by Elk Petroleum, Inc. to the Authorized Officer no later than December 1st for use during the following spring/summer period.

ii) A Wyoming Department of Environmental Water Quality Department (WDEQ/WQD) Storm Water Pollution Protection Plan (SWPPP) will be prepared for all construction activity anticipated in conjunction with the Grieve Unit CO_2 EOR project. SWPPP

best management practices implemented in compliance with that Plan will be maintained until that particular portion of the disturbance is stabilized and released from the SWPPP by the WDQ.

13) LESSEE'S OR OPERATOR'S REPRESENTATIVE AND CERTIFICATION

Representative

Ralph Schulte, Engineering Manager
Elk Petroleum, Inc.
123 W. 1st, Suite 550
Casper, Wyoming 82602
Telephone: 307-265-3326

Certification

All lease and/or unit operations will be conducted in such a manner that full compliance is made with all applicable laws, regulations, Onshore Oil & Gas Orders, the approved plan of operations, and any applicable Notice to Lessees.

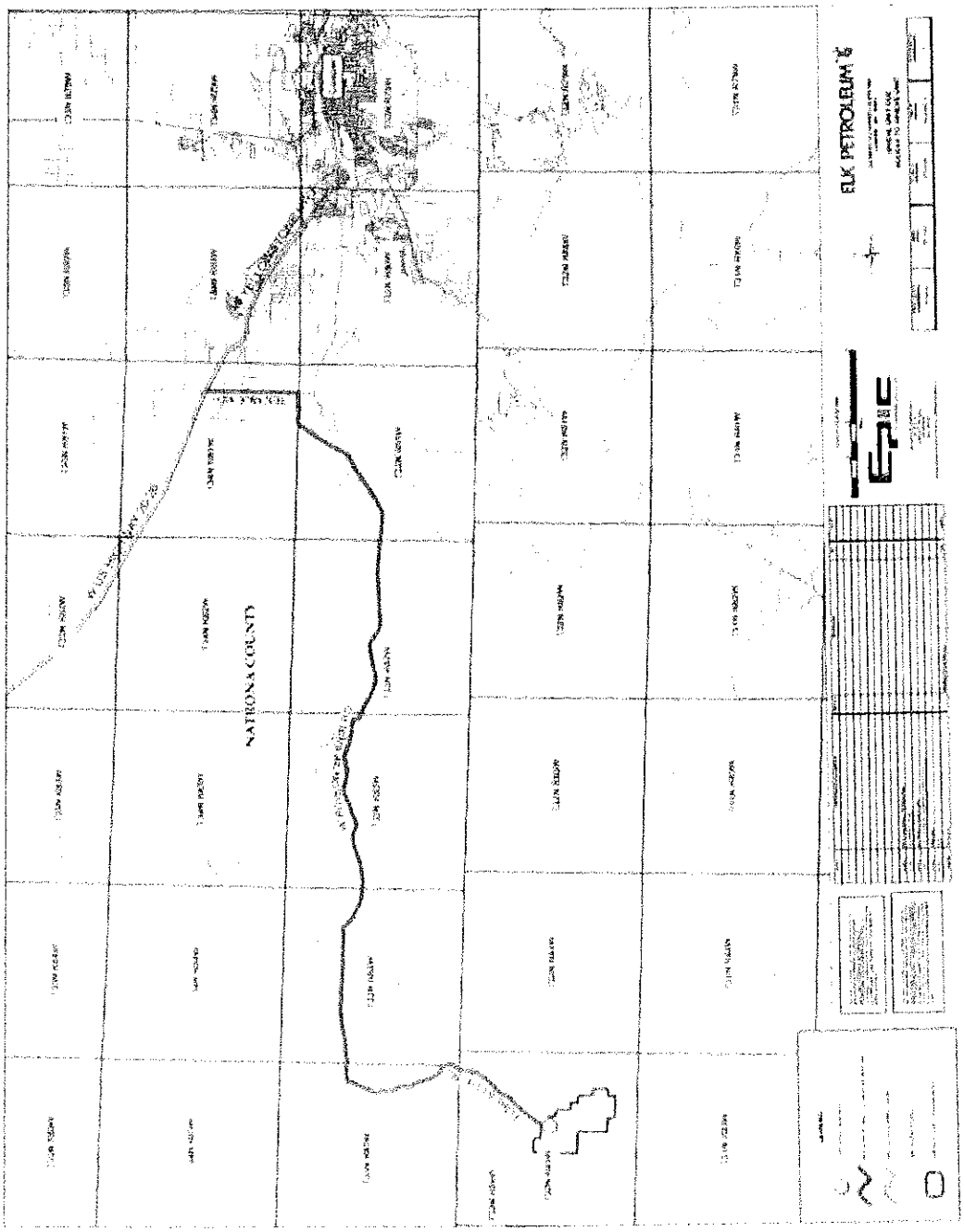
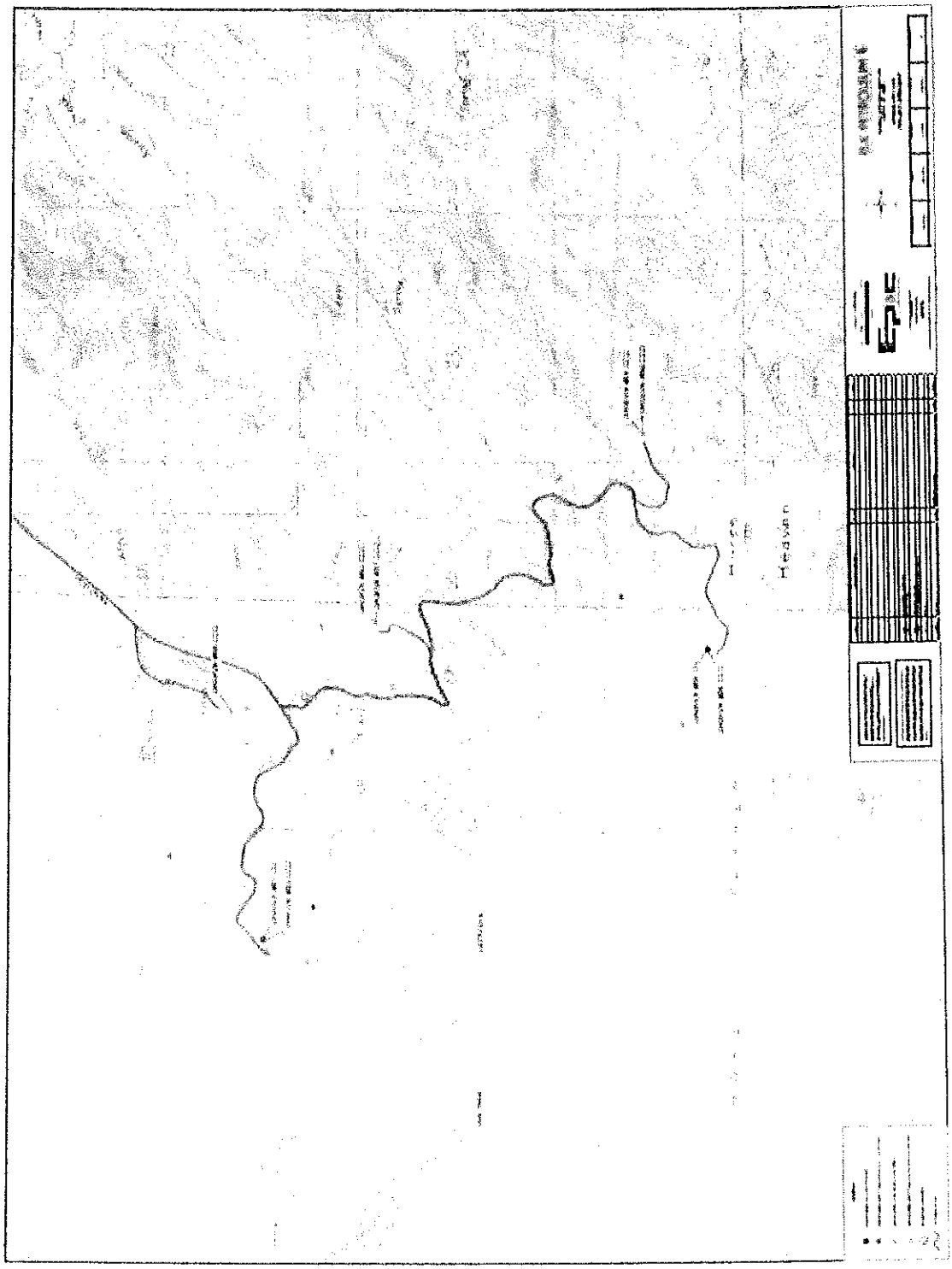
Elk Petroleum, Inc. will be fully responsible for the actions of their subcontractors. A copy of these conditions will be furnished to the field representative(s) to ensure compliance. The dirt contractor will be provided with a copy of the Surface Use Plan from the approved Application for Permit to Drill.

This drilling permit will be valid for a period of two (2) years from the date of approval. After permit termination, a new application will be filed for approval for any future operations.

I hereby certify that I, or persons under my direct supervision, have inspected the proposed drill site and access route; that I am familiar with the conditions which currently exist; that the statements made in this plan are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed by Elk Petroleum, Inc., their contractors and subcontractors in conformity with this plan and the terms and conditions under which it is approved. This statement is subject to the provisions of 18 U.S.C. 1001 for the filing of a false statement.

Executed this 16 day of August, 2011. Name: Ralph Schulte
Position Title: Engineering Manager

Map A: Map providing Direction to Grieve Unit from Casper, Wyoming



Map B: Well Locations and Access for Proposed Grieve Unit Wells