

2.0 PROPOSED ACTION AND ALTERNATIVES

This environmental document analyzes the impacts of the Proposed Action and the No Action Alternative for eight additional horizontal wells proposed to be drilled by SWPC on federally-owned mineral estate within the Hornbuckle Field in northern Converse County, Wyoming. These eight wells would test the commercial productivity of the Sussex Formation (Fm) for commercial oil production. The only other alternative considered available or reasonable in this analysis is the No Action Alternative.

2.1 THE PROPOSED ACTION

SWPC is proposing to drill eight horizontal oil wells within the Hornbuckle Field at the surface locations identified in Table 2.1 and shown in Figures 2.1a-d. The proposed bottom hole location for each well is also provided in Table 2.1.

Table 2.1

Proposed Horizontal Sussex Fm Wells in the Hornbuckle Field

| Well Name and Number | Surface and Bottom Hole Locations of Proposed Wells | | | | | Surface Ownership |
|----------------------|-----------------------------------------------------|-----------------------------------|---------|----------|---------|-------------------|
| | Surface Hole | Bottom Hole | Section | Township | Range | |
| BR Federal 44-4H | SE $\frac{1}{4}$ SE $\frac{1}{4}$ | NW $\frac{1}{4}$ NE $\frac{1}{4}$ | 4 | 37 North | 73 West | David Blaylock |
| BR Federal 11-10H | NW $\frac{1}{4}$ NW $\frac{1}{4}$ | SE $\frac{1}{4}$ SW $\frac{1}{4}$ | 10 | 37 North | 73 West | David Blaylock |
| DCR Federal 31-24H | NW $\frac{1}{4}$ NE $\frac{1}{4}$ | SE $\frac{1}{4}$ SE $\frac{1}{4}$ | 24 | 37 North | 73 West | Duck Creek Ranch |
| HR Federal 44-20H | SE $\frac{1}{4}$ SE $\frac{1}{4}$ | NW $\frac{1}{4}$ NE $\frac{1}{4}$ | 20 | 38 North | 73 West | Hornbuckle Ranch |
| GH Federal 44-21H | SE $\frac{1}{4}$ SE $\frac{1}{4}$ | NW $\frac{1}{4}$ NE $\frac{1}{4}$ | 21 | 38 North | 73 West | Hardy Ranch |
| GH Federal 24-22H | SE $\frac{1}{4}$ SW $\frac{1}{4}$ | NW $\frac{1}{4}$ NW $\frac{1}{4}$ | 22 | 38 North | 73 West | Hardy Ranch |
| BR Federal 24-26H | SE $\frac{1}{4}$ SW $\frac{1}{4}$ | NW $\frac{1}{4}$ NW $\frac{1}{4}$ | 26 | 38 North | 73 West | David Blaylock |
| HR Federal 11-28H | NW $\frac{1}{4}$ NW $\frac{1}{4}$ | SE $\frac{1}{4}$ SW $\frac{1}{4}$ | 28 | 38 North | 73 West | Hornbuckle Ranch |

All of the proposed horizontal wells would be drilled on private surface estate as indicated above, with portions of the horizontal well bores drilled through federal mineral estate and subject to one or more federal mineral leases in each respective horizontal well bore (lateral).

Drilling operations in the Hornbuckle Field would be initiated as soon as all of the necessary permits have been obtained (subject to any timing restrictions for the protection of wildlife on specific drilling permits). It is anticipated that all eight wells would be drilled within one year of permit approval.

All lease and/or unit operations would be conducted in full compliance with all applicable laws, regulations (43 CFR 3100), *Onshore Oil and Gas Orders*, the approved plan of operations and any applicable Notices to Lessees.

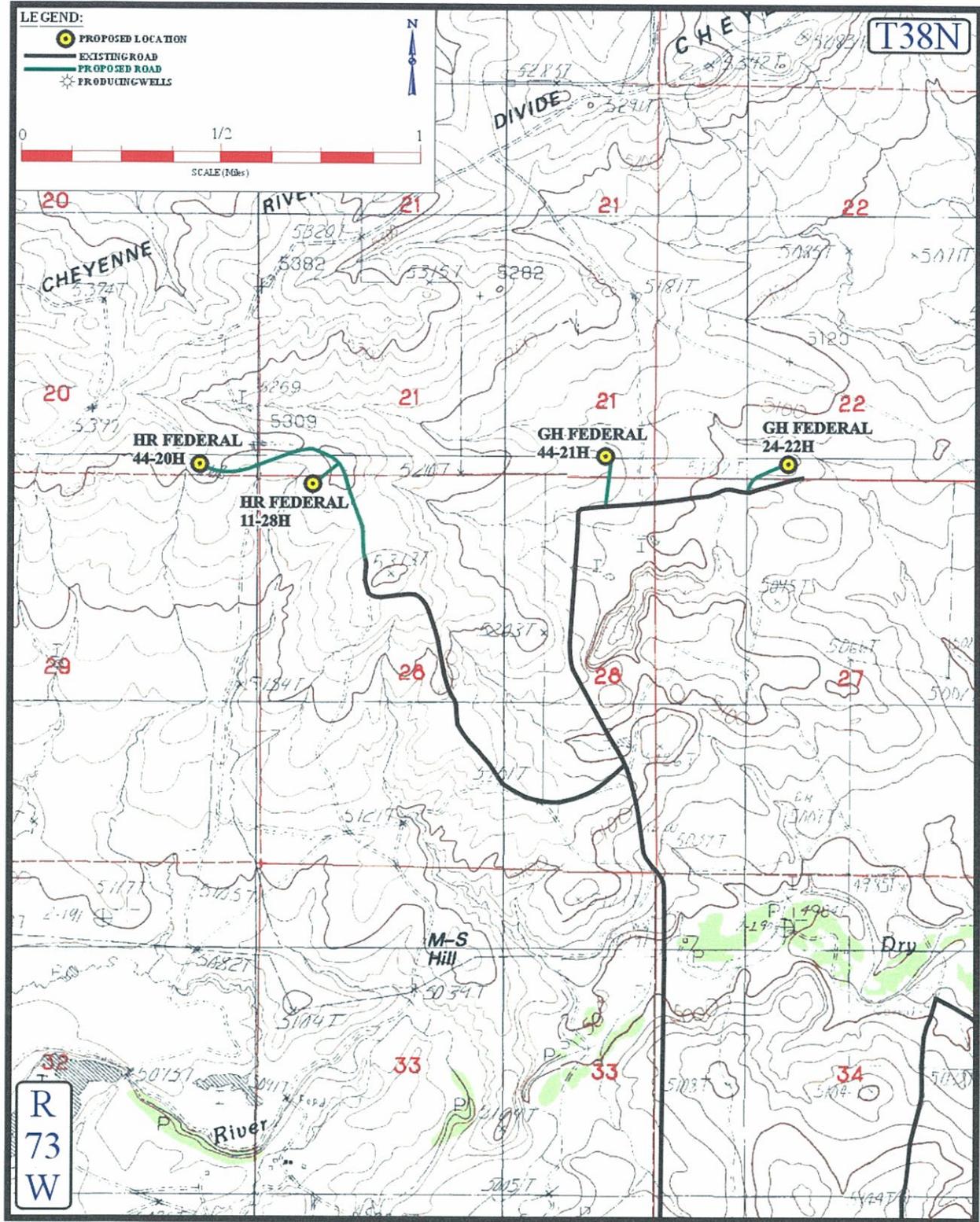


Figure 2.1a: Horizontal Sussex Fm Wells Proposed by SWPC in the Hornbuckle Field

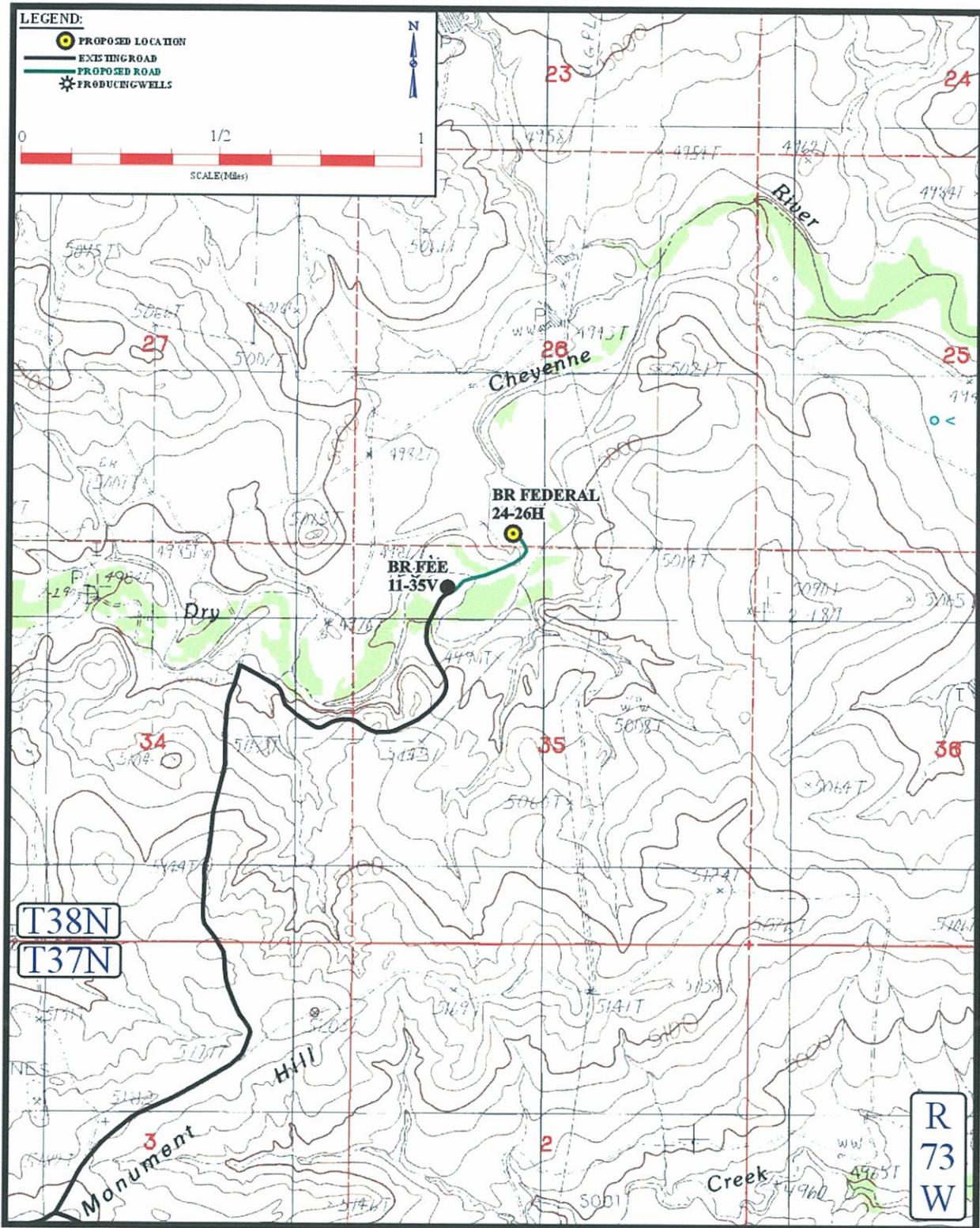


Figure 2.1b: Horizontal Sussex Fm Wells Proposed by SWPC in the Hornbuckle Field

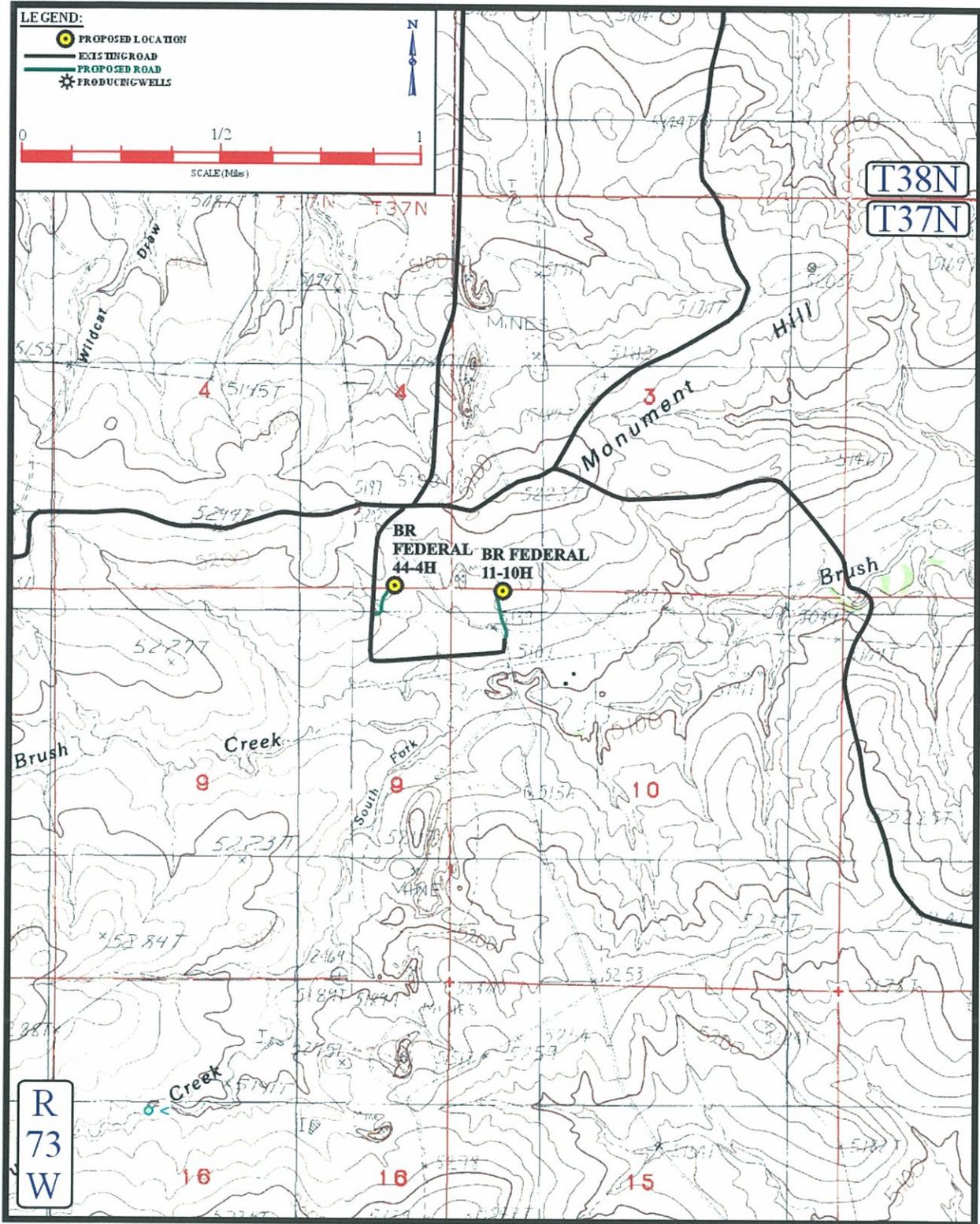


Figure 2.1c: Horizontal Sussex Fm Wells Proposed by SWPC in the Hornbuckle Field

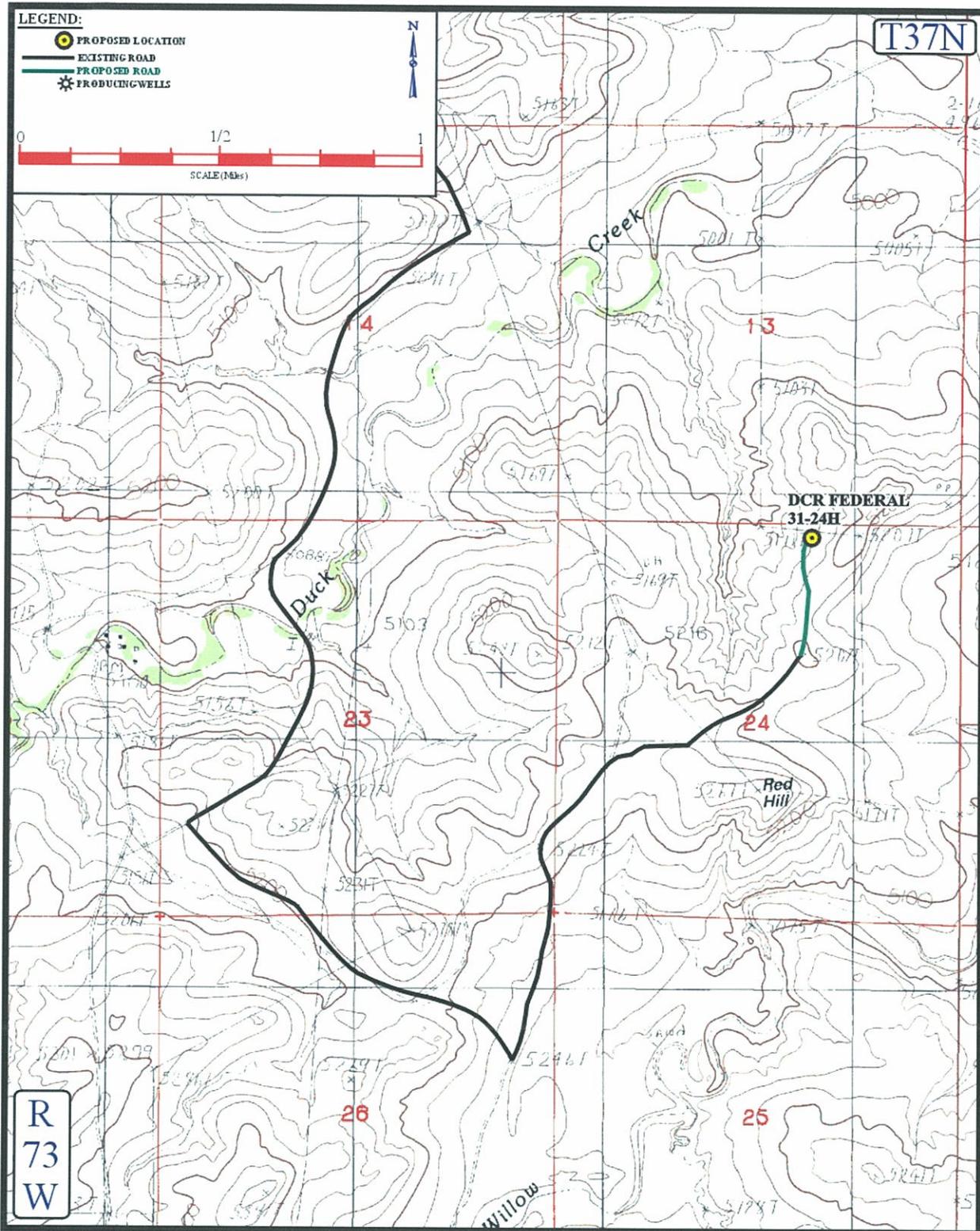


Figure 2.1d: Horizontal Sussex Fm Wells Proposed by SWPC in the Hornbuckle Field

2.1.1 Construction Activities

Construction activities for each proposed well location and access road route would follow practices and procedures outlined in each individual Application for Permit to Drill (APD) and any Conditions of Approval (COAs) appended thereto by the BLM. Access road and well pad construction activities would follow guidelines and standards as set forth in the joint BLM/U.S. Forest Service (USFS) publication: *Surface Operating Standards for Oil and Gas Exploration and Development* (Fourth Edition) and/or the contractual requirements of the affected private (fee) surface owner(s).

2.1.1.1. Access Roads

Access to the Hornbuckle Field would generally be obtained via the Ross Road (Converse County Road #31) and then via existing, upgraded oilfield roads (crowned and ditched with gravel running surfaces) within the field. Access to the eight proposed horizontal Sussex Fm. well locations from existing roads within the Hornbuckle Field would require the construction of approximately 6,600 feet (1.25 miles) of new access road and the reconstruction of approximately 5,000 feet (0.95 miles) of existing two-track trail, resulting in the initial disturbance of an additional 10.65 acres of surface estate (based on a maximum disturbed road width of 40 feet). Table 2.2 provides the amount of road to be constructed or reconstructed for access to each of the eight proposed well locations.

Table 2.2

Proposed Access Roads to the Eight Proposed Horizontal Wells in the Hornbuckle Field

| Well Name and Number | Upgraded Road | New Road | Total Road |
|-----------------------------|----------------------|-----------------|-------------------|
| BR Federal 44-4H | 0' | 500' | 500' |
| BR Federal 11-10H | 0' | 600' | 600' |
| DCR Federal 31-24H | 3,000' | 1,500' | 4,500' |
| HR Federal 44-20H | 600' | 1,300' | 1,900' |
| GH Federal 44-21H | 0' | 500' | 500' |
| GH Federal 24-22H | 0' | 600' | 600' |
| BR Federal 24-26H | 0' | 1,200' | 1,200' |
| HR Federal 11-28H | 1,400' | 400' | 1,800' |
| TOTALS | 5,000' | 6,600' | 11,800' |

Whenever possible, access roads would be designed and constructed to disturb less than the 40 foot right-of-way (ROW) width referenced above so long as traffic and safety concerns could be

satisfied. The existing access roads would be maintained as necessary to accommodate appropriate year-round traffic and prevent unnecessary erosion. Roads would be constructed in accordance with BLM manual section 9113 and/or the roading standards outlined in the joint BLM/USFS publication: *Surface Operating Standards for Oil and Gas Exploration and Development* (Fourth Edition) and would be designed by a professional engineer as necessary or required by the BLM.

Topsoil would be stripped from the access road corridor as directed by the affected fee surface owner(s) prior to the commencement of construction activities, with the stockpiled topsoil redistributed on the “outslope” areas of the borrow ditch following completion of road construction activities. These borrow ditch areas would then be reseeded as soon as practical thereafter with a seed mixture to be recommended by either the private surface owner or the BLM.

In the event that commercial production is established from any/all of the proposed horizontal wells, the access roads would be graveled with a minimum of four inches of gravel as necessary or required by either the private surface owner or the BLM and the roadway would remain in place for the productive life of the well. The gravel would be obtained from the Collins Limestone Quarry located in the NE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 30 in Township 30 North, Range 68 West.

2.1.1.2. Well Locations

Major components of the proposed well pad would include:

- a leveled area suitable for placement/support of the drilling rig and related equipment; and
- a series of three earthen reserve pit(s) designed to contain drilling fluids, drilled cuttings, fluids produced during the drilling operation and fluids used/produced during the completion operation

Construction activities for each well would follow practices and procedures outlined in each individual APD and any Conditions of Approval (COAs) appended thereto by the BLM. Well pad construction activities would follow guidelines and standards as set forth in the joint BLM/U.S. Forest Service (USFS) publication: *Surface Operating Standards for Oil and Gas Exploration and Development* (Fourth Edition). Sufficient topsoil to facilitate revegetation would be segregated from subsoil materials during construction and stockpiled for future reclamation of the disturbed areas. The salvaged topsoil would be evenly distributed over those disturbed surfaces subject to reclamation upon termination of drilling and completion operations as part of the reclamation and revegetation program. Topsoil stockpiles would be stabilized with vegetation (annual ryegrass) until used for reclamation purposes as necessary or required by either the private surface owner or the BLM.

After the topsoil has been removed, the well pad would be graded to produce a level working platform around the drill hole for support of the rig substructure. The excavated soil material (subsoil) would be utilized in overall pad construction, with the finished well pad graded to allow for positive drainage of natural water (e.g., rain and/or snow melt) away from the drill site.

The level area of the well pad required for drilling and completion operations (including the reserve pit) would be approximately 460' x 341' (3.60 acres) in overall size. Minor deviations would occur in the overall size of individual well locations due to topographic constraints and efforts by both BLM, SWPC and the private surface owners to limit surface disturbances in certain circumstances (including, but not limited to, areas of extensive cuts and/or fills, proximity to ephemeral drainages, etc.) as determined at the time of the on-site inspections. Construction of all eight well locations would result in approximately 38.39 acres of additional surface disturbance within the existing Hornbuckle Field (see Table 2.3).

Erosion control would be maintained through prompt revegetation and by constructing surface water drainage control structures such as berms, diversion ditches and waterbars as necessary on the proposed well location(s).

Table 2.3 provides a summary of surface disturbance associated with well pad and access road construction for each of the eight proposed well locations.

Table 2.3

Acres of Surface Disturbance Directly Associated with the Proposed SWPC Horizontal Drilling Program

| Well Name and Number | Access Road ¹ | Well Location ² | Total Disturbance |
|-----------------------------|---------------------------------|-----------------------------------|--------------------------|
| BR Federal 44-4H | 0.46 | 4.50 | 4.96 |
| BR Federal 11-10H | 0.55 | 4.85 | 5.40 |
| DCR Federal 31-24H | 4.13 | 5.13 | 9.26 |
| HR Federal 44-20H | 1.75 | 4.78 | 6.53 |
| GH Federal 44-21H | 0.46 | 4.76 | 5.22 |
| GH Federal 24-22H | 0.55 | 4.53 | 5.08 |
| BR Federal 24-26H | 1.10 | 4.44 | 5.54 |
| HR Federal 11-28H | 1.65 | 5.40 | 7.05 |
| TOTALS | 10.65 | 38.39 | 49.04 |

1 Based upon a 40-foot total disturbed road ROW width

2 Including cut/fill slopes and soil stockpiles

2.1.2 Drilling Operations

To facilitate the drilling of the proposed horizontal wells, SWPC would utilize a rotary drilling rig rated for drilling operations to a measured depth of approximately 14,500 feet. Rig transport and on-site assembly would be completed in approximately seven days per well and actual drilling

operations would require approximately thirty-five days/well to reach the target depth. The proposed drilling operation would not penetrate any formation known or suspected to contain concentrations of hydrogen sulfide (H₂S) gas.

Human waste generated during operations would be collected in standard portable chemical toilets or service trailers located on-site and would be transported off-site to a state-approved wastewater treatment site upon completion of operations. Non-human waste would be collected in enclosed containers and disposed of at a state-approved solid waste disposal facility.

2.1.2.1 Drilling Fluids System

The actual drilling operation would utilize a fresh-water based mud system with additives to drill the surface hole (surface to approximately 3,200'). Basically, this system involves drilling with water and utilizing non-hazardous additives such as bentonite to minimize down hole problems. On the average, SWPC would utilize approximately 1.27 barrels of water (42 gallons/barrel) per foot of hole drilled (or approximately 170,688 gallons/well) to drill the initial 3,200 feet of hole, with this water obtained from a commercial source in the immediate area. The fresh water based mud system would use a separate reserve pit approximately 60' X 60' x 8' to contain the cuttings and fluids used/generated during the drilling of the surface hole.

Upon setting and cementing of the surface casing string, SWPC would switch to an oil invert mud system (approximately 80% diesel fuel and 20% water) to drill the remainder of the hole, with approximately 155,400 gallons of diesel fuel and 31,080 gallons of water used in the invert mud system. SWPC would clean and re-use as much of the oil invert mud as possible during the drilling operation. Upon completion of drilling operations, the oil invert mud would be recycled and used in successive drilling programs, with any free fluids remaining in the reserve pit removed and hauled to an approved disposal site as indicated below. . The oil based mud (OBM) system would use a separate reserve pit approximately 100' X 80' x 8' to contain the OBM cuttings and fluids.

Use of an oil-invert mud system would reduce the potential for hole sloughing while drilling through water-sensitive formations (shales). Drilling fluids utilized in the oil-based mud system would be contained in steel tanks on location designed specifically for the containment of these oil-based fluids. These fluids would be recycled during the drilling operation by centrifuging the returns to separate the drilled cuttings from the oil-based fluids. The centrifuged cuttings would be deposited into a separate, lined reserve pit for disposal and the fluids would be recycled back into the mud system (steel tanks) for continued use in the drilling operation. Upon completion of drilling operations, any remaining oil-based fluids would be removed from the well location and disposed of in accordance with BLM and/or Wyoming Oil and Gas Conservation Commission (WOGCC) rules and regulations pertaining thereto. A plastic/vinyl liner would be placed underneath all steel tanks designed for the storage and/or mixing of the oil-based drilling fluids.

As stated above, cuttings generated in conjunction with the drilling operation would be contained in a separate reserve pit to be constructed on each individual well location. The reserve pit(s) would be lined with an impervious (plastic/vinyl) liner in order to prevent drilling fluids loss through seepage and contamination of the underlying soil material by the oil-based cuttings. The liner

would be installed with sufficient bedding (either straw or dirt) to cover any rocks, would overlap the pit walls, extend under the mud tanks, and would be covered with dirt and/or rocks to hold it in place. Prior to the commencement of drilling operations, the reserve pit(s) would be fenced on the three non-working sides, with the fourth side of the pits (location side) fenced immediately following removal of the drilling rig in order to protect both wildlife and livestock or as otherwise directed by the affected fee surface owner(s). Fencing would be installed in accordance with guidelines contained in the joint BLM/USFS publication: *Surface Operating Standards for Oil and Gas Exploration and Development*, Fourth Edition and would be maintained until such time as the reserve pits have been backfilled.

SWPC intends to utilize the Soli-Bond, Inc. (or a similar) solidification technique for the processing and disposal of oil-based cuttings generated in conjunction with the drilling operation. Use of the Soli-Bond processing technique would render these drilled cuttings into an inert, solid mass that would be buried in place in the reserve pits with a minimum of four feet of overburden upon completion of the solidification process. Solidification of all pits would be in accordance with WOGCC rules and regulations pertaining thereto using a WOGCC approved contractor for solidification and pit closure.

Solidification would be accomplished through the controlled addition of a non-toxic, chemically reactive, Portland-cement based reagent (or fly ash) to the drilled cuttings to form a homogenous slurry similar to brick mortar. Oily substances that could be present in the drilled cuttings (waste) would be broken up into small droplets or particles and dispersed throughout the reagent/waste mixture during the mixing phase of the process. After the mixing phase, an irreversible cementitious reaction begins to occur between the reagent and water present (or added) to the waste, ultimately causing the reagent/waste mixture to be transformed into a solid granular material within forty-eight hours after initial processing. Any dispersed particles of hydrocarbons within the processed granules are locked in place in their isolated state within the reacted cementitious matrix of each granule which prevents them from re-coalescing and suddenly being released to the environment at significant rates in the future. Moreover, the alkaline nature of the cementitious mixture chemically stabilizes various metals that may be present in the processed waste, primarily by transforming them into less soluble metal hydroxides and other less soluble compounds.

2.1.2.2 Casing and Cementing Operations

As indicated above, surface casing would be set at an approximate depth of 3,200 feet and cemented back to the surface during the drilling operations. This would serve to isolate all near surface fresh water aquifers which could occur in the immediate project area. Intermediate casing would be set to a measured depth (MD) of approximately 10,488 feet and would also be cemented in place, with the top of cement designed to be above the top of the Parkman Fm. This procedure would eliminate any possibility for fluid communication between potential hydrocarbon bearing zones below the Teapot Fm and any near-surface fresh water aquifers which may be encountered down hole. The cementing operations would be conducted in full compliance with *Onshore Oil and Gas Order Number 2*.

2.1.3 Completion and Evaluation Operations

Once a well has been drilled and cased, a completion (work-over) unit would be moved onto the well location and completion operations would commence. These completion operations would generally require an average of thirty days for a well of this depth and would typically consist of cleaning out the well bore, pressure testing the casing, perforating and fracturing (as appropriate) the Sussex Fm in the horizontal portion of the hole and running production tubing in the event that commercial production is established there from.

In certain instances, it may be necessary to hydraulically fracture selected intervals in the Sussex Fm in order to “stimulate” production. These hydraulic fracturing (frac) jobs would typically consist of pumping a mixture of sand and some form of transport medium (water, nitrogen, etc.) down hole under extreme pressure with this mixture forced through the existing perforations into the formation. As the formation is fractured, the resultant fissures (fractures) are filled with sand which props them open and facilitates the flow of oil/gas into the well bore and subsequently to the surface. Upon completion of the fracturing, the well would be flowed back to the surface in an attempt to recover as much of the fracture fluids as possible and to clean excess sand out of the perforations prior to setting production equipment on location and commencing production. All fluids utilized in the completion procedure would either be captured in a separate reserve pit to be constructed on the well location or in test (frac) tanks situated on the well location, with these fluids ultimately disposed of in strict accordance with both BLM and WOGCC rules and regulations applicable thereto.

2.1.4 Production Operations

Production equipment required on the individual well locations would typically include the following equipment:

- a pumping unit at the well head;
- a vertical heater/treater;
- a tank battery (which generally consists of two to four 400 barrel steel tanks);
- a flare/production pit; and
- a dehydrator and meter run for gas sales where applicable.

All permanent above ground production facilities installed on the producing well location would be painted Shale Green (Munsell standard color #5Y 4/2) or another of the standard environmental colors recommended by the Rocky Mountain Five-State Interagency Committee to be selected at the discretion of the BLM. A dike would be constructed completely around those production facilities designed to hold fluids (i.e., production tanks and/or heater/treater). These dikes would be constructed of compacted subsoil, be impervious, hold 110% of the capacity of the largest tank, and would be independent of the back cut. Load out lines would be

located within the tank battery dike and would have a heavy screen-covered drip barrel installed under the outlet. A metal staircase would be placed over the dike to protect the dike as well as support the tanker truck flexible hose.

Oil produced from each well would be collected in tanks installed on the individual well locations and would be periodically trucked to a pre-existing oil terminal for sales. The frequency of trucking activities would depend solely upon the amount of oil being produced from the wells. Recent production tests from the HR Federal #44-29 indicate that commercial quantities of natural gas may be expected from some horizontal completions in the Sussex Fm. SWPC has indicated that gas sales from these wells would be accomplished under a third-party agreement where the purchaser would run a sales line to the well location and the custody transfer of the gas would occur at a meter run to be installed on the producing well location. SWPC would encourage the purchaser to install these lines adjacent (parallel) to pre-existing roads to the extent possible, but the ultimate placement of these sales lines would be dictated by the location of the main transmission lines and any contractual agreements between the affected private surface owners and the gas purchaser. SWPC would not require any federal approvals for gas sales under this third party agreement. In those cases where commercial quantities of gas were not encountered, small (non-commercial) volumes of gas would be flared in accordance with Notice to Lessees (NTL) 4A. Any water produced in conjunction with the hydrocarbon stream would be captured in tanks on the well location and periodically trucked to an approved disposal site. As above, the frequency of trucking activities would depend solely upon the volumes of water produced from each individual well.

2.1.5 Interim Reclamation for Production

All disturbed surfaces would be reclaimed as soon as possible after the initial disturbance. This reclamation would consist primarily of backfilling the reserve pits, leveling and recontouring of “non-working” disturbed areas, redistribution of stockpiled topsoil over these disturbed areas, installation of erosion control measures, and reseeding as recommended by the BLM and/or private surface owner. Approximately 1.38 acres of the well pad (an area equal to 300’ X 200’) would be required for long-term production operations, the remaining 2.22 acres of the constructed well pad would be reclaimed as indicated above. Solidification and subsequent reclamation of the reserve pit(s) would be accomplished as soon as possible following well completion. Solidification would be accomplished as outlined in Section 2.1.2.1 and the pit would be backfilled immediately upon completion of the solidification process.

Interim reclamation of the well location including reduction of the cut and fill slopes, redistribution of the stockpiled topsoil over the recontoured slopes, and reseeding of these disturbed areas would be accomplished within a maximum of two years following the termination of drilling and completion operations. As indicated above, approximately 2.22 acres of the existing well pad would be reclaimed and reseeded in accordance with the guidelines contained in the approved APD.

Likewise, topsoil stockpiled in conjunction with initial road construction would be re-distributed over the outslope areas of the borrow ditches and these areas would also be reseeded as recommended in the approved APD. Reclamation of these outslope areas along the access road

would reduce the overall disturbed road ROW width from approximately 40 feet to approximately 28 feet and would reduce the long-term disturbance associated with the access road ROW to approximately 7.46 acres for all eight well locations.

The working area(s) of the well pad and the access road running surface would be surfaced with gravel or crushed rock and these surfacing materials would be obtained from a previously approved location within the general area. As stated in Section 2.1.1.1, crushed rock (gravel) is currently being obtained from the Collins Limestone Quarry located in the NE¹/₄NW¹/₄ of Section 30 in Township 30 North, Range 68 West.

2.1.6 Abandonment and Reclamation

Upon final abandonment, all existing surface facilities would be removed from the well location, the well bore would be physically plugged with cement as directed by the BLM, and a dry hole marker would be set in accordance with existing regulations and direction contained in the approved APD. Upon completion of plugging operations, both the access road and remaining “work” areas of each abandoned well location would be scarified and recontoured, erosion control measures would be installed as necessary, and all recontoured (disturbed) areas would be reseeded as recommended by the BLM and/or private surface owner. However, there may be certain circumstances where the private surface owner may wish to retain specific access roads for future use at the time of final abandonment.

2.1.7 Hazardous Materials

SWPC has reviewed the Environmental Protection Agency’s (EPA’s) Consolidated List of Chemicals Subject to Reporting Under Title III of the *Superfund Amendments and Reauthorization Act* (SARA) of 1986 (as amended) to identify any hazardous substances proposed for production, use, storage, transport, or disposal by this project, as well as the EPA’s List of Extremely Hazardous Substances as defined in 40 CFR 355 (as amended) and has determined that none of the materials listed as hazardous and/or extremely hazardous would be used or generated by this project.

2.1.8 Field Camps

No man camp is proposed in conjunction with horizontal drilling operations as currently proposed in the Hornbuckle Field. Personnel would commute to the project site daily, most likely from either the Casper or Douglas areas.

Self-contained trailers may be sited on the individual well locations to house key personnel during the drilling operation; however, these trailers would be temporary in nature and would be removed following the termination of drilling and completion operations on each individual well.

2.3 THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the Proposed Action would not be implemented and the eight wells as currently proposed in the Hornbuckle Field would not be approved. Current land use practices would continue, and minerals within the Hornbuckle Field would continue to be available for oil and gas exploration and development. Should future development be proposed, those actions would require individual NEPA analyses on a case-by-case basis.