



Reclamation Plan
Myers 14-21 Well Pad
Weld County, Colorado

Prepared for:
Noble Energy Inc.

Prepared by:
Duraroot, LLC

Date:
March 19, 2019

BASELINE INVENTORY

MYERS 14-21 WELL PAD



Site Description

The former Myers 14-21 well pad location was field investigated by a Duraroot Environmental Consulting, LLC (Duraroot) Reclamation Soil Scientist on February 26, 2019. The former Myers 14-21 well pad is located in the NE ¼ of the NW ¼ of Section 14, Township 5N, Range 65W in Weld County, Colorado (Figure 1). The pre-disturbance and current land use is hay crop.

During the field investigation, Duraroot collected two (2) soil samples, one from the former wellhead (WH) area and one from the former production facility (PF) area. Soil samples were analyzed to establish current soil physicochemical properties for reclamation planning (Table 1). Field observations included high soil compaction resulting in poor drainage. Soil sample results indicate that soil electrical conductivity (EC) and soil lime (CaCO₃) content are elevated in the wellhead sample. Soil sample EC of samples collected from the wellhead location is 5.1 dS/m. According to USDA-NRCS classification, soils from the wellhead location are slightly saline. In addition, elevated lime content may limit plant available phosphorus. There are no other observed soil properties that should limit reclamation success on the former Myers 14-21 well pad. To account for site conditions, Duraroot has developed a reclamation guideline specific to the location.

Table 1. Soil chemical and physical data for the former Myers 14-21 well pad.

| Sample ID | Depth | pH | EC | SAR | Percent Saturation | Organic Matter | Lime | Sand | Silt | Clay | Texture | NO3 - N | NO ₃ - N | Mehlich-P | NH ₄ OAC-K |
|-----------|--------|-----|------|------|--------------------|----------------|------|------|------|------|-----------------|---------|---------------------|-----------|-----------------------|
| | inches | | dS/m | | % | | | | | | | ppm | lbs/acre | ppm | |
| WH | 0 - 6 | 7.9 | 5.1 | 4.3 | 32 | 1.3 | 5.6 | 69 | 8.0 | 23 | Sandy Clay Loam | 20 | 35 | 57 | 210 |
| PF | 0 - 6 | 8.0 | 0.84 | 0.60 | 32 | 1.2 | 2.8 | 67 | 10 | 23 | Sandy Clay Loam | 18 | 31 | 58 | 311 |

The Myers 14-21 location will be seeded to straight alfalfa. Alfalfa should be seeded at a rate of 20-pounds per acre and should be inoculated with live rhizobium bacteria (*Rhizobium meliloti*), specific to the alfalfa cultivar selected. Seeding at this rate will provide approximately 100 pure live seeds (PLS) per square foot.

Appropriate site preparation procedures, soil amendments, revegetation species, and a site-specific Integrated Weed Management Plan (IWMP) should help expedite reclamation success at the Myers 14-21 well pad location. A site-specific reclamation plan is provided on Pages 2 and 3.



Figure 1. Aerial image of the former Myers 14-21 wellhead and production facility.

RECLAMATION PLAN

MYERS 14-21 WELL PAD



(1) Seedbed Preparation

These recommended site preparation steps will aid in successful reclamation. Steps may be omitted, conducted in different order, or changed to optimize success and efficiency depending on field conditions, sub-soil properties, and local terrain.

- Cross-rip soil resources to a minimum depth of 18-inches using a parabolic ripper or equivalent equipment to reduce post-construction soil compaction and improve drainage. The shanks on the back of a grader or dozer should NOT be used to reduce soil compaction.
- Apply recommended soil amendments, discussed below, to offset soil nitrogen immobilization.
- Finally, disc the site to a depth of 4.0 to 6.0-inches to incorporate fertilizer and to create a seedbed conducive to seedling establishment (disk and harrow, field cultivator, vibra-shank, or other alternative suitable to site conditions). The seedbed should be smooth and firm prior to seeding.

(2) Fertilizer

Soil fertilizer application is recommended on the Myers 14-21 well pad to offset nitrogen immobilization due to carbon-rich organic matter additions through straw mulch application, see below. It is recommended to apply soil nitrogen (N) at a rate of 40-pounds per acre. Fertilizer should be applied and incorporated into topsoil resources to a depth of 4.0 to 6.0-inches during seedbed preparation activities.

(3) Seeding

Seeding should be conducted using a drill seeder capable of direct seed placement into medium textured soils. A combination drill and packer is desirable. Seed depth is critical for alfalfa. It is recommended that the seed be placed no deeper than ¼-inch below ground surface. The recommended seeding rate of 20-pounds per acre provides approximately 100 PLS per square foot. Alfalfa seed should include a rhizobium bacteria inoculant specific to the alfalfa cultivar selected.

Seeding should occur within ideal seeding windows for greatest success. In Colorado, this is after September 15 for late fall, dormant seeding (preferred) and from spring thaw to June 1, for spring seeding. If reclamation is completed outside of the ideal seeding season, a suitable cover crop should be seeded to provide quick vegetation establishment and more immediate ground cover and protection.

(4) Straw Mulching

Application of straw mulch is recommended to reduce potential water and wind erosion. Recommended straw mulch application rates are between 1.5 to 2.0-tons per acre. This will provide ground coverage of approximately 80 to 90-percent of the ground surface prior to crimping. Once applied the straw mulch should be crimped into the soil. Upon successful crimping the straw mulch should be standing vertically with approximately 40 to 60 percent of the ground surface covered. Straw mulch should be at least 6.0-inches in length. Straw mulch should be crimped sufficiently to cause vertical cover that will not be dislodged by light breezes. Install perimeter fencing to prohibit grazing for the first two growing seasons.

(5) Weed Management

A site-specific IWMP should be implemented once weedy species can be identified. The site could be mowed prior to flowering and seed head production of weedy species. Mowing will reduce competition with desirable species and allow greater opportunity for reclamation success. In addition to mowing, herbicides appropriate for the identified weedy species could be applied to eradicate any problematic species. Application timing and rates for herbicides should follow the manufacturer's recommendations. At a minimum, weed management during the first two (2) seasons following reclamation should be diligent to improve establishment of seeded grasses and to prevent weedy species infestation.

Table 2. Reclamation prescription for the former Myers 14-21 well pad.

| RECLAMATION | ACTION | SPECIFICATION | PURPOSE |
|-------------|--|---|---|
| | Compaction Relief | Cross-rip soil surface to a minimum depth of 18-inches using a parabolic ripper or equivalent equipment. | Ripping will reduce soil compaction and improve drainage, leaching of soil salts, and root development. |
| | Soil Amendments | NA | NA |
| | Fertilizer | Apply 40-lbs/ac N with straw mulch application. | Fertilizer application will offset soil nitrogen immobilization. |
| | Seedbed Preparation | Disc the site to a depth of 4.0 to 6.0-inches to incorporate fertilizer. Cultipacking the soil before and after seeding will help stand establishment. | Discing will break up soil clods, incorporate soil amendments, and enhance seed to soil contact. |
| | Seeding (<i>see preferred seeding dates</i>) | Drill seed into the soil surface no deeper than ¼-inch. Seed mix should include rhizobium bacteria (<i>Rhizobium meliloti</i>) inoculant. | Drill seeding enhances seed to soil contact. |
| | Stormwater BMPs and Erosion Control | Crimp straw mulch at a rate of 1.5 to 2.0-tons per acre. | Crimped straw mulch will stabilize and protect soil resources until seed germination and grass establishment occurs. Straw mulch will also protect seeds from desiccation until germination occurs. |
| | Weed Management | Establish and maintain a site-specific IWMP. | Weedy species will compete with seeded grass species for important resources required for germination and seedling establishment. |