COLORADO
Oil & Gas Conservation Commission
Department of Natural Resources

COGCC FORM INSTRUCTIONS
RULE 304.C.(14)
TOPSOIL PROTECTION PLAN

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Rule Citations

304.c.Plans. All Form 2As will include site-specific plans that demonstrate compliance with the Commission's Rules for the operation of the proposed Oil and Gas Location in a manner that is protective of and minimizes adverse impacts to public health, safety, welfare, the environment, and wildlife resources. Each Form 2A will include the following plans, unless otherwise provided in a Commission Order approving a CAP pursuant to Rule 314.

304.c.(14) Topsoil Protection Plan. A topsoil protection plan consistent with the requirements of Rule 1002.c.

Rule 1001. Introduction

a. **General.** The Rules and regulations of this series establish the proper reclamation of the land and soil affected by oil and gas operations and ensure the protection of the topsoil of said land during such operations. The surface of the land shall be restored as nearly as practicable to its condition at the commencement of drilling operations.

Rule 1002. Site Preparation and Stabilization
b. **Soil removal and segregation.**

(1) **Soil removal and segregation on crop land.** As to all excavation operations undertaken after June 1, 1996 on cropland, the operator shall separate and store soil horizons separately from one another and mark or document stockpile locations to facilitate subsequent reclamation. When separating soil horizons, the operator shall segregate horizons based upon noted changes in physical characteristics such as organic content, color, texture, density, or consistency. Segregation will be performed to the extent practicable to a depth of six (6) feet or bedrock, whichever is shallower.

(2) **Soil removal and segregation on non crop-land.** As to all excavation operations undertaken after July 1, 1997 on non-crop land, the operator

shall separate and store the topsoil horizon or the top six (6) inches, whichever is deeper, and mark or document stockpile locations to facilitate subsequent reclamation. When separating the soil horizons, the operator shall segregate the horizon based upon noted changes in physical characteristics such as organic content, color, texture, density, or consistency.

(3) **Horizons too rocky or too thin.** When the soil horizons are too rocky or too thin for the operator to practicably segregate, then the topsoil shall be segregated to the extent possible and stored. Too rocky shall mean that the soil horizon consists of greater than thirty five percent (35%) by volume rock fragments larger than ten (10) inches in diameter. Too thin shall mean soil horizons that are less than six (6) inches in thickness. The operator shall segregate remaining soils on crop land to the extent practicable to a depth of three (3) feet below the ground surface or bedrock, whichever is shallower, based upon noted changes in physical characteristics such as color, texture, density or consistency and such soils shall be stockpiled to avoid loss and mixing with other soils.

c. **Protection of soils.** All stockpiled soils shall be protected from degradation due to contamination, compaction and, to the extent practicable, from wind and water erosion during drilling and production operations. Best management practices to prevent weed establishment and to maintain soil microbial activity shall be implemented.

Purpose of Attachment

A Topsoil Protection Plan is required for every Form 2A, Oil and Gas Location Assessment (Form 2A). The Topsoil Protection Plan will demonstrate how the operator will comply with Rule 1002 and effect the long term protection of topsoil disturbed by oil and gas operations. The Topsoil Plan will describe the operator's determination of site-specific topsoil horizons, topsoil thicknesses for excavation, the volume of topsoil to be salvaged, plans for topsoil segregation and stockpiling, and the methods planned for topsoil protection.

Note: Although Rule 304.c.(14) only references Rule 1002.c, protection of soils, this guidance document also addresses topsoil removal and segregation (Rule 1002.b).

General Recommendations:

1. The Topsoil Protection Plan should be completed by a person with experience in field soil identification and reclamation techniques and standards.

2. On both crop land and non crop land, soil horizons must be identified based on physical characteristics to allow for proper stockpile segregation and storage. In the event there is a plow layer, the entire plow layer will be considered topsoil and must be salvaged.

3. The plan should use standard terminology and indicators to define the soil horizons. All applicable horizons should be identified, including the A horizon (topsoil), B horizon (subsoil) and C horizon (substratum or parent material).

4. Soil test pits should be dug at the proposed location to determine the site-specific soil horizons and soil thicknesses. Table 1 (below) provides the recommended number of soil test pits and optional soil sample locations based on the disturbed area size. Figures 1 - 3 show suggested soil test pit and sample location spacing and density across example Oil and Gas Locations.

5. The plan should include a scaled aerial photograph or diagram showing the USDA Natural Resource Conservation Service (NRCS) soil types and the site-specific soil test pit locations. Operators may use the Natural Resource Conservation Service (NRCS) soil survey provided by the United States Department of Agriculture (USDA) that is linked to the COGCC map for the NRCS soil types. NRCS map unit description sheets should not be attached to theTopsoil Protection Plan; that information is a separate attachment to the Form 2A.

6. The plan should include a description of the soil horizon thicknesses and include an evaluation of the soil characteristics. The evaluation may include descriptions of the texture, Munsell color, structure type, organic matter, density and gravel content. Photographs of each soil pit profile showing each soil horizon with a visible scale bar (eg, Ruler, tape measure, etc.) should be included.

7. The plan should include a narrative description of the total available topsoil to be salvaged in cubic yards, per the sampling profiles.

8. The plan should include a description of the method and timeline for seeding and stabilizing the soil stockpiles with a seed mixture that complies with 1000 series Rules for interim and final reclamation. The operator will sow the soil stockpiles with desirable species or a seed mixture that is specifiedby the Surface Owner for the particular location.

9. Site-specific BMPs should be consolidated in one section of the plan to allow them to be copied onto the Form 2A by COGCC Staff. The plan should include BMPs that address both short-term and long-term stockpile stabilization, seeding and weed prevention, practices for maintaining soil microbial activity, and planned stockpile

heights and slope steepness (e.g. 1:3 slopes). BMPs for marking and identifying topsoil and other stockpiles should also be included.

Supplemental Information

To further define the topsoil, the operator is encouraged to analyze samples for agronomic analytes and soil properties. This should include a minimum of two soil samples per NRCS soil type for each location with discrete samples for all topsoil horizon(s). These soil samples may include the top two to three soil horizons depending upon the soil profile. A minimum of the first 6 inches of depth should be included for analysis on rangeland even if there is not technically 6 inches of topsoil present pursuant to the applicable 1000 series Rules for topsoil salvaging depth. The sample descriptions and analytical results should be included in the Topsoil Protection Plan.

Operators may analyze all soil samples for the following agronomic properties and analytes:

- SAR – from saturated paste extract
- EC – Saturated Paste
- ESP %
- CEC
- pH- saturated paste method
- % Organic matter – Walkely-Black method
- NO_3 - Nitrate – nitrogen - AB-DTPA
- NH_4 - Ammonium – nitrogen - AB-DTPA
- P – Phosphorous AB-DTPA
- K- Potassium AB-DTPA
- Zn- AB-DTPA
- Fe- AB-DTPA
- Mn - AB-DTPA
- Cu - AB-DTPA
- Cl – Chloride
- % calcium carbonate equivalent - gravimetric
- Texture – by hydrometer with textures reported as USDA
- Boron, hot water soluble method

General Note

All methods for topsoil protection should be included in the plan. It is imperative that all topsoil to be salvaged and protected is properly identified. Topsoil should never be used for building the location nor should it be left in place and covered by subsoil.

The available NRCS soil mapping provides a relatively large landscape scale view of the soils and can be used as a tool. However, in order to conduct resource planning on a

smaller scale, onsite soil investigations are necessary. Hence, the topsoil plan will require on-location evaluations of the topsoil.

Table and Example Figures

Table 1		
Disturbed Acres	**Soil Pits**	**Acres per Pit**
1	2	0.5
2	2	1.0
3	2	1.5
4	2	2.0
5	4	1.3
6	4	1.5
7	4	1.8
8	4	2.0
9	4	2.3
10	4	2.5
11	6	1.8
12	6	2.0
15	8	1.9
16	8	2.0
17	10	1.7
18	10	1.8
19	10	1.9
20	10	2.0
21	12	1.8
22	12	1.8
23	12	1.9
24	12	2.0
25	12	2.1
26	14	1.9
27	14	1.9
28	14	2.0
29	14	2.1
30	14	2.1

Figure 1:

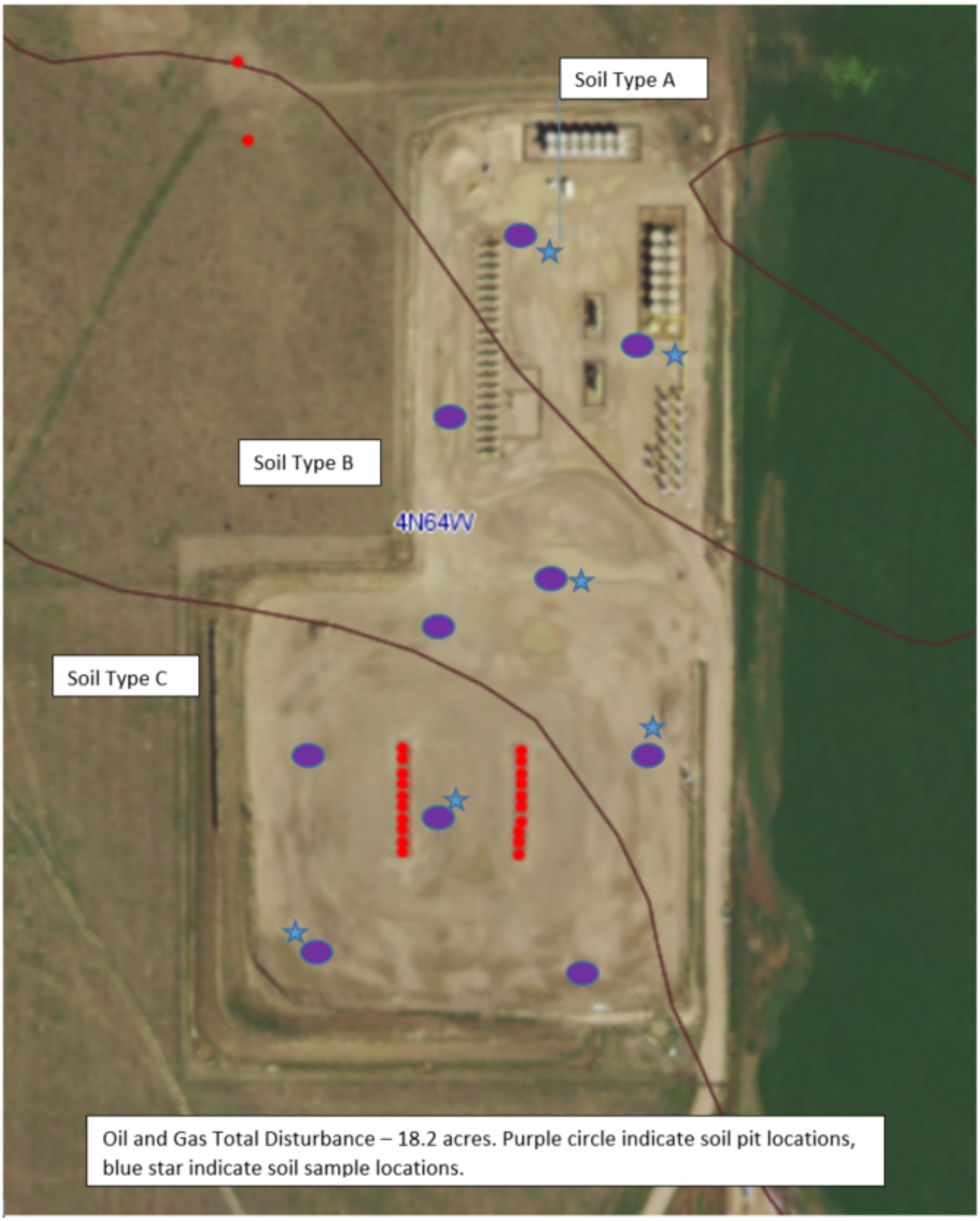
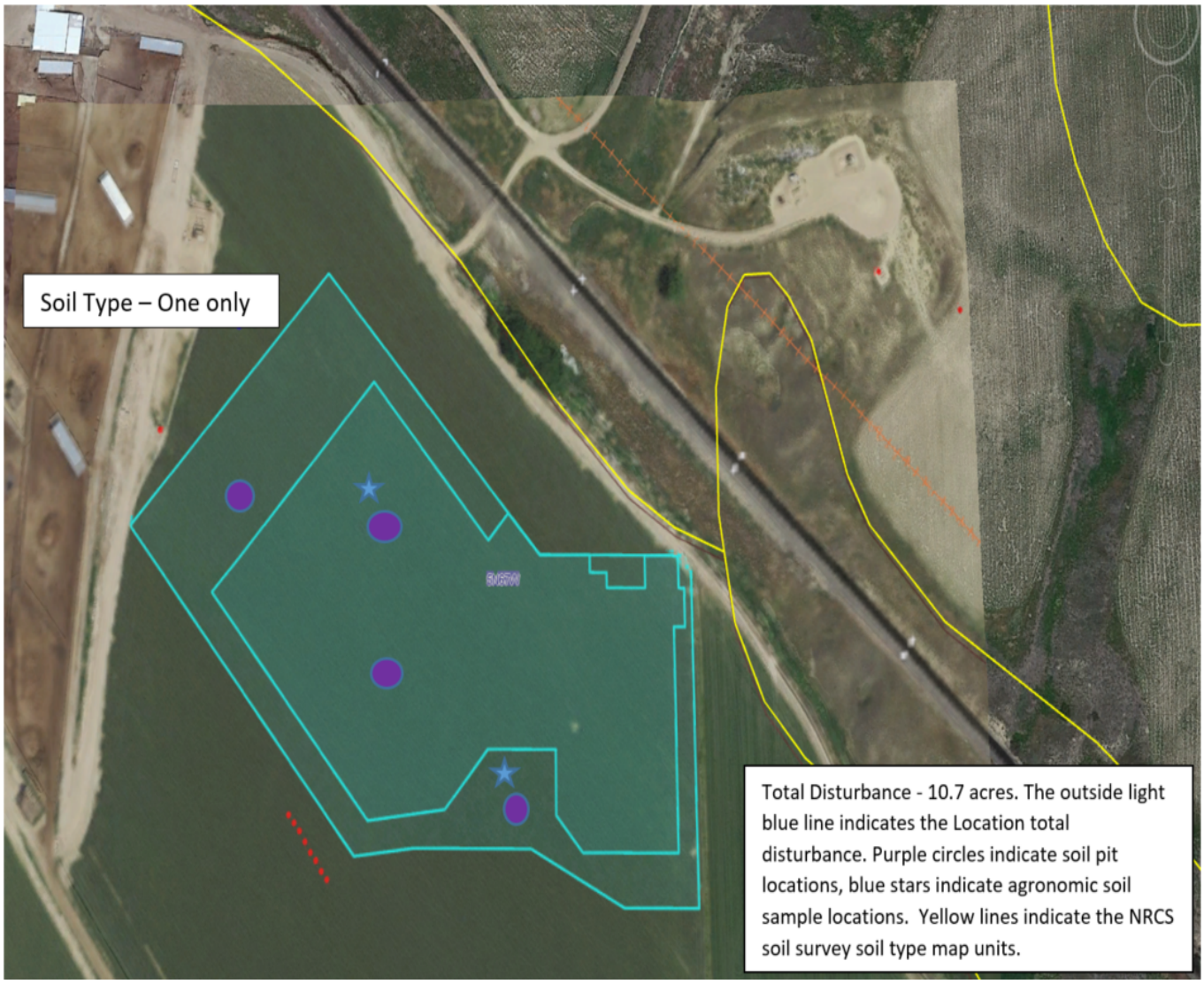

Soil Type A
Soil Type B
4N64W
Soil Type C
Oil and Gas Total Disturbance – 18.2 acres. Purple circle indicate soil pit locations, blue star indicate soil sample locations.

Figure 2:


Soil Type A
5N63W
Soil Type B
32
33
Oil and Gas Total Disturbed area 8.7 acres. Purple circles indicate soil pits, blue stars indicate soil sample locations.

Figure 3:


Soil Type – One only
Total Disturbance - 10.7 acres. The outside light blue line indicates the Location total disturbance. Purple circles indicate soil pit locations, blue stars indicate agronomic soil sample locations. Yellow lines indicate the NRCS soil survey soil type map units.