BASELINE DATA REPORT

Section 6.0

Topsoil

OCTOBER 2009

Submitted To:

New Mexico Mining and Minerals Division
&
U.S. Forest Service (Cibola National Forest)

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NMAC §19.10.6.602 D.(13) (e)

Baseline data shall include, as applicable:
If revegetation is part of the reclamation plan, provide a description of the thickness and nature of the topsoil, if any, over the proposed permit area. A soil survey and soil analyses conducted in accordance with standard methods acceptable to the Director may be required to show variations in topsoil depth and suitability. Where the applicant proposes to use something other than topsoil, the application shall provide the results of analyses as necessary to determine the suitability of the proposed materials to use as topdressing.

6.1 Introduction

A successful reclamation program is dependent, in part, upon the quantity and quality of topsoil available for use during the reclamation process. Roca Honda Resources, LLC (RHR) is assessing the quantity and suitability of topsoil present at the permit area in two ways. First, current literature concerning soil characteristics was reviewed to make a general determination of site-specific soil characteristics and is summarized in this section of the BDR. Secondly, a SAP was developed to aid in determining more detailed site-specific soil characteristics. This SAP is currently undergoing agency review and is included in this mine permit application. The SAP will be implemented upon approval and will provide a more detailed assessment of soils in the permit area. The purpose of the soils characterization program identified in the SAP is to quantify the amount of "suitable soil" that can be salvaged for use in reclamation. RHR will remove such soil to the extent practical from disturbed areas for use in future reclamation. This section contains the results of the literature review.

6.2 Soils Survey and Analysis

The term "topsoil" refers to the A, B and C soil horizon or soil material that is salvageable from the areas to be disturbed and capable of supporting vegetation. In semi-arid climates, good suitable materials such as these may be available. As such, a more accurate term for such materials is "suitable top dressing." However, in the interest of conforming to the requirements of the Mine Act regulations, the term "topsoil" is used to describe this material. General information about the soils present on the Roca Honda permit area was obtained from two separate soil surveys. The level of detail varies in the two surveys; however, both contain a recommendation on topsoil suitability. Both studies use the nomenclature "good," "fair," and "poor". The first survey was conducted by the USFS (Strenger et al. 2007) and covered Sections 9 and 10 of the permit area. The second survey covered Section 16 of the permit area and was conducted by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) in cooperation with the Bureau of Land Management, the Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station (NRCS 2006). The results of the two surveys and their respective areas are shown in Figure 6–1. The soil types appear disconnected on the Section 9 and Section 16 line. This disparity is due to the two separate surveys conducted by the two different agencies. The USFS uses observational soil identifications while the NRCS uses defined soil complex identifications.

As noted above, it will be necessary to conduct a detailed soils survey of the disturbed areas as described in the SAP. This survey will result in a higher level of confidence in identifying the

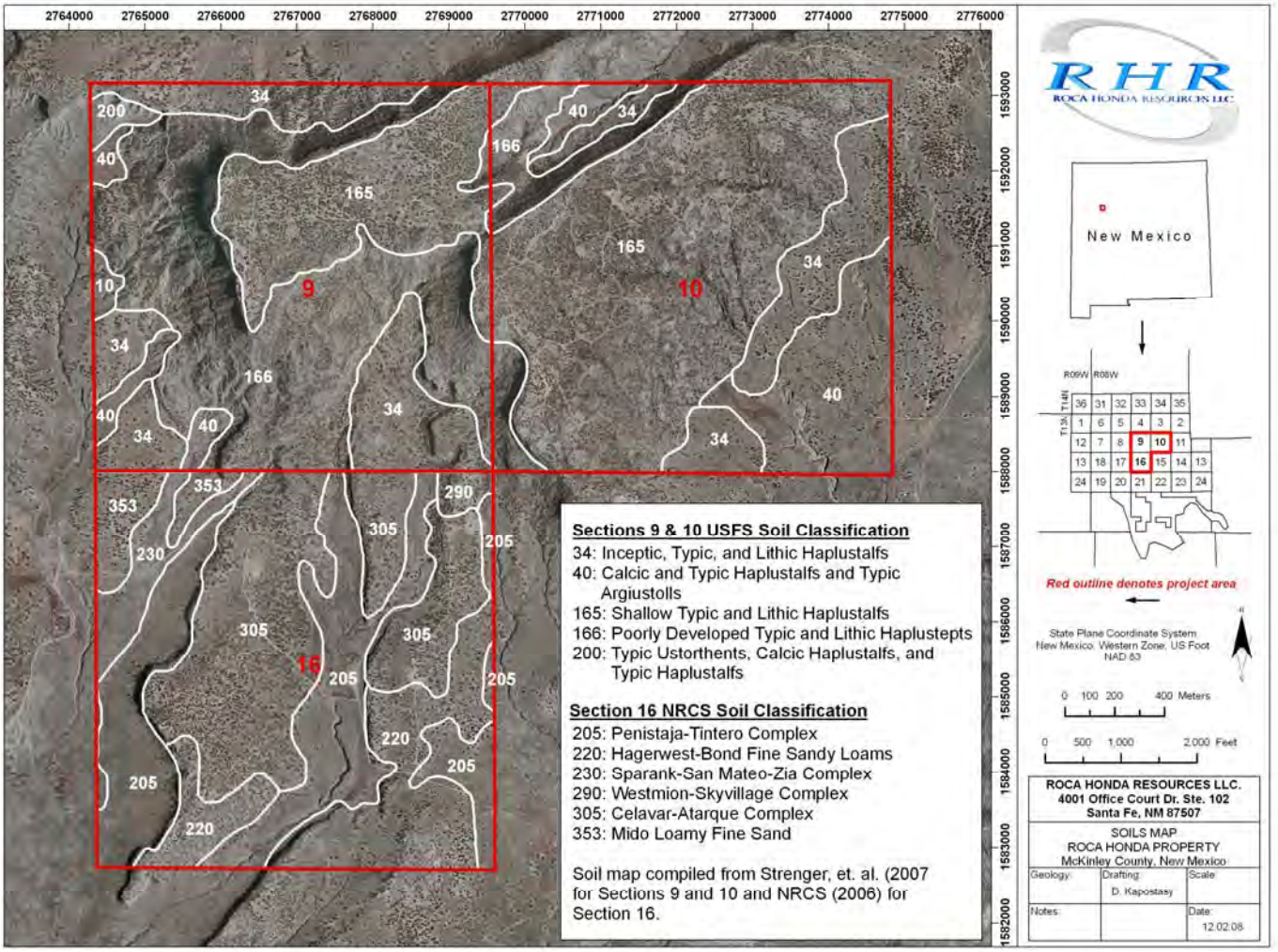

Figure 6-1. Roca Honda Permit Area Soil Survey

"suitable soils" available for use in reclamation. Not all materials identified as suitable will be salvageable, however. Such materials may be located on steep slopes, for example, or lost during handling, storage, etc. Additional detailed soils mapping will be performed in proposed disturbance areas and allowances made in calculating needed material quantities.

6.2.1 Thickness and Nature of Topsoil

The majority of Section 9 and some of the northwest and southwest portions of Section 10 are covered by Typic and Lithic Haplustepts (identified in Figure 6-1 as 166) that are poorly developed, coarse-loamy to fine soils on steep slopes of about 55 percent. Soil depth to sandstone bedrock typically varies from 20 to 40 inches. However, these thicknesses are variable throughout the site as the surface materials tend to pinch out towards contact with bedrock. This condition is applicable to all of the soils discussed herein in the permit area. The potential for soil erosion in this area is severe because of the steep slopes. Topsoil suitability is rated "poor" due to steep slopes.

The main area of Section 10 and a large portion of Section 9 are covered by shallow Typic and Lithic Haplustalfs (165) on slopes of about 2 to 4 percent. Bedrock in this area is within 10 to 40 inches of the surface. These soils have particle size classes of fine, fine-loamy, loamy, and coarse-loamy, and have moderate erosion potential. Topsoil suitability is rated "poor" to "fair" due to soil being too clayey or too thin a layer.

Small areas throughout Sections 9 and 10 are covered by Inceptic, Typic, and Lithic Haplustalfs (34). Particle size classes range from fine-loamy, coarse-loamy, to sandy. These soils are primarily in valleys on low slopes of 4 to 6 percent and are highly susceptible to wind erosion when vegetation is removed. Topsoil suitability is rated "poor" due to either being too alkaline or too sandy.

A small portion of the northwest part of Section 9 is covered by a complex of Typic Ustorthents, Calcic Haplustalfs, and Typic Haplustalfs (200) that are on slopes of 7 to 35 percent. Depth to a paralithic contact ranges from 4 to 20 inches in some areas. Particle-size classes range from fine to fine-loamy to loamy skeletal. The soil erosion hazard in this area is considered severe due to the silty nature of the surface. Topsoil suitability is rated "poor" to "fair" due to either low fertility or too thin a layer.

The majority of Section 16 is covered by a Celavar-Atarque complex (305), with roughly 50 percent of the soil being Celavar soils, 35 percent being Atarque soils, and 15 percent other minor components. The depth to bedrock for Celavar soils in this area ranges from 20 to 40 inches. Depth to bedrock for Atarque soils ranges from 10 to 20 inches. These soils are well drained and have sandy clay loam and clay-loam textures. Slopes range from 1 to 8 percent. Topsoil suitability is rated "poor" to "fair" due to depth to bedrock.

Two long, narrow bands of Penistaja-Tintero complex (205) soils run north and south through Section 16. Approximately 45 percent of this complex is Penistaja and similar soils, 40 percent is Tintero and similar soils, and 15 percent is formed of other minor soil components. Depth to bedrock for both Penistaja and Tintero soils is 60 inches or more. These soils are in well drained to excessively well drained areas on 1 to 10 percent slopes. Topsoil suitability is rated "good".

Two areas in Section 16 contain Hagerwest-Bond fine sandy loams (220). Approximately 50 percent of this area is Hagerwest and similar soils, 35 percent Bond and similar soils, and 15 percent minor components. Depth to bedrock for Hagerwest soils in this area ranges from 20 to 40 inches, and for the Bond soils, it ranges from 10 to 20 inches. Both soils have textures of fine sandy loam, sandy loam, and sandy clay loam. Slopes range from 1 to 8 percent. Topsoil suitability is rated "poor" to "fair" due to depth to bedrock and presence of rock fragments.

The northwest portion of Section 16 is covered by approximately 90 percent Mido loamy fine sand (353) and 10 percent other minor components. Depth to bedrock for the Mido loamy fine sand is 60 inches or more. This soil is excessively well drained and is on 1 to 6 percent slopes. Topsoil suitability is rated "poor" due to being too sandy.

The northwest portion of Section 16 also contains Sparank-San Mateo-Zia complex (230). This complex is approximately 40 percent Sparank, 35 percent San Mateo, 20 percent Zia, and 5 percent other minor soil components. Depth to bedrock for this soil complex is 60 inches or more, and this soil is well drained to excessively well drained. Soil textures range from silty clay loam, clay loam, sandy loam, and fine sandy loam. This complex is on 0 to 3 percent slopes. Topsoil suitability is rated "poor" to "fair" due to sodium content or being too clayey.

A small portion of the northeast corner of Section 16 consists of rock outcrop-Westmion-Skyvillage complex (290) on steep slopes of 30 to 80 percent. This area is approximately 30 percent Westmion and similar soils, 15 percent Skyvillage and similar soils, and 10 percent other minor soil components. The rock outcrop portion of this area is barren or mostly barren on 5 to 15 percent slopes. The Westmion-Skyvillage portion of the complex is well drained and is on 30 to 80 percent slopes. Depth to bedrock for both the Westmion and Skyvillage soils is 5 to 20 inches. Topsoil suitability is rated "poor" due to depth to bedrock, slope, being too clayey, and presence of rock fragments.

6.3 Alternative Top Dressings

At this time, RHR does not anticipate the need for using any form of alternative top dressings. The Reclamation Plan contained in this mine permit application discusses topsoil and "suitable soils" use and soil amendment requirements proposed for use in reclaiming the disturbed areas.

6.4 References

NRCS (Natural Resources Conservation Service), 2006. *Soil Survey of McKinley County Area, New Mexico, McKinley County and Parts of Cibola and San Juan Counties,* U.S. Department of Agriculture, Natural Resources Conservation Service, in cooperation with U.S. Department of Interior, Bureau of Land Management and Bureau of Indian Affairs, and the New Mexico Agricultural Experiment Station.

Strenger, S., S. Sebring, W. Robbie, F. Escobedo, C. Vaandrager, V. Andrew, E. Brooks, C. Krasine, B. Nielsen, and R. Fletcher, 2007. *Terrestrial Ecosystems Survey of the Cibola National Forest and National Grasslands*, USDA Forest Service, Southwestern Region.