MO-03 Technical Note

Date: November 15, 2006

Subject: Guide to describing and documenting soils with surface fragments

It is common throughout the Northern Basin and Range Region (MO-03) to encounter soils with a surface cover of rock fragments. The fragments vary in size from small gravel to boulders. Some areas with desert pavements may exceed 90 percent cover of fragments. Some mountainous areas have similar high volumes of fragments on the surface due to colluvial, glacial or shrink-swell processes.

It is important to describe the surface cover of fragments when they occur. It is also important to recognize the fragment volume as part of the soil horizon or layer that occurs immediately below the soil surface. It would be incorrect to describe the surface cover of rock fragments, and then to ignore the fragment volume when describing the soil horizon. The Soil Survey Manual (p63) states that for soils with 80 percent or more rock fragments on the soil surface, the top of the surface horizon is measured from the surface of the rock fragments. The Soil Survey Manual adds that the when the surface cover is 80 percent or more, the top of the soil is the mean height of the top of the rock fragments, (p145 – see also Field Book for Describing and Sampling Soils, p2-5.). Thus the soil with a desert pavement or a layer of till-deposited stones and cobbles with 80 percent cover would have a layer of gravel or stones as the first layer described. The top of the soil would affect depth class and depth to important features in the series description.

Where the surface cover of fragments is less than 80 percent, the top of the soil is measured from the top of the fine-earth material or organic soil material. However, the rock fragments should not be ignored when describing the horizon fragments. They should be described both as cover on the surface (NASIS component surface fragments table) and as fragments mixed with the top horizon (NASIS horizon fragments table).

A special case exists when the surface cover includes stones or boulders. The impact of these large fragments on use and management is such that surface stoniness or boulderiness classes have been defined to address them separately. They are still a part of the surface cover of fragments, and are still included in the horizon fragment volume, but the classes of stones or boulders may be recognized separately in the component phase name. Where the surface stoniness class and the USDA texture modifier are not sufficiently contrasting, do not include the stoniness class in the name.

The following is a brief summary of actions to take when dealing with surface rock fragments:

1.) If the soil surface is partly covered with < 80 percent rock fragments:
   - Describe the aerial cover of the fragments. In NASIS they are entered as percent cover of 2-5 mm, 5-75 mm, 75-250 mm, 250-600 mm, 600-(biggest size boulder) mm fragments in the component surface fragments table. (For flat fragments the size classes are 2-5 mm, 5-150 mm, 150-380 mm, 380-600 mm, 600-(biggest size boulder).
   - In the profile description, mix the surface fragments with the uppermost horizon and describe the fragment volume percent of 2-5 mm, 5-75 mm, 75-250 mm, 250-600 mm, 600-(biggest size boulder) mm fragments in the horizon fragments table.
   - Measure the top of the soil from the top of the fine-earth or organic soil material.

- From the surface cover, check for the need to recognize a class of stoniness or boulders. If the phase term adds value for interpretation under the expected use and management of the soil, add it to the component phase terms in the name. Phase terms for stoniness or boulderiness class follow the slope class in the name. (Alpha loam, 2 to 8 percent slopes, bouldery, is an example.)

2.) If the soil surface is covered with 80 percent rock fragments or more:

- Describe the aerial cover of the fragments. In NASIS they are entered as percent cover of 2-5 mm, 5-75 mm, 75-250 mm, 250-600 mm, 600-(biggest size boulder) mm fragments in the component surface fragments table. (For flat fragments the size classes are 2-5 mm, 5-150 mm, 150-380 mm, 380-600 mm, 600-(biggest size boulder).
- In the profile description, recognize the top of the soil at the top of the rock fragments in accordance with the Soil Survey Manual. It is likely that the first horizon described will use a term in lieu of texture such as gravel. Unless the rock fragment material is the result of a recent deposition that buries the soil below, consider the master horizon designation to be an A horizon.
- From the surface cover, check for the need to recognize a class of stoniness or boulders. If the phase term adds value for interpretation under the expected use and management of the soil, add it to the component phase terms in the name.