is as if viewed looking toward the hillslope. The net soil-surface altitude change for each point (station) along an erosion-study plot traverse was the difference between the September or October 1989 altitude and the June 1990 altitude.

SUMMARY

Geomorphic, hydrologic, and erosion data were collected from five reclaimed hillslopes at the Seneca II mine near Hayden. Data presented in this report were collected during an investigation of hillslope-hydro-logic processes and soil loss at a representative reclaimed surface coal mine in northwestern Colorado. The Seneca II mine is producing coal from Cretaceous sedimentary rocks of the Williams Fork Formation. The climate of the region is semiarid, and a large amount of the 16-in. mean annual precipitation is snow.

Data were collected at two areas of the mine the Spring Creek area, reclaimed in 1986 and 1987, and the Cow Camp Creek area, reclaimed in 1985. The geomorphology of the reclaimed hillslopes was determined from surveys made onsite and from topographic maps. Cumulative hillslope lengths and local hillslope gradients were determined at 50- to 100-ft intervals along five surveyed hillslope transects. Aspect of the three Spring Creek area hillslopes was generally west and the altitude range of the hillslope transects was 6,890 to 7,125 ft. Hillslope lengths at the Spring Creek area were between 750 and 1,280 ft, and the mean hill-slope gradient was between 0.17 and 0.23 ft/ft. Aspect of *the* two Cow Camp Creek area hillslopes was generally south and the altitude range was about 6,970 to 7,140 ft. Hillslope lengths at the Cow Camp Creek area were 670 and 800 ft, and the mean hillslope gradient for both hillslopes was 0.22 ft/ft.

Vegetation cover was determined at 50- to 100-ft intervals along the hillslope transects with a 10-point vegetation sampling frame. Vegetation on

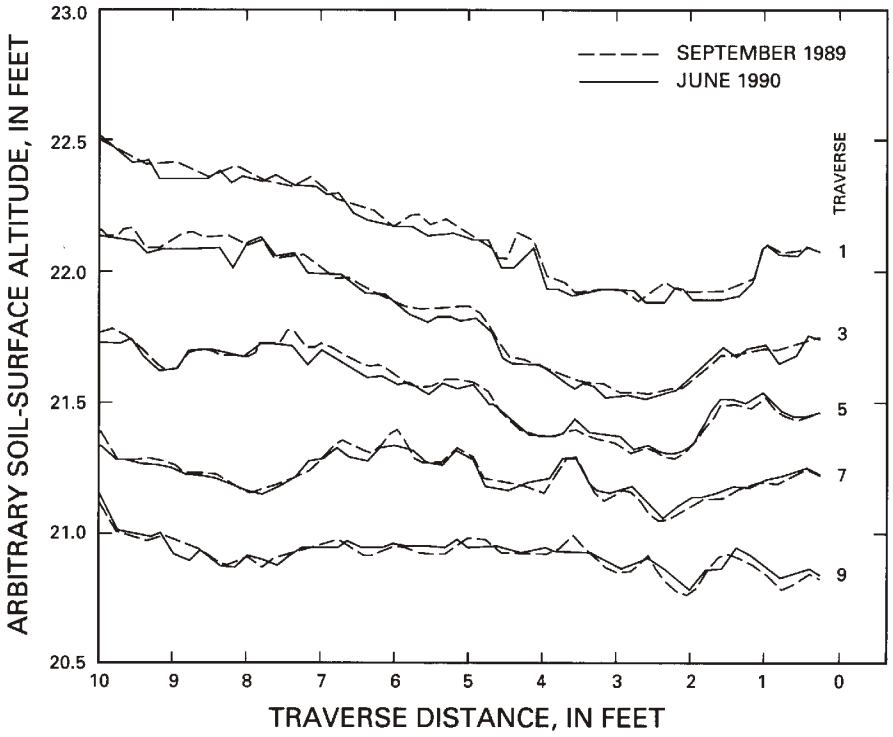

Figure 15. Soil-surface profiles from erosion-study plot SCA-620.

the reclaimed hillslopes predominantly was grasses and forbs. Mean vegetation covers (live vegetation litter) for the three Spring Creek area hillslopes ranged from 74 to 80 percent, and mean vegetation covers for the two Cow Camp Creek area hillslopes were 86 and 91 percent.

Total precipitation (rain and snow) data were collected daily at the Spring Creek and Cow Camp Creek areas with weighing-bucket precipitation gages. Total monthly precipitation, computed for December 1988 through June 1990, varied monthly, annually, and between the two study areas. Snowpack measurements were made at selected locations in water year 1989, and at 50- to 100-ft intervals along all hillslope transects in water year 1990. Snowpack depths varied seasonally, along a transect, and between the two study areas.

Volumetric soil-water contents were determined at several hillslope locations using two techniques. A neutron probe measured soil-water content at 1-ft depth intervals in 13 soil-water access tubes at the Spring Creek and Cow Camp Creek areas. Neutron-probe measurements were made approximately monthly from November 1988 through May 1990. Soil-water content in most of the soil-water access tubes varied with time and with depth below the surface. Additional soil-water measurements were made in the upper 11.8 in. of topsoil with a TDR. TDR measurements were made approximately monthly from November 1989 through May 1990 at 18 locations at the Spring Creek and Cow Camp Creek areas.

The occurrence of rills on reclaimed hillslopes may indicate active or recent soil loss. Rills along the five reclaimed hillslope transects were identified and mapped in August 1989. Rill density (the sum of all rill lengths per unit area) was computed for 10- by 100-ft traverse areas located at 50-ft intervals along each hillslope transect. Soil-surface altitude changes at selected erosion-study plots can be used to quantify soil loss by rill and sheet erosion. The erosion-frame method was developed to detect small soil-surface changes onsite. This method uses a 10- by 10-ft portable metal reference frame and involves replicate surveys of microtopographic features in several erosion-study plots. The erosion-frame method avoids some of the disadvantages of other methods used to measure erosion onsite. Soil-surface altitudes were determined at 16 erosion-study plots in September and October 1989. A second set of soil-surface surveys was made at these erosion-study plots in June 1990.

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