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PROCEDURES RECOMMENDED FOR OVERBURDEN AND HYDROLOGIC STUDIES OF SURFACE MINES

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RESEARCH SUMMARY

This report outlines the kind of information required to evaluate the soils, overburden, and hydrology so that appropriate land management decisions can be made regarding the selection of mineral lease sites, the development of lease stipulations, and the formulation of mining and reclamation plans. In addition, cost effective procedures are presented for data acquisition and analysis associated with soils, overburden, and hydrologic studies.

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RATIONALE AND PROBLEM IDENTIFICATION

Thorough analysis and planning for reclamation of lands disturbed by surface mining and for the control and mitigation of potential water quality degradation can preserve the long-term productivity of the land and the integrity of the water resources without undue hindrance to the development of mineral resources. This goal can be achieved through evaluation of the characteristics and interrelationships of soils, overburden, surface water, and ground water; thereby permitting rational assessment of alternatives for exploration, mining, and reclamation activities.

This project was a part of the 17-agency Federal Energy/Environment Research and Development Program. It was partially funded by the Surface Environment and Mining Program (SEAM) of the USDA Forest Service and by the U.S. Environmental Protection Agency to develop recommendations and criteria for the study of soils, overburden, and hydrology at surface mining sites. Two basic goals were established for the project:

1. Determine the kinds of information required to evaluate the soils, overburden, and hydrology so that appropriate land management decisions can be made relative to the selection of lease sites, development of lease stipulations, and formulation of mining and reclamation plans.

2. Recommend cost effective procedures for data acquisition and analysis associated with soils, overburden, and hydrologic studies.

The objectives are achieved by defining soils, overburden, and hydrologic information requirements and by evaluating and prioritizing alternative approaches to sampling and analysis where possible. The purpose is to assist in making leasing, mining, and reclamation decisions that give due consideration to surface stability, soil and overburden fertility, occurrence and distribution of toxic materials, surface and ground water quality and quantity, and future land and water uses. The information requirements and procedures for analysis are derived with the recognition that the chemical, mineralogical, and textural characteristics of soils and overburden affect fertility, stability, weathering (weatherability), erosion, water quality, runoff, and recharge. Also, the data needs that were developed reflect the requirement that the relationships among topography, geology, climate, vegetation, surface water, ground water, water quality, and water use must be adequately understood.

This handbook has been prepared as a result of the SEAM study. No attempt was made to identify all available technology and information available for the study of soils, overburden, and hydrology; but rather to recommend proven methods and procedures that are known to give good results. References are cited so that the reader can obtain more detailed information when desired.

The Final Report of the SEAM Thunder Basin Project summarizes an evaluation of site-specific data on a study site in Campbell County, Wyoming. This report includes an evaluation of data on geology, mineralogy, texture and geochemistry of overburden, discussion of plant growth studies, and surface and ground water hydrology.