EPA-600/2-78-054
March 1978

Environmental Protection Technology Series

FIELD AND LABORATORY METHODS APPLICABLE TO OVERBURDENS AND MINESOILS

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Grant No. R803508-01-0

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FOREWORD

When energy and material resources are extracted, processed, converted and used, the related pollutional impacts on our environment and even our health often require that new and increasingly more efficient pollution control methods are used. The Industrial Environmental Research Laboratory - Cincinnati (IERL-Ci) assists in developing and demonstrating new and improved methodologies that will meet those needs both efficiently and economically.

This report provides chemical, physical, mineralogical, and microbiological procedures for the analysis of coal overburdens and the resultant minesoils. These step-by-step methods identify and measure rock and soil properties that influence advance planning, mining efficiency, post-mining land and water quality and long range land use.

Rock and soil property measurements will be especially useful to State and Federal agencies, private contractors, and mining firms who require detailed information for pre-mining planning and projections of future results expected under specified management. For further information contact the Extraction Technology Branch of the Resource Extraction and Handling Division.

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ABSTRACT

With the growing demand for environmental assessment of a mining site, it becomes apparent that a manual of field and laboratory procedures to study the overburden and the resulting minesoil is necessary.

Incorporated within this manual are step-by-step procedures on field identification of common rocks and minerals; field sampling techniques; processing of rock and soil samples; and chemical, mineralogical, microbiological, and physical analyses of the samples. The methods can be used by mining companies, consultant firms, and State and Federal agencies to insure mining efficiency, post-mining land and water quality and long range land use.

Inherent to these methods is the definition of terms. Many common terms are used inconsistently even within small groups; and when multiple disciplines are involved, communication demands that many terms must be defined for that particular purpose. Thus, the definition of essential rock, soil, chemical, mineralogical, microbiological, and physical terms constitute an important part of this project.

This report was submitted in fulfillment of Project R803508-01-0 by West Virginia University under the sponsorship of the U.S. Environmental Protection Agency. Work was completed as of December, 1976.

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ABBREVIATIONS

a	-- acre(s)
cc	-- cubic centimeter(s)
CEC	-- Cation Exchange Capacity
cm	-- centimeter(s)
ft	-- foot (feet)
g	-- gram(s)
in	-- inch(es)
kg	-- kilogram(s)
km	-- kilometer(s)
l	-- liter(s)
lb	-- pound(s)
m	-- meter(s)
M	-- Molar
meq	-- milliequivalent(s)
meq/100g	-- milliequivalents per 100 grams
mg	-- milligram(s)
min	-- minute(s)
ml	-- milliliter(s)
mm	-- millimeter(s)
mmhos/cm	-- millimhos per centimeter
MPN	-- Most Probable Numbers
N	-- Normal
nm	-- nanometer(s)
oz	-- ounce(s)
ppm	-- parts per million
pp2m	-- parts per 2 million
%	-- percent
psi	-- pounds per square inch
RPM	-- revolutions per minute
S.M.P.	-- Shoemaker, McLean, and Pratt
t	-- ton(s)

ACKNOWLEDGMENTS

The following organizations have assisted in this work: West Virginia Steering Committee for Surface Mine Research; West Virginia Surface Mine and Reclamation Association; West Virginia Department of Natural Resources; West Virginia Geological and Economic Survey; United States Department of Agriculture, Soil Conservation Service; and a number of mining companies whose employees provided active cooperation that made this study possible.

Valuable consultation and advice were provided by: Alan C. Donaldson, Frank W. Glover, Walter E. Grube, Jr., Everett M. Jencks, John J. Renton, John C. Sencindiver, and Rabindar N. Singh.

The following people participated in the preparation of this report: Thomas Arkle, Jr., Carlos P. Cole, John R. Freeman, Milton T. Heald, Eric F. Perry, William A. Schuller, Richard Meriwether Smith, Andrew A. Sobek, Ronnie L. Taylor, and Harold A. Wilson.

Assistants in the field and laboratory work included: Sammy L. Baldwin, Shelia A. McFarland, Robert A. Philips, and Alfred N. Wickline.

For the reader who may have need to confer with the authors of individual major topics, the following list is provided:

Introduction, Units, Conversions, and Preplanning (Arkle, Smith, Sobek).

What to Look For and Measure in the Field (Freeman, Perry, Schuller, Smith, Sobek, Taylor).

Overburden Sampling and Labeling (Freeman, Perry, Schuller, Smith, Sobek).

Minesoils (Freeman, Sencindiver, Smith, Sobek).

Characterizing, Subsampling, and Crushing Samples (Freeman, Perry, Schuller, Sobek).

Chemical Methods (Freeman, Schuller, Smith, Sobek).

Mineralogical Methods (Heald, Schuller).

Physical Methods (Perry, Schuller, Sobek).

Microbiological Methods (Schuller, Smith, Wilson).

Short Term and Simulated Weathering (Freeman, Schuller, Smith, Sobek, Taylor).

The support of the project by the Office of Research and Development, U.S. Environmental Protection Agency, and the help provided by Robert B. Scott in finalizing this report; Elmore C. Grim, Grant Project Officer; and Ronald D. Hill is gratefully acknowledged.