

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**PRESENTATION TO
THE NUCLEAR WASTE TECHNICAL REVIEW BOARD**

SUBJECT: SOILS

PRESENTER: MONICA M. DUSSMAN

**PRESENTER'S TITLE
AND ORGANIZATION: MANAGER
ENVIRONMENTAL FIELD PROGRAMS DEPARTMENT
SCIENCE APPLICATIONS INTERNATIONAL CORPORATION**

**PRESENTER'S
TELEPHONE NUMBER: (702) 794-7799**

APRIL 24, 1990

OBJECTIVES OF SOILS PROGRAM

- **PROVIDE DATA NECESSARY TO DESCRIBE THE SOIL RESOURCE IN THE YUCCA MOUNTAIN AREA**
- **DELINEATE EXTENT AND DISTRIBUTION OF SOIL GROUPS**
- **SUPPORT RECLAMATION REQUIREMENTS RESULTING FROM LAND ACCESS AGREEMENTS WITH THE BUREAU OF LAND MANAGEMENT AND FROM REQUIREMENTS LISTED IN NWPA**

TECHNICAL APPROACH

- **CONDUCT REGIONAL SOIL SURVEY TO COMPLETE SOIL MAPPING OF YUCCA MOUNTAIN REGION**
- **CONDUCT PRE-ACTIVITY SOILS INVESTIGATIONS TO PROVIDE SITE-SPECIFIC SOILS INFORMATION FOR RECLAMATION PLANNING**
- **CONDUCT PRE-RECLAMATION SOIL SAMPLING AND ANALYSIS JUST PRIOR TO RECLAMATION**

TECHNICAL QUESTIONS

- 1. HOW ARE THE SOIL MAP UNITS DISTRIBUTED AT YUCCA MOUNTAIN?**
- 2. WHAT IS THE COMPOSITION OF THE SOILS FOUND AT YUCCA MOUNTAIN?**
- 3. WHAT IS THE SUITABILITY OF SOILS FOR RECLAMATION?**

TECHNICAL QUESTION 1: HOW ARE THE SOIL MAP UNITS DISTRIBUTED AT YUCCA MOUNTAIN?

TECHNICAL APPROACH

- **CONDUCT INITIAL FIELD STUDY TO DEVELOP THE INITIAL SOIL SURVEY LEGEND, AND TO DETERMINE TRENCH/PIT LOCATIONS FOR MAPPING**
- **SOIL SURVEY TO MEET ORDER 3 NATIONAL COOPERATIVE SOIL SURVEY STANDARDS**
- **MAP UNITS TO CONSIST OF SOIL ASSOCIATIONS**
- **SURVEY TO COVER DOE, U.S. AIR FORCE, AND BLM LANDS**
- **EXCAVATION OF TRENCHES TO ASSIST IN FIELD MAPPING OF REPRESENTATIVE SOILS**
- **SAMPLING OF ADDITIONAL TRENCH LOCATIONS TO ANALYZE REPRESENTATIVE SOIL PEDONS TO ASSIST IN SOIL COMPOSITION INTERPRETATION**

STATUS

- **INTERAGENCY AGREEMENT WITH SOIL CONSERVATION SERVICE TO BE PUT IN PLACE 5/90**
- **TECHNICAL PROCEDURES TO BE SUBMITTED FOR PROJECT OFFICE APPROVAL 6/90**
- **OPERATIONS AND SAFETY PLAN FOR CONDUCTING SURVEY TO BE COMPLETED 6/90; APPROVAL EXPECTED 7/90**
- **INITIAL FIELD STUDY TO TAKE 2 TO 3 WEEKS**
- **SUBMITTAL AND APPROVAL OF THE SITE ACCESS REQUESTS FOR TRENCHING TO REQUIRE 4–6 WEEKS; SUBSEQUENT FIELD MAPPING AND SAMPLING WILL REQUIRE 3 TO 4 MONTHS**
- **THREE MONTHS REQUIRED FOR PRODUCTION OF FINAL REPORT AND MAPS**

TECHNICAL QUESTION 2: WHAT IS THE COMPOSITION OF THE SOILS FOUND AT YUCCA MOUNTAIN?

TECHNICAL APPROACH

- **FOR EACH PEDON CONDUCT LABORATORY ANALYSIS OF SOIL PROPERTIES BY HORIZON**
- **SAMPLE 8 TO 12 BENCHMARK SOILS**
- **PHYSICAL PROPERTIES TO BE EXAMINED:**
 - **TEXTURE**
 - **PARTICLE SIZE DISTRIBUTION**
 - **WATER RETENTION CAPABILITY**
 - **BULK DENSITY**
 - **SATURATION PERCENT**

TECHNICAL QUESTION 2 (CONTINUED)

● **CHEMICAL PROPERTIES TO BE EXAMINED:**

- **REACTION**
- **SALINITY**
- **ORGANIC CARBON**
- **CATION EXCHANGE CAPACITY**
- **SODIUM ABSORPTION RATIO**
- **CALCIUM CARBONATE EQUIVALENT**
- **GYPHUM CONTENT**
- **EXTRACTABLE CARBONS (CARBONATES)**
- **AVAILABLE NITROGEN AND PHOSPHORUS**
- **AMORPHOUS SILICA**
- **IRON**

TECHNICAL QUESTION 2 (CONTINUED)

- **INTERPRETATIONS TO BE DEVELOPED BASED ON CHARACTERISTICS OF SOIL PROPERTIES**
 - **TAXONOMIC CLASSIFICATION**
 - **HORIZON CHARACTERISTICS**

STATUS

- **SOIL SAMPLES TAKEN DURING PRE-ACTIVITY SURVEYS IN 1989**
- **SOIL ANALYSIS CONDUCTED ON THESE SAMPLES IN 1989**
- **SOILS SAMPLES TAKEN IN 1990 TO BE ANALYZED IN LATE 1990**

TECHNICAL QUESTION 3: WHAT IS THE SUITABILITY OF SOILS FOR USE IN RECLAMATION EFFORTS?

TECHNICAL APPROACH

- **BASED ON SOIL CHARACTERISTICS, DETERMINE USE SUITABILITY OF EACH SERIES WITHIN SURVEY AREA**

- **CONDUCT PRE-ACTIVITY SOIL INVESTIGATIONS TO PROVIDE SITE-SPECIFIC SOILS INFORMATION**
 - **DETERMINE VOLUME OF SUITABLE SOILS AVAILABLE**
 - **PROVIDE SOIL PROPERTIES DATA**

- **CONDUCT PRE-RECLAMATION SOILS SAMPLING AND ANALYSIS**
 - **SAMPLING AND ANALYSIS OF STOCKPILED TOPSOIL MATERIALS**
 - **SAMPLING AND ANALYSIS OF UNCONSOLIDATED MATERIALS AT DISTURBED SITES**

TECHNICAL QUESTION 3 (CONTINUED)

STATUS AND ACCOMPLISHMENTS

- **SAMPLE ANALYSES CONDUCTED IN 1989 WERE TRANSMITTED TO EG&G/EM FOR RECLAMATION SUITABILITY ASSESSMENTS**
- **ENVIRONMENTAL FIELD ACTIVITY PLAN FOR SOILS RELEASED 3/90**
- **INTERAGENCY AGREEMENT BETWEEN DOE AND SOIL CONSERVATION SERVICE INITIATED; TO BE FINALIZED 5/90**

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