APPENDIX D-13
Analytical Procedure for Soil Moisture: Method ASA 21-2.2.2

Soil Moisture, Oven Drying Method
ASA Physical Method 21-2.2.2

1.0 Purpose

To determine the moisture loss of a soil sample by oven drying overnight at 105 °C.

2.0 Scope

This procedure applies to soil, sand, silt, rock, and soil organic matter.

3.0 Summary

A sample is dried overnight at 105 °C. Moisture content is determined by weight loss.

4.0 References

Chapter 21-2.2 "Gravimetry With Oven Drying." *Methods of Soil Analysis, Part I, Physical and Mineralogical Methods*, Second Edition, 1986. Arnold Klute, Editor. American Society of Agronomy, Inc. Soil Science Society of America Inc. Publisher, Madison, Wisconsin, USA.

ASTM D 2216-92, "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock"

ASTM D 2974-87 (Reapproved 1995) "Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils"

5.0 Responsibilities

5.1 The Laboratory Manager shall ensure that this procedure is followed during the analysis of samples.

5.2 The Laboratory Group Leader shall review and approve data produced under this procedure.

5.3 The laboratory analyst shall follow this procedure and laboratory safety guidelines. The analyst shall record all data, calculate results, and sign a written report of the analysis.

6.0 Requirements

6.1 Prerequisites

None

6.2 Limitations and Actions

For extremely dry soils, the quantity weighed should be increased in step 7.1.3 to 50g.

6.3 Requirements

6.3.1 Apparatus/Equipment

6.3.1.1 Laboratory oven with forced air, thermostatted to control temperature to plus or minus 5 °C.

6.3.1.2 Desiccator with active dessicant (Drierite, or Anhydrone)

6.3.1.3 Tongs or insulated gloves

6.3.1.4 Analytical Balance - capable of weighing to 0.0001 g.

6.3.2 Reagents and Standards

None

6.4 Quality Control Sample Requirements

Run a duplicate sample and method blank for every batch of 20 samples or subset thereof.

7.0 Procedure

7.1 Procedure Instructions

7.1.1 Thoroughly mix a portion of soil. Remove stones larger than 1 cm diameter. Remove roots and leaves. Break up any lumps or adhesions.

7.1.2 Dry a beaker or weighing dish for 30 minutes at 105 °C. Allow to cool in a desiccator with active dessicant.

7.1.3 Obtain the tare weight of the container then the weight plus 10 to 20g soil (record weight to 0.0001g).

7.1.4 Place the moist sample and container in the drying oven overnight (approximately 16 hours) at 105 °C uncovered.

7.1.5 Remove the container from the oven and place it in a desiccator with active dessicant to cool.

7.1.6 Weigh the dried sample and container.

7.2 Calculations and Recording Data

7.2.1 Calculate the water content of the material to the nearest 0.1% as follows:

$$w = [(M_{cws} - M_{cs})/(M_{cs} - M_c)]* 100$$

where

w = water content, %
M_{cws} = mass of container and wet specimen in grams
M_{cs} = mass of container and dry specimen in grams
M_c = mass of container

7.2.2 Calculate the percent solids to the nearest 0.1% as follows:

Percent solids = 100 - w

7.2.3 Record data on the form provided in 10.1.

Note: A spreadsheet may be used to calculate the data.

8.0 Safety

8.1 Follow general laboratory safety rules. Exercise care in removing hot items from the oven. Use tongs or insulated gloves.

8.2 Excercise caution to not spill hot soil containing organic matter into Anhydrone (magnesium perchlorate) which is a strong oxidizing agent.

9.0 Notes

None

10.0 Attachments and Appendices

10.1 Soil Percent Moisture Worksheet

Percent Moisture
Oven Drying Water Worksheet

Initial Date/Time _____ Initial Oven Temp _____
Final Date/Time _____ Final Oven Temp _____

Workorder						
Fraction						
Gross Wt						
Tare Wt						
Dried Wt						

Wt sample						
Wt loss						
% Moisture						
%Solid						

Entered by _____ Date _____

Reviewed by _____ Date _____

END OF PROCEDURE