Preparation of NTS Core Samples for Crushed Rock Experiments

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Preparation of NTS Core Samples for Crushed Rock Experiments

1. PROCEDURE IDENTIFIER: TWS-INC-DP-63

INTRODUCTION

2. PURPOSE

The purpose of this procedure is to describe the grinding, sieving and washing of NTS core samples used for individual LANL YMP experiments.

3. SCOPE

This procedure defines guidelines for preparing NTS samples for utilization in the LANL YMP.

4. APPLICABLE DOCUMENTS

a. TWS-QAS-QP-05.2 "Preparation of a Detailed Technical Procedure"

b. TWS-QAS-QP-07 "Procedure for Technical Review of Publications"

c. TWS-MSTQA-QP-14 "Research and Development (Experimental) Procedure"

5. RESPONSIBILITIES

The PI has the responsibility of organizing and overseeing all operations. He may assign appropriate tasks to personnel trained to this DP. It is the responsibility of the users of this DP to adhere to the procedure. Investigators may direct deviations from the procedure upon approval of the responsible PI. It is the responsibility of the user to document such deviations in accordance with TWS-MSTQA-QP-14. If change requests are in process it is the responsibility of the user to document the procedure change in his laboratory notebook. It is the responsibility of the users of this DP to report unplanned deviations from this procedure to the responsible PI.

6. PRINCIPLE

The samples prepared using this procedure can be used in any experiment for the LANL YMP.

7. DEFINITIONS

None

PROCEDURE

8. ADEQUATE AND APPROPRIATE EQUIPMENT, INSTRUMENTATION, AND SOFTWARE

This procedure utilizes stainless steel hammer or rock-crushing container with five-ton press to break the core into small pieces capable of fitting into the grinder. An agate grinding set must be utilized to crush rock pieces to desired particle size. ASTME certified sieves are used to separate rock particles according to size. Washing of the sieved particles is effected using non-ferrous equipment (such as glass or teflon beakers, plastic bottles, teflon-coated spatulas, and stainless steel sieves).

9. EXPERIMENTAL PREPARATORY STEPS AND VERIFICATION

Ensure that the equipment used for core preparation is clean. If upon inspection the equipment is found to be unclean, clean it using the appropriate method. The ASTME sieves must be cleaned by brushing the back side of the sieve using a soft bristle brush followed by ultrasonication of the sieve.

Notebook Entries

Verify that the following entries have been made in the laboratory notebook prior to sample preparation:

a. unique identifier for sample(s) to be prepared (drill hole number and footage or NTS area at which sample was collected).

b. desired range of particle size for the crushed rock (e.g., 75μm to 500μm).

c. whether or not the sieved rock sample will be washed. The PI is responsible for making this decision based on the mineralogy of the NTS rock sample.

10. SUITABLE AND CONTROLLED ENVIRONMENTAL CONDITIONS

No special conditions are required for this DP. If any special conditions are utilized, record them in the laboratory notebook.

11. EXPERIMENTAL STEPS AND ACCEPTANCE OR REJECTION CRITERIA OF DATA COLLECTED

a. Break NTS core into small pieces. Save a piece (5 gm) for mineralogic analysis (x-ray diffraction and thin section analysis) and chemical analysis.

b. Grind rock pieces to at least the maximum desired size.

c. Sieve ground rock to achieve desired range of particle size.

d. Wash the sieved sample if appropriate (see section 9, item c) according to wash methods #1 or #2, using the water to be used for the actual experiment.

d.1 Wash Method #1 -

d.1.1 Place a portion of crushed rock in a large beaker and fill the beaker with the appropriate water. Mix thoroughly and let the crushed rock settle. Pour off cloudy water.

d.1.2 Repeat the water wash until water remains clear after settling (more than 20 washes is not unusual).

d.1.3 In order to dry the washed rock sample, add a portion of the water to the crushed rock and mix. Pour mixture through the lower boundary sieve. Continue to do this until no crushed rock remains in the beaker. Cover the sieve and let the crushed rock air dry.

d.2 Wash Method #2 -

d.2.1 Transfer the desired fraction size of the sieved rock (e.g., 75μm to 500μm)

to the lower boundary sieve (i.e., the 75μm mesh sieve).

d.2.2 Use a portion of the appropriate water for washing the crushed rock.

d.2.3 Pass the water through the sieve containing the crushed rock. Continue to use this procedure until particles no longer pass through the sieve.

d.2.4 Set covered sieve containing washed crushed rock aside to air dry.

e. Place the dried crushed rock in a plastic bottle labeled with the unique identifier (see section 9, item a), the date sample was ground, particle size range, the date the sample was washed, water used for washing, the initials of the individual(s) performing these activities, and the TWS number of the notebook in which these activities are reported. Save a portion (5 gm) for mineralogic analysis (x-ray diffraction and thin section analysis) and chemical analysis.

Notebook Entries

The following entries must be made in the laboratory notebook:

a. date grinding was completed.

b. wash method used.

c. date washing was completed.

d. water used for washing.

A comparison of the mineralogic and chemical analyses for the solid piece of rock and the ground and washed rock will provide information on possible contamination or lost of a key mineral during preparation of the sample. Contamination or mineral lost will result in rejection of the ground sample.

12. POTENTIAL SOURCES OF UNCERTAINTY AND ERROR

Unclean equipment can lead to contamination of the sample.

13. METHOD OF DATA REDUCTION

No methods of data reduction are employed in this DP.

14. METHODS OF RECORDING AND STORING DATA AND RESULTS

Notebook Entries

Record the information required for preparatory verification (outlined in section 9) in the laboratory notebook. Record any special conditions used for sample preparation in the laboratory notebook (see section 10). Record the information specified in section 11 in the laboratory notebook.

15. SAMPLE/SITE TRACEABILITY

Segregate all samples and portions thereof according to their unique identifier and the additional information specified in section 11, item e.

QUALITY ASSURANCE REQUIREMENTS

16. QUANTITATIVE OR QUALITATIVE ACCEPTANCE CRITERIA FOR DETERMINING THAT ACTIVITIES HAVE BEEN SATISFACTORILY ACCOMPLISHED

Notebook Entries

Verify that all necessary information for the prepared sample(s) is recorded in the notebook. The following information is required:

a. unique identifier for sample(s) (drill hole number and footage or NTS area at which sample was collected).

b. range of particle size for the crushed rock (e.g., 75μm to 500μm).

c. date grinding was completed.

d. whether or not the sieved rock sample was washed. If washing was effected, the following information must be recorded: wash method used, date washing was completed, and water used for washing.

17. HANDLING, SHIPPING, AND STORAGE REQUIREMENT

No special requirements are necessary for samples used in this procedure.

18. IDENTIFICATION OF QA RECORDS TO BE GENERATED AND THEIR CONTROL

The records produced by this procedure will be the investigator's laboratory notebook. The data obtained using the prepared samples will be published in accordance with LANL Policy and TWS-QAS-QP-07. Investigators may direct deviations and modifications of the procedure for specific applications. Such actions are documented in the notebook.

19. TRAINING REQUIREMENTS AND METHODS

Staff members and technicians assigned to this work will be qualified by "hands-on" training under the supervision of qualified personnel.

20. CALIBRATED INSTRUMENTATION INFORMATION

No calibration documentation is required in this procedure.

21. PROVISION FOR DOCUMENTATION, REPORTING, AND EVALUATION OF PROCEDURAL DEVIATION

Unplanned deviations from this procedure will be documented in the notebook. The responsible PI or his designee will make a determination as to whether to use the prepared sample affected by the deviation. If a decision to use the sample is made, the justification for this decision must be entered in the investigator's laboratory notebook.

22. SUBJECTS REQUIRING VERIFICATION

The recording of the information specified in section 9 needs to be verified before preparation of the sample(s) is initiated.

23. APPENDIX AND/OR ATTACHMENTS

None