ROCK-SPLITTING: OPERATION OF THE 50-TON HYDRAULIC PRESS

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ROCK SPLITTING: OPERATION OF THE 50-TON HYDRAULIC PRESS

1.0 PURPOSE

This procedure describes the rock-splitting utilizing the 50-ton hydraulic press. In this procedure, you begin with whole original rocks and end with rock chips that are clean, unaltered, and suitable for crushing.

2.0 SCOPE

This procedure applies to all splitting of rock samples prepared for the Yucca Mountain Project.

3.0 PREPARATION

3.1 Equipment Used

ENERPAC 50-ton hydraulic press

No software is used.

3.2 Safety

3.2.1 Never operate the hydraulic press without either the flat-face plate or the chisel-point chuck securely attached to the hydraulic ram. To do so could severely damage the ram and render it unusable.

3.2.2 While operating the hydraulic press, always keep hands clear of the ram and keep in mind that you control 50 tons (100,000 psi) with the PRESSURE button.

3.2.3 Always wear safety glasses when operating the press.

3.3 Suitable Environmental Conditions

A clean work area is necessary for performing this procedure.

Cleanliness is important. Only pieces with clean, fresh, minimally touched surfaces are used in the next step. From here on, always use new plastic gloves when handling rock samples with clean surfaces.

3.4 Cleaning the Equipment

3.4.1 Clean off the workbench area with distilled water and alcohol.

3.4.2 Lay down a clean sheet of aluminum foil over the work area.

3.4.3 Use a Kimwipe and distilled water to clean the surface of the 2" steel plate. Repeat using alcohol in place of water.

3.4.4 If the chuck points have embedded rock fragments, they should be scraped with a steel wire brush.

3.4.5 Repeat step 3.4.3 for the chisel-point chuck, the lower chuck and the plastic container.

3.4.6 Set the equipment on the clean sheet of aluminum foil.

3.5 Inserting the chucks into the hydraulic press

3.5.1 Use a large allen wrench to remove the 2 allen screws and the flat-face plate from the hydraulic ram.

3.5.2 Screw the chisel-point chuck as far as it will go into the ram.

3.5.3 Tighten the chisel-point chuck with the small allen wrench until it is parallel to the right and left sides of the 2" steel plate.

3.5.4 Place the lower chuck in the hole in the center of the 2" steel plate so that it is parallel with the chisel-point chuck.

4.0 PROCEDURE

4.1 Set Up

4.1.1 Carefully label containers into which the split sample will be put and keep rocks with their labelled bags and containers. Label the side and top of containers so that tops cannot be switched.

4.1.2 Clean out containers with canned air blower and place on a clean sheet of aluminum foil.

4.1.3 Check rock sample for major contamination such as mud or dirt clinging to the surface. If these conditions exist, take the rock to the sink and scrub it with a nylon bristle brush and dry it with a canned air blower. If the rock sample is only slightly dusty, blow lightly with your mouth. Do not use air blower as this will put dust into the air and contaminate your work area.

4.1.4 Place the plastic container with the lower chuck sticking through it on the 2" steel plate.

4.1.5 Be sure that your safety glasses are are on at this time.

4.1.6 Put on plastic gloves.

4.1.7 Place the rock sample on the lower chuck.

4.2 Splitting

4.2.1 Press START on the right side of the Enerpac.

4.2.2 Pick up the Electric Valve Control Station and press the PRESSURE button until the chisel-point chuck just touches the rock sample.

4.2.3 Use one hand to hold and center the rock while slowly pressing the PRESSURE button until the chisel-point chuck just touches the rock sample.

4.2.4 Back away and press the PRESSURE button until the rock is split. Be careful not to exceed the 50 ton load reading (read the pressure gauge).

4.2.5 Press the RETURN button until the ram is above the plastic container.

4.2.6 Repeat steps 4.2.2 through 4.2.5 using the new half sample for the rock until all of the visibly altered outer surface is broken off. Only the unaltered center portion of the sample will be used.

4.2.7 When all the splitting is complete, press the STOP button on the right side of the Enerpac.

4.3 Clean Up Between Samples

4.3.1 Put all of the clean-cut rock chips into the clean, labelled container.

4.3.2 Put all the chips with altered surfaces back into their original labelled containers.

4.3.3 Throw away the aluminum foil and replace it with a clean sheet.

4.4 Final Clean Up

4.4.1 When all the samples have been split, all the equipment must be cleaned and put away.

4.4.2 Repeat steps 3.4.3 through 3.4.5.

4.4.3 Use a small allen wrench to remove the chisel-point chuck.

4.4.4 Remove the lower chuck.

4.4.5 Put the flat-face plate back in the ram and tighten the 2 allen screws with the large allen wrench.

4.5 Verification Points

Both the chisel-point chuck and the lower chuck should be checked periodically to make sure that they are both parallel to each other and to the right and left sides of the 2" steel plate.

5.0 QUALITY ASSURANCE

5.1 Personnel

Only YMP certified personnel may perform this procedure for YMP materials. Training for this procedure consists of reading the detailed procedure and performing the procedure under the supervision of a trained person. The preparer of this detailed procedure is considered trained to perform the procedure and to train others. Evidence of training and certification shall be documented in accordance with the YMP Personnel Certification Procedure.

5.2 Calibration

Not applicable.

5.3 Documentation

All samples split shall be entered into a controlled YMP logbook, including complete sample ID, date of splitting, and the signature of the person splitting the sample. Any procedural deviations shall also be noted in this logbook.

5.4 Sample Traceability

Great care shall be exercised not to mix or contaminate samples. All subsequent analyses rely on this procedure. Samples are to be tracked in accordance with the YMP procedure for Identification and Control for Mineralogy-Petrology Studies.

5.5 Accept/Reject Criteria

Only the clean, unaltered portion of the sample will be accepted, unless otherwise instructed by the investigator. The adequacy of the removal of altered surfaces will be determined by visual inspection of the individual sample pieces made by the operator or by the investigator.

5.6 Storage Requirements

When samples are not in use, they are to be stored and locked in a YMP designated cabinet. They are to be kept separate from all other samples.

There are no storage requirements for the equipment used in this procedure.

5.7 Responsibilities

The thin section lab supervisor is responsible to see that this procedure is followed correctly. This person is also responsible for the proper care and use of the equipment. This person may delegate these responsibilities to a YMP certified person.

6.0 REFERENCES

6.1 TWS-ESS-DP-101: Sample Identification and Control for Mineralogy-Petrology Studies.

PULVERIZING USING THE ROCKLABS 3E SHATTERBOX

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PULVERIZING USING THE ROCKLABS 3E SHATTERBOX

1. PURPOSE

The purpose of this procedure is to describe the process of pulverizing fine crushed rock to a fine powder that is suitable for fusing.

2.0 SCOPE

This procedure applies to all pulverizing of fine-crushed rock prepared for the Yucca Mountain Project (YMP).

3.0 PROCEDURE

3.1 Equipment

This procedure uses a Rocklabs 3E shatterbox (or its equivalent) and tungsten carbide containers and pucks. No software is needed for this procedure.

3.2 Safety

3.2.1 Since tungsten carbide is a very brittle material, to prevent breakage, never run empty containers with pucks.

3.2.2 Load containers with at least 5 ml of material (material should be crushed as fine as possible.)

3.2.3 Always run Shatterbox with 4 containers. If only one, two, or three samples are to be ground, run the other containers as dummies without pucks to distribute the load on the Shatterbox mechanism.

3.3 Cleanliness

3.3.1 Suitable environmental conditions require that this procedure be performed in a clean work area.

3.3.2 Always wear a new pair of plastic gloves for each sample to prevent contamination.

3.3.3 Use clean sheets of aluminum foil and place all the cleaned parts and samples on these aluminum sheets. Use a new clean sheet of foil for each new sample. Cover the work bench top where an operation is performed.

3.3.4 All equipment must be thoroughly cleaned between each sample.

3.4 Cleaning the equipment

3.4.1 Scrub with hot water all four containers, pucks, lids, 10 ml graduated cylinders, and small spatulas.

3.4.2 Put on a new pair of plastic gloves. Rinse all of the parts first with deionized water and then with alcohol.

3.4.3 Dry all parts first with a canned air blower (do not use the building compressed air; use only the freon dusters) and then wipe the container and pucks with a Kimwipe (Note: All the inside parts must be dry before filling with rock particles).

3.4.4 Set all of the clean parts on new aluminum foil or on a clean Kimwipe.

3.5 Sample Traceability

3.5.1 Complete records shall be kept in a laboratory controlled logbook, including full sample name or number, date of preparation, and signature of person preparing each sample. Samples shall be tracked in accordance with the YMP procedure for Sample Identification and Control for Mineralogy-Petrology Studies (TWS-ESS-DP-101).

3.5.2 Great care shall be exercised not to mix or contaminate samples. All subsequent analyses rely on this procedure.

3.5.3 Carefully label containers into which the pulverized sample will be put and keep rocks with their labelled bags and containers. Label side and top of container so that tops cannot be switched.

3.5.4 The tops and sides of the tungsten carbide shatterbox containers are labeled A, B, C, D in order to keep track of which sample is contained by a particular tungsten carbide container. Put that same corresponding label (A, B, C, D) on the container previously labeled in step 3.5.3.

3.6 Sample Run

3.6.1 Place a clean puck on one side of a clean container.

3.6.2 Pour 5-10 ml of sample into the container beside the puck. Cover the container with its lid and label the sample container containing the non-pulverized rock fragments with the same I.D. Record sample number, matching container number, and date in the QA notebook. Do not use particles larger than 5 mm on a side.

3.6.3 Repeat steps 3.6.1 through 3.6.2 for the remaining three containers.

3.6.4 Put all four containers in the Shatterbox. Make sure that the samples are clamped and secure in place.

3.6.5 Set the timer for 5 minutes and turn the power switch on.

3.6.6 When the machine stops, remove the containers. Work only with one sample at a time to prevent contamination.

3.6.7 Check to see if samples are completely ground. If not completely ground, repeat steps 3.6.4 and 3.6.5.

3.6.8 Place a clean piece of aluminum foil on your work area.

3.6.9 Place the container next to the foil. (Do not place the container on the foil because the bottom is often contaminated).

3.6.10 Remove the lid, and with a weighing sheet gently scrape the powder on top of the puck back into the container.

3.6.11 Pick up the container and hold it over the foil. Gently tip it to the side to remove the puck. Use your gloved finger to scrape all of the powder from the container onto the foil.

3.6.12 Put lid, container, puck, graduated cylinder, and spatula in sink for cleaning.

3.6.13 With a weighing sheet, scoop the powder on the foil into a new sample bottle after ensuring bottle is properly identified.

3.6.14 Throw out the foil, gloves, and weighing sheet. (Use clean equipment for each sample).

3.6.15 Repeat steps 3.6.8 through 3.6.14 for the remaining three samples. Use new gloves for each sample.

4.0 QUALITY ASSURANCE

4.1 Personnel

Only certified persons will perform this procedure for YMP samples. Training for this procedure consists of reading the written detailed procedure and performing the procedure under the supervision of a trained person. The preparer of this detailed procedure is considered trained to perform this procedure and to train others. Evidence of training and certification shall be documented in accordance with the YMP Personnel Certification Procedure.

4.2 Calibration

Not applicable.

4.3 Documentation

All samples pulverized shall be entered into a controlled lab logbook, including complete sample name or number, date of pulverizing, and signature of person pulverizing the sample. Any deviations from this procedure are to be recorded in the QA notebook.

4.4 Responsibilities

The thin section lab supervisor is responsible to see that this procedure is followed correctly. This person is also responsible for the proper care and use of the equipment. The thin section lab supervisor may delegate these responsibilities to a YMP certified person.

4.5 Storage Requirements

When samples are not in use, they are to be stored and locked in a YMP designated cabinet. They are to be kept separate from all other samples. Unused portions of samples are to be labeled and returned to permanent storage in the designated YMP sample storage room in accordance with the YMP Procedure for Sample Identification and Control for Mineralogy-Petrology Studies.

There are no storage requirements for the equipment used in this procedure.

4.6 Accept/Reject Criteria

Adherence to this procedure results in an acceptable powder that is free of coarse rock fragments.

4.7 Sources of Uncertainty

Careful labelling of containers and sample cartons and bottles reduces errors due to mislabeling.

The new tungsten carbide containers and pucks have more rounded edges, which reduces chipping and the likelihood that rock fragments will become embedded in the sides of the containers. This reduces uncertainty due to cross contamination between samples.

5.0 REFERENCES

5.1 TWS-ESS-DP-101: Sample Identification and Control for Mineralogy-Petrology Studies.