

UVM Cosmogenic Group Laboratory Safety Manual Delehanty Hall Room 108

Rock and Sediment Preparation

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Individuals responsible for lab and lab safety

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The rock preparation laboratory is where field samples are prepared to the specified grain size ready for processing in the mineral separation laboratory. Several different techniques are employed to begin the purification process including washing samples, drying samples, crushing and grinding rocks, sieving sediment and ground rock, and magnetic separation. In this space, we also inventory

The most important thing to remember when working in the rock preparation lab is to reduce sample cross talk and to clearly maintain sample identity. This is accomplished by working with only one sample at a time and by double checking bag and container labels.

In terms of health and safety, the most important concern in this laboratory is dust control. Dust control is accomplished best by controlling dust at its source and by thorough cleaning (vacuum and wipe down) after each time the lab is used. This is a shared lab. Please respect other users by cleaning up after yourself. **Always vacuum before using compressed air to minimize dust release.**

This manual contains the following chapters:

1. **Safety Considerations and Equipment** including: laboratory access, safety equipment in the lab, laboratory safety training protocol, personnel capability checklist for laboratory procedures
2. **Sample Processing Protocols including:** Sieving to size (wet or dry), washing with water to remove fines, drying sample, magnetic separation as well as special procedures for certain samples.
3. **Laboratory Maintenance and Sample Storage:** How to clean up after yourself and where to keep your samples during processing

Chapter 1 - Safety Considerations and Equipment

1. Lab, supply, and sample access – Room 108

Access to the rock preparation laboratory is restricted to faculty, staff, students, and visiting scientists and students who have been trained specifically as outlined in the safety training protocol below. Keys will be issued on request (and with a deposit paid to the department) to those meeting the training criteria.

Note that the cosmogenic lab sample import permit requires that samples are stored in a locked room. Thus, when you are not working in the lab, it is imperative that the door be closed and locked.

Cosmogenic group supplies for grinding, sieving, and sample curation are located in the red drawers that are secured with cables and master locks (key 3383). When you are done working in the lab for the day, please lock up all equipment so it is not borrowed by others.

2. General Laboratory Practice

- a. Personal protective equipment must be worn, specifically a respirator (dust mask), eye protection and hearing protection.
- b. Suitable clothing should be worn, no loose materials that could get caught in machinery
- c. Samples must not be left on the counter except when work is active. Samples should be put away at the end of each work day.
- d. The lab should be cleaned at the end of each work day including vacuuming the crusher and plate grinder and sweeping off the counter as well as cleaning the floor.

3. Safety equipment in lab

Personal Protective Equipment - Should be worn at all times when working with acids.

Goggles or safety glasses – Stored in drawers below the workbench. Must be worn when crushing, grinding, or sieving rock.

Hearing protection (ear muffs)- Stored in drawers below the workbench. Must be worn when crushing, grinding, or sieving rock.

Particle masks – Stored in drawers below the workbench. Must be worn if crushing, grinding, or sieving rock.

Lab Coats – Stored on hooks on the wall next to the rock grinder and crusher.

Fire Alarm – Is located in the hall outside the lab near the stairs and should be used for major emergencies including any fire.

Fire Extinguisher – Two are located in the lab. Use these only if you are confident in how they work and you have an easy and safe escape path from the lab; otherwise, evacuate and pull the fire alarm immediately.

4. Safety training protocol

As soon as is practical, all personnel must complete the following safety classes. These courses are offered at regular intervals and req.24000n7 (s) 8 (e) 3 (s) 8 () nd t40C

6. Monthly self inspection

UVM mandates that we conduct a monthly self inspection of all laboratories to identify and remediate hazards before they cause accidents and injuries.

On or about the first of each month, **XXXXXXXXXX** will inspect the laboratory and note on the self inspection cards any outstanding issues. She will email her findings to all students, faculty and staff using the rock preparation facility as well as lab supervisor

Chapter 2 - Sample processing protocols

The following are sample processing protocols have been designed to yield sample of the correct grain-

- After each use, remove the safety shield, vacuum all parts of the crusher paying

- Use the stainless 250 and 850 micron sieves and always clean them again before use. Place a pan at the bottom of the stack, then the 250 micron sieve, then the 850 micron sieve, then the filler stack.
- Fill the 850 sieve about 2/3 full. Place the filler sieves on top and then a lid on top of the stack.
- Place the stack on the shaker and run for one minute. Remove the filler sieves and separate the 850 and 250 micron sieves carefully to avoid spilling.
- Place the sample in three labeled bags (<250 micron, 250-850 micron, and > 850 micron). Place these bags in a larger bag labeled with the sample name.
- The bags should have sample name and grain size written with a sharpie on the outside.
- Clean sieves between each sample using the small wire brushes stored in our locked drawers. Don't worry that a few grains are left jammed in the sieves. They won't come out.
- When you have completed sieving, vacuum the closet in which the sieve shaker resides and place the cosmolab sieves back in the locked drawers.

c. Magnetic Separation

The goal here is get the cleanest quartz separate possible without losing large amounts of quartz. There are several settings that can be changed to optimize your split. These settings will vary from sample to sample. Experiment with the settings by using the small amount of sample used to decontaminate the machine.

Magnet control (up and down arrows) - The green is the set point; the red is where the magnet is running. Note that over time the magnet may sag and the deflector may need to be adjusted.

Roll Speed control (up and down arrows) – Start at 21 and bring up or down for cleanest split.

Vibrator control – off when sample loading, on when running sample; turn up to get reasonable flow.

Gate control – open sufficiently to allow sample to pass.

Deflector – adjust to get the split you need. This is the most critical adjustment and must be changed as other settings are changed.

Use the small ceramic magnet to determine if there is any magnetite in the sample. If there is significant magnetite in the sample, use a low magnet control setting at first (1.0). This setting will allow you to strip magnetite so it does not plug the machine.

****Blow out the unit with compressed air to clean. **PAY SPECIAL ATTENTION** to the black brush it will clog with sediment and if it is not cleaned between **EVERY** sample will result in sample cross talk.*****

You should run a small amount of sample through and DISCARD it to clean and pre-contaminate the machine. This pre-sample can be used to optimize machine settings.

Place the non-magnetic and magnetic fractions into separate, labeled sample bags. Save and file away the magnetic fraction with the other sample remainders.

At the end of the day, please vacuum the floor in front of the magnetic separator. It usually accumulates a large number of sample grains.

Samples are now ready for processing in the mineral separation laboratory. The non magnetic, 250-850 fraction should be carried up to the mineral separation lab. The remaining sample should be stored in buckets or coolers until ready to be archived in the Quonset Hut.

3. Special Procedures

Some samples require different handling than most. Below are some additional steps that might be required of your sample depending on what type of sample it is.

Meteoritic split – All sediment samples for cosmogenic analysis should have a small aliquot (~50 grams) removed and reserved for meteoric ¹⁰Be analysis before any additional work is done to the sample. This aliquot should be stored DRY in a 3 by 4 inch bag labeled with the sample identification as well as the words “meteoric split”.

SPEX powdering – hope LUKE can write this? Samples intended for either whole rock chemical analysis or meteoric ¹⁰Be analysis need to be powdered using the spex mill.

Wet sieving – hope MATT will write Extracting quartz from soil profile samples is best done with wet sieving in the rock room sink.

Small samples – There are miniature versions of both the jaw crusher and plate grinder for use with very small samples. There are stored in the grey cabinet under the window and used on the grey rolling plastic cart. These units should be used in front of their larger cousins with a door open to maximize draw out of the room and minimize dust accumulation. For safety sake, these units should not be used sitting on the floor.

Chapter 3 - Laboratory Maintenance and Sample Storage:

This is a shared lab that has the potential to generate large amounts of dust so cleanliness and attention to protocol is important both as a courtesy as well as to prevent cross contamination of samples.

a. Maintenance

1. Vacuum cleaner – Before using the lab, open the center closet and check that the vacuum cleaner is hooked up to the copper piping and that the all valves with open ends are shut.

damaged. There should not be any significant amount of dust leaving the vacuum or in the closet in which the vacuum is stored (the shatter box, because the TJ 0 Tm /F (t) -2 6J Wgw c:

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