Standard Operating Procedure

CCM-2 Microsampler

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| **Department:** | Earth and Environmental Sciences |
| **Date SOP was written:** | 9/19/2013 |
| **Date SOP was approved by PI/lab supervisor:** | 9/19/2013 |
| **Principal Investigator:** | Jessica Oster |
| **Internal Lab Safety Coordinator/Lab Manager:** | Richard Bradshaw |
| **Lab Phone:** | Click here to enter text. |
| **Office Phone:** | J. Oster (615) 322-1461R. Bradshaw (615) 343-0839 |
| **Emergency Contact:** | J. Oster (530) 574-5760R. Bradshaw (208) 260-2792 |
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| **Location(s) covered by this SOP:** | *SC6706* |
| *(Building/Room Number)* |

**Type of SOP:** ☒ Process ☐Hazardous Chemical ☐ Hazardous Class

**Purpose**

**Personal Protective Equipment (PPE)**

**Respirator Protection**

**Eye Protection**

ANSI approved, tight-fitting safety glasses/goggles and/or face shield.

**Body Protection**

Remove any loose jewelry around your neck or any jewelry on your hands and wrists. Tightly secure long hair in ponytail.

**Ear Protection**

Ear protection in the form of ear muffs or ear plugs must be worn during operation.

**Engineering Controls**

**Medical Emergency**

To contact the [Vanderbilt University Police Department](http://police.vanderbilt.edu/) in an emergency:

* Call **911** from any campus phone.
* Call **(615) 421-1911** from any other phone.

**Protocol/Procedure**

**Report any problems or abnormalities with the equipment immediately to the PI or LM.**

**\*\*\*NEVER leave the machine unattended while operating\*\*\***

Before you start, it is worthwhile to get your sample properly configured. If you are working with a thin section, set up the rotational stage. This is relatively straightforward. If you are working with a rock sample or stalagmite, this takes considerable effort. You must be certain that your sample is level, that you can work within the area that you want to focus your drilling on and that the sample can be in focus and can reach the drill easily without maxing out movement on any of the motors. Please see Jessica the first few times you configure your sample. **Only move the loaded stalagmite holder in and out of place with the help of somebody else. This is always true, even if you’ve done it many times**.

**Never touch any knobs behind the microscope!** This could send the microscope crashing onto the table. That is a horrible scenario and would cost a lot of money.

Once you feel prepared to begin and have loaded your sample into the stalagmite holder:

1. Turn on computer.
2. Oster Lab password is **helictite**.
3. Turn on light sources:
	1. Transmitted
	2. Reflected
	3. Fluorescent
4. Turn on camera and remove lens cap and binocular scope caps.
5. Turn on amplifier.
6. Open CM Software icon (located on desktop).
7. Confirm that you have ample movement on all axes.
8. Insert drill. To insert drill:
	1. Place bit in drill tip and tighten by pressing button on back of chuck until bit moves into head of drill
	2. Tighten drill into clamps and attach to stage
	3. Plug head into drill motor
	4. Drill bit should always be in image (this becomes very important when setting up sampling patterns).
9. Auto-white-balance live image.
10. How to move:
	1. X- and Y- with joystick
	2. Button on joystick begins overdrive
	3. Z- movement requires Z-button
	4. Change scope of image by dragging green cross in top-left corner viewbox
	5. Focus using knobs on microscope.
11. Make sure scope and software magnification are set to the same value. Insert manual calibration slide. If you are working on a stalagmite, this can be taped directly to the sample for the purpose of calibration. If you are drilling from a thin section, the slide can replace your sample slide.
	1. English Allen wrenches are used to move sample stage.
12. Follow instructions provided on screen for Manual Calibration in order to place calibration points in equal increments from center (Do not click NEXT on Active Pathway until all dimensions are calibrated).
13. When using a thin section, remove calibration slide and replace with slide for study. If using full stalagmite, remove calibration slide and leave sample.
14. Manually calibrate Z-Axis with drill bit barely touching sample.
15. **Click Next. Now you are ready to drill a pattern.**
16. Acquire a high-resolution image, the select pathway points.
17. Draw sample pathway and name the path.
18. Set your drill location by clicking the drill location icon and then double-clicking your desired drilling edge.
19. Select your active drilling pathway and turn on the drill.
20. Select Next then “start sampling along pathway”.
21. Set your depth and desired number of passes across the pathway (e.g. 50 µm and 3 passes – **Each pass moves the original depth one time over, so be careful ([50, then 100, then 150] so more depth will lead to fracturing without extra care**.)
22. Have a sample vial handy, and allow drilling. When drilling is complete, turn off drill and collect sample, putting it into the corresponding container.
	1. **Note: higher drill speeds will lead to fracturing or disparity of the sample, so do not set the drill speed past 1000rev/min-1**
	2. Note: Turning counterclockwise with the drill helps to prevent displacement of powder

**NOTE**

Any deviation from this SOP requires approval from PI.

**Documentation of Training** (signature of all users is required)

* Prior to conducting any work with the Chipmunk Crusher, LM or designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, and emergency procedures.
* The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP.
* The Principal Investigator must ensure that their laboratory personnel have attended appropriate laboratory safety training and are current with any refresher training required.

I have read and understand the content of this SOP:

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| **Name** | **Signature** | **Identification** | **Date** |
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