Standard Operating Procedure for

Critical Point Dryer

Do not attempt to use this instrument until you have been ***trained by FMIC staff***

**Do not** operate the CPD unless there is an EM center staff person available (ie. in the FMIC) at the time of the run for the entire run.

Protective Equipment: lab coat, safety glasses, gloves

Please check with staff prior to beginning procedure. **Please read all instructions before beginning a run**. **Do not operate** this equipment until you have been trained by FMIC staff.

1. Turn on power, **wait 3 minutes** for CPD to warm up before use. Sign in on the control sheet.

2. Make sure all valves (**Fill**, **Cool**, **Purge**/**Bleed**/**Vent**) are closed (hand tight). Open LCO2 (liquid carbon dioxide) **Tank Valve.**

3. Sample should be dehydrated completely in 100% ethanol and kept in closed containers at room temperature. Place 5-10 ml of 100% ethanol (using a plastic pipet – do not pour from bottle with desiccant) in the Sadri high pressure chamber. Transfer sample holder into the chamber. Make sure any sample surfaces are never exposed to air. Dry any alcohol that may be in the O-ring groove. Examine rubber O-ring for defects, replace if needed.

4. Place rubber O-ring in groove. Put lid on and evenly hand tighten the knurled knobs - using equal pressure on all three knobs.

5. Open **Cool Valve** and reduce the temperature of the chamber to near 0°C (the temp should drop to near zero in about 1 minute, if longer the LCO2 tank maybe empty). Close the **Cool Valve**.

6. Open **Fill Valve** to fill the chamber with LCO2. A bubble (meniscus) will travel across the window indicating the chamber is full

7. To exchange all the ethanol with LCO2, slowly open the **Purge**/ **Vent Valve** until the chamber is approximately 3/4 empty. **Don’t forget to warn people working in the hood that you will be venting the CPD**. Check the beaker in the hood next to the CPD to see if all the ethanol is exhausted. (If the temperature of the chamber goes above **10°C** during purging of the alcohol, open the cool valve, this will not interfere with the purging mode, until the chamber is cooled to about 0°C, then close it).

8. After purging ethanol, close the **Purge**/ **Vent Valve**. Keep the fill open until the chamber is full with LCO2. Note the “bubble” under the lid-window disappear. Then close the **Fill Valve**. Usually 2 - 3 changes of CO2 of 10 minutes each are needed to completely purge all the ethanol. Close the **Tank Valve** when finished with all exchanges. Note: Please wipe dry any moisture that may have condensed on the lid.

9. Make sure the chamber is filled with CO2 before turning on the heat. Turn the **Heat** switch on. Heat light will go on. After the temperature passes 31°C and between 33°C and 39°C the heat light will go off, indicating the chamber heaters were turned off automatically. Do not turn off heat-switch. The Samdri will maintain the chamber at a temperature higher than the critical temperature of CO2.

10. When the Samdri is above the CO2 critical pressure (approx. 1,100 psi) the temperature (approx 31°C) can maintain itself automatically at an “Equilibrium State”. **Wait four (4) minutes** before going on to the next step.

11. Slowly open the **Bleed Valve** to reduce pressure and adjust pressure decrease rate to about 100 psi per minute. Note: Fast decompression could result in artifacts and CO2 “condensation”. Please allow 9 minutes for pressure to reach 350 psi. Chamber heater will go on and off to maintain it above 32°C. Close **Bleed Valve.**

12. Slightly open **(approx.** to 0.25x) the **Purge**/ **Vent Valve**. When the pressure reaches 0 psi (atmospheric pressure) in 2 - 3 minutes, loosen the three knurled knobs evenly by hand. Remove sample and transfer it to a dry environment (vacuum dessicator) or sputter coat. Note: Samdri samples are extremely hygroscopic, coating with conducting film immediately will best preserve surfaces of interest.

13. Make sure the chamber is clean and O-ring is in good condition. Be sure the valve on the LCO2 tank is closed. Open all valves of the Samdri to “drain” them from any and all residual line.

14. Turn off heat and power switches.