Eco-Snow CO_2 Clean System Operation

This equipment is to be operated only by individuals that have been trained and qualified by the MNFC staff. Do NOT use or attempt to use this tool unless you are qualified to do so.

Reference Documents

Microenvironment (Clean Dry Box) Manual, CDB-100, Eco-Snow Systems
BOC, 4935A Southfront Rd, Livermore, CA 94500, phone: 925-606-2000

Eco-Snow Variable Orifice Jet Spray Gun Manual, Model W-2
Eco-Snow Systems, 4935A Southfront Rd, Livermore, CA 94500

Material & Safety

Nitrogen (N2)
House supply. In high concentrations can replace oxygen in the air and act as an asphyxiant.

Liquid Carbon Dioxide (CO_2)
Research grade 99.999% or higher with a dip/siphon tube. Currently supplied by UA Cryogenics facilities. In high concentrations it is an asphyxiant. Keep bottle in a well ventilated area. Avoid exposure with the liquid emanating from the spray gun as it may result in cold burns/frostbites.

1. Always disconnect the CO_2 tank FIRST prior to any maintenance or opening the machine for general cleaning.
2. Unplug the electrical plugs from the bottom right hand side of the machine prior to any maintenance or general cleaning.

3. Always turn off the Nitrogen purge and adequately ventilate the system prior to opening it up for maintenance.
4. Always assume that the in sides of the machine are covered in toxic substances and protect yourself accordingly.
5. ALWAYS, open the machine up and wait at least 1/2 hour prior to sticking your head inside the machine. There is a possibility that there are substances in the chamber that may react with air.

Set-up

Note: If electric discharge control is desired then make sure the ion bar is turned on. The switch for the ion bar is under the back panel on the right hand side of the machine.

1. Turn on N_2 purge valves in the chase behind the tool and make sure the regulator is set at 40psi. Refer to Fig. 1 and 2.
2. Set the N2 flow for the load-lock to 5 SCFH and for the chamber to 50 SCFH. See Fig. 3 for location.
3. Run N_2 through the Clean Dry Box (CDB) at least 1 hour prior to introduction of the samples into the chamber.
4. For particle control, turn on blower and set to 50-60% level using controls on the front panel.
5. When placing sample in the load-lock wait 5 minutes before introducing it into the chamber.
6. Turn on the platen (see Fig. 5) heat using front panel switch and set to the desired temperature. The hot plate has a range from 30 to 80 deg. C.
7. Allow the platen temperature to equilibrate for about an hour after each temperature adjustment.
8. When changing the nozzle, manually retighten the nut that holds it in place. Don't over-tighten the nut.
9. Use the valve inside the Clean Dry Box (CDB) to turn on/off the CO_2 flow. Do not use the micrometer for this purpose. The CO_2 valve is located in the lower front left corner of the CDB (see Fig. 4)
10. Refer to Gun manual for nozzle change procedures and micrometer settings.
11. Normal micrometer settings for the spray gun are as follows:

Nozzle #	Nozzle Type	Micrometer Setting Range	Type of CO2 particle
882	Aggressive	22 - 40	Hard Snow Particles
883	Medium Aggressive	25 - 40	Medium Hard
884	Medium	25 - 50	Medium
885	Mild	20 – 30	Mild Snow

Each full rotation of the micrometer is equivalent to 25. So that the four full rotations will equal 100 and the inner gauge reading will be "1".

12. Turn on the CO_2 at the tank by opening the regulator. The pressure should read greater than 800 psi. If not, the liquid CO_2 in the tank may have been depleted and the tank may have to be replaced.
13. Turn on the vacuum pump on the floor if you will be using the platen. Place the substrate on the platen and turn open the labeled vacuum valve inside the CDB to hold substrate in place.

Processing Instructions

1. Turn on the CO_2 valve and allow the CO_2 to flow for about 30 seconds prior to processing. Make sure it has a consistent flow and is not spitting.
2. The nozzle should be held 1 inch from the wafer and at 45 degrees during processing.
3. If the substrate can not be removed from the platen, turn off the vacuum pump.

Shut Down Instructions

1. Close the CO_2 regulator at the tank.
2. Turn off the vacuum pump.
3. Leave CO_2 valve on allow all the CO_2 to get purged out of the gun. When regulator pressure drops off to zero, close CO_2 valve.
4. Turn off all IR lamps.
5. Turn off the platen heater using front panel switch.
6. Turn off all lights.
7. Turn off blower.
8. Turn off the N2 purge valves behind the tool in the chase of after each use. (See Fig. 1 & 2).

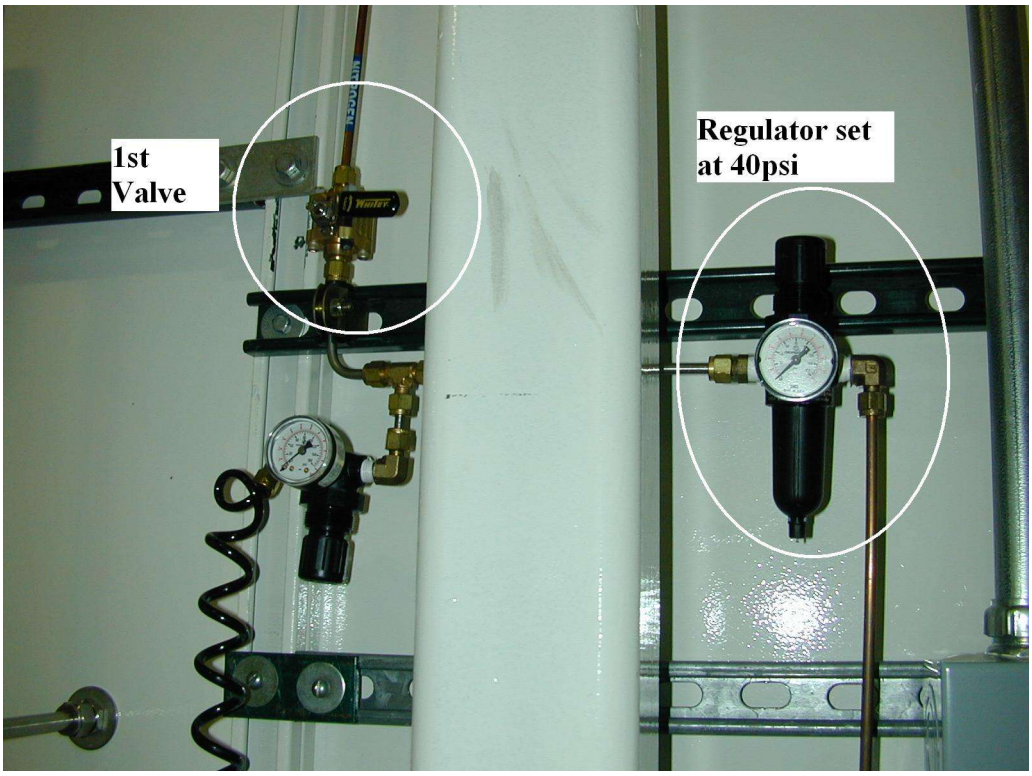

Figure 1- 1st Nitrogen Purge Valve and Regulator

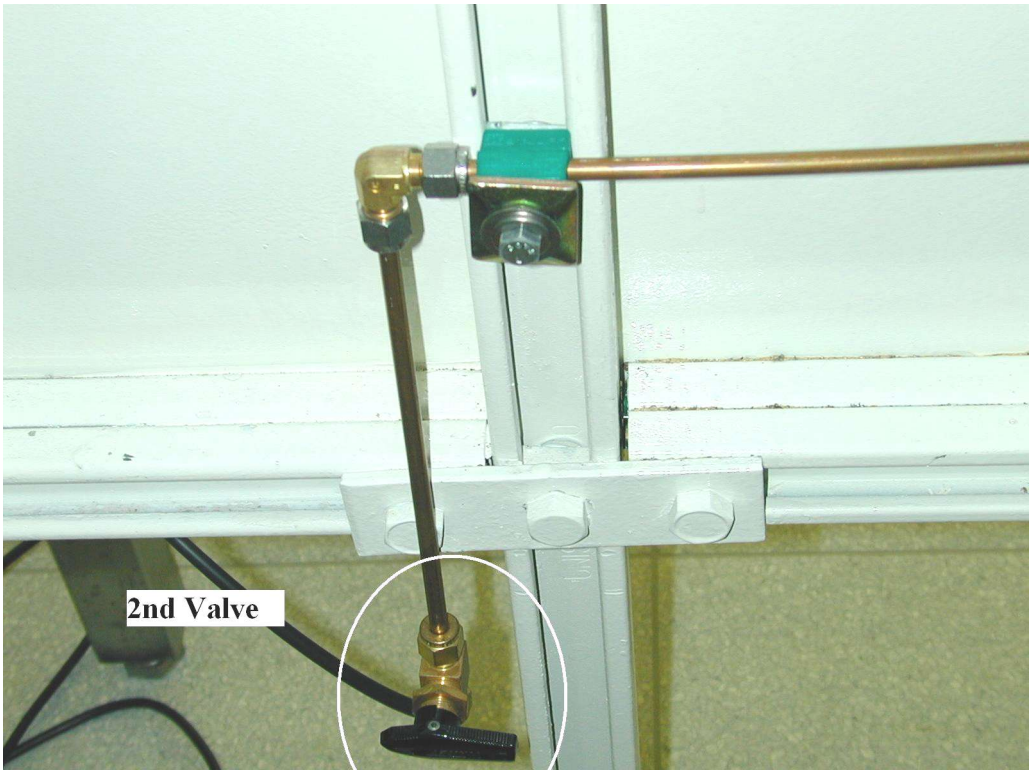

Figure 2 – 2nd Nitrogen Purge Valve in the Chase

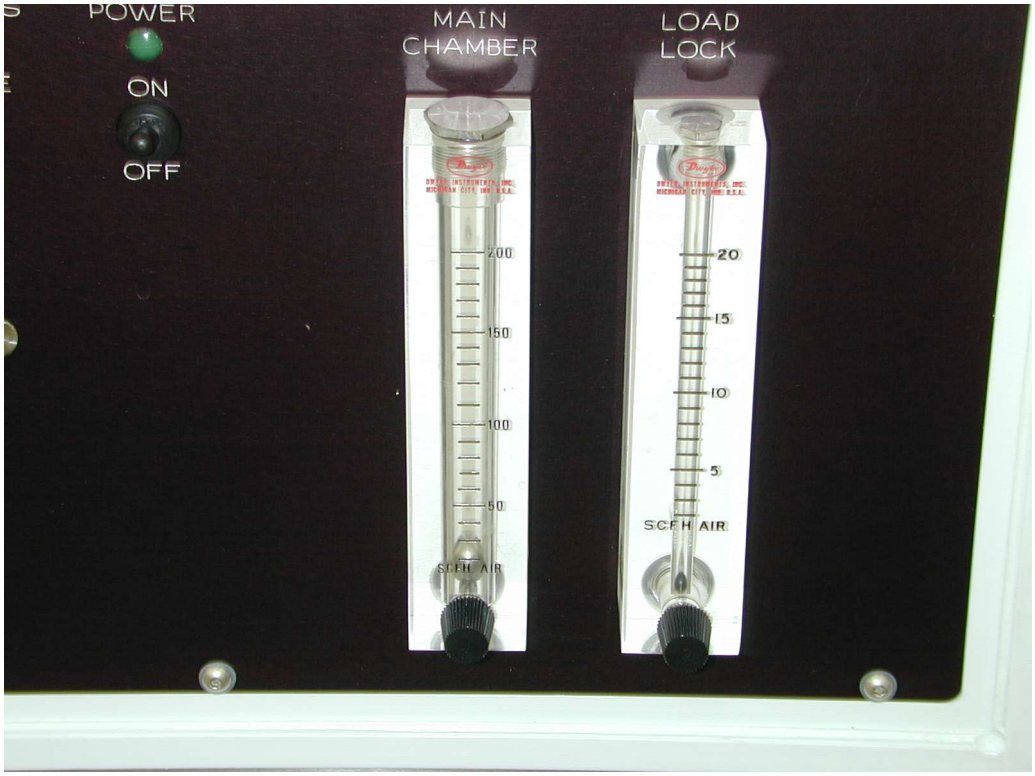

Figure 3 – N2 purge flowmeters on the front panel

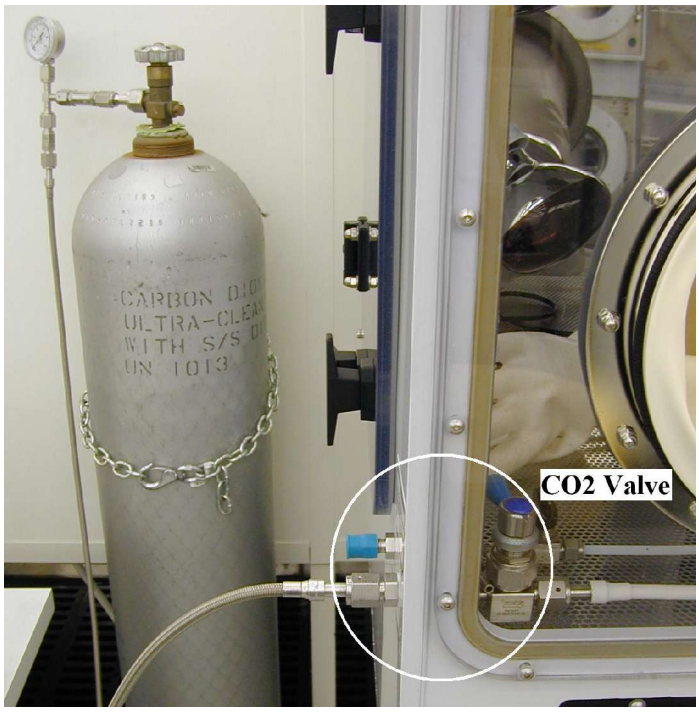

Figure 4- CO2 Valve

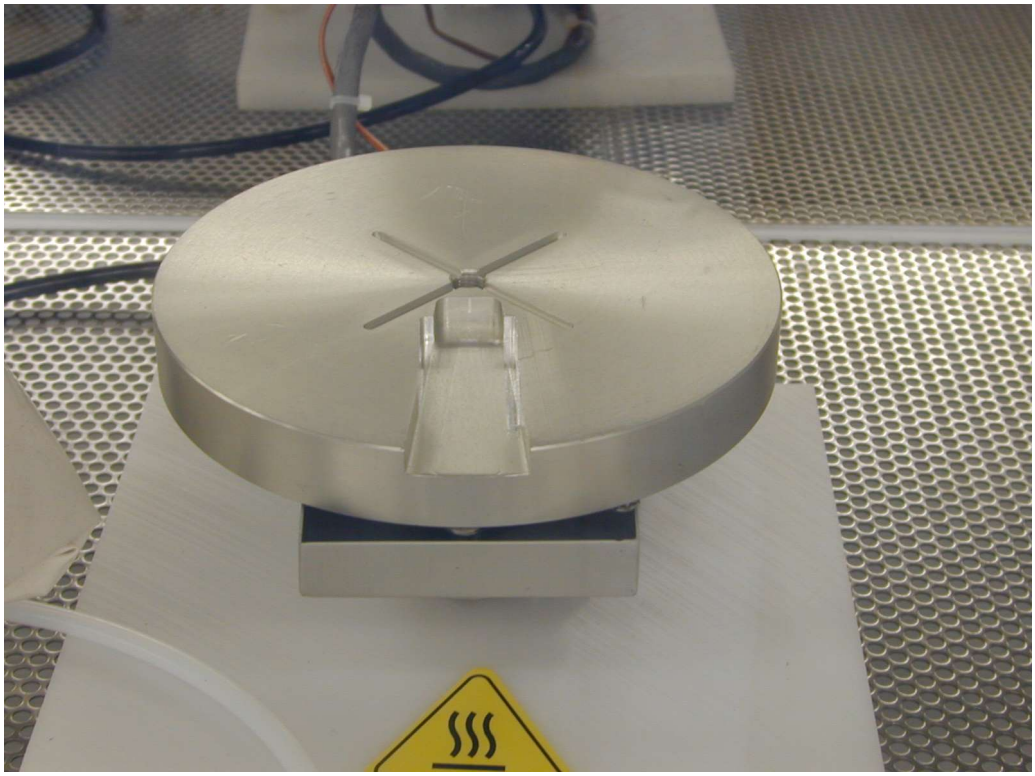

Figure 5 – Heated Substrate Platen (vacuum available if needed)

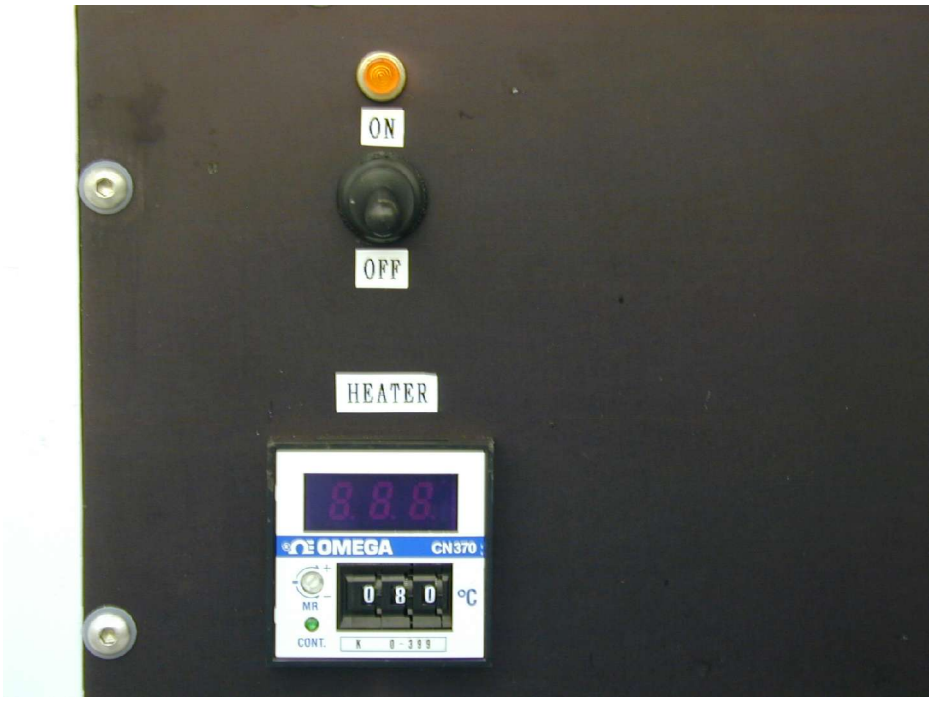

Figure 6 – Front panel platen temperature control

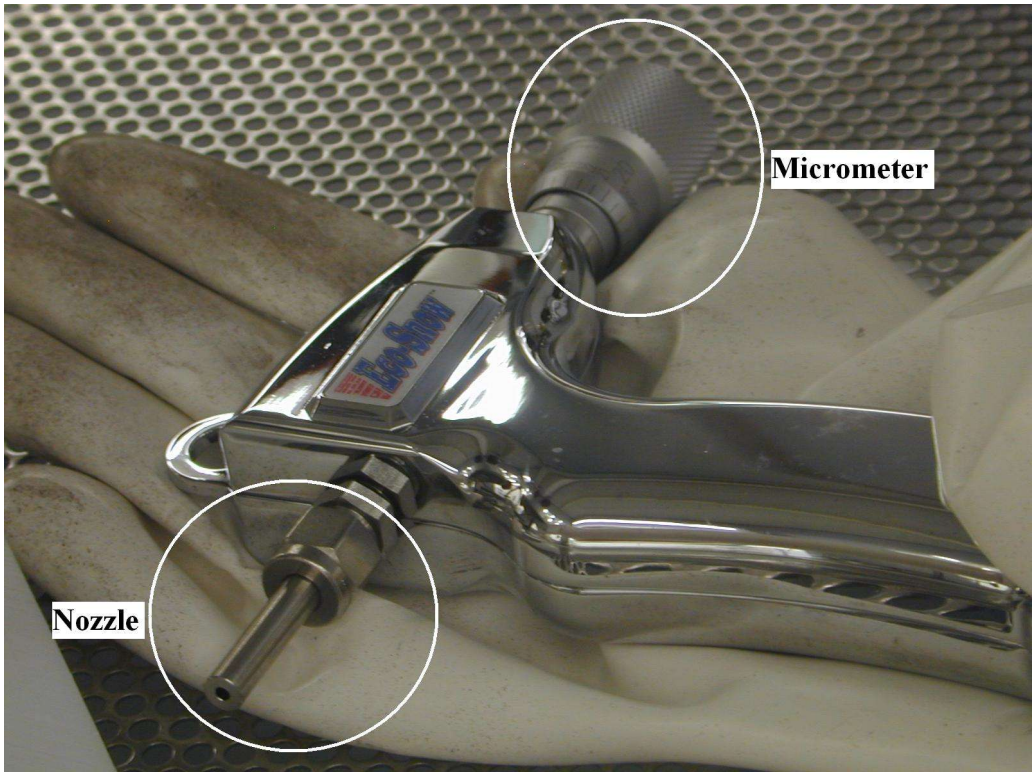

Figure 7 – Variable Orifice Jet Spray Gun

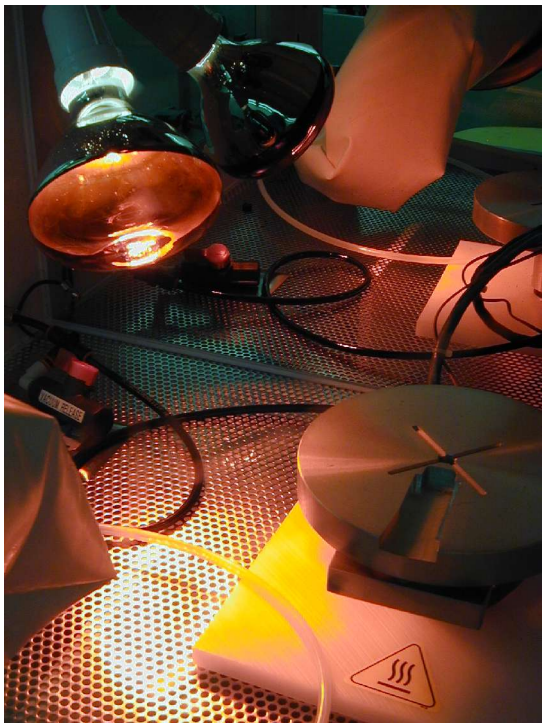

Figure 8 – IR Lamp1 is turned on

Revision	Description of Change	Change Initiator	Date of Change
2	Update contact information	James Bohlman	12/09/2024