Darkroom Procedures

In order for us to continue to produce film data of utmost quality, the darkroom must remain spotless. What looks like water spots when wet may actually be film chemicals. When dry, these contribute to dust that can affect the longevity of our film. Make sure all surfaces, including the bench tops and the two sinks, are thoroughly washed down and then dried with paper towels. Wet mop the floor each time to remove anything that may have been splashed there.

Film Desiccator Procedures: (Click on each thumbnail for a larger image. Click on the large image to close.)

The film desiccation system is composed of 3 film desiccators (one each for the Polara and Sphera and one for holding extra, open packets of film), a controller-timer unit, a zeolite chamber with a heater, and a vacuum pump (Fig. 1). The vacuum pump is timed to evacuate the film chambers on an interval basis. In addition, the system is hooked up to a zeolite chamber that pulls moisture from the film. The zeolite chamber has a heater that regenerates the desiccant when it loses its effectiveness. In the normal condition the power switch on the controller should be on and the heater switch should be off (Fig. 2).

All three desiccators are hooked up in-line to the pump. That means, unless care is exercised, releasing air into one chamber will release air into the other two as well. In most instances this is not necessary.

1. Put on latex or nitrile gloves. Do not touch the film plates with your bare hands.
2. Kodak SO-163 electron image film may be handled in the dark with red safelights. There are three safelights of the proper color in the darkroom.
3. To release air into one chamber first close the in-line valves to the other two chambers and then open the air release valve on the chosen chamber (Fig. 3). The in-line valve on the desiccator that holds the extra film packets is the one closest to the chamber. The large silver handle is for air release. Follow the directions on top of that chamber.
4. You may now remove the film camera from the chamber.
5. Open film packets are kept in the square desiccator to lessen the amount of time needed to dry film that is loaded in the cameras. Please make sure that there are at least two open packets in the chamber at all times so the next user is not left short. If the number of packets is running low get a new box out of the freezer and allow it to come to room temperature. Then open each of the new packets and put them on the lower shelf of the desiccator.
6. To pump down the desiccators close the air release valve and open the in-line valves to the pump line. If the pump is not currently running, turn the power switch off and then on again in a few seconds. (Fig. 2).
7. After the vacuum in the chamber has improved, and the needle on the gauge is almost to 28 in. Hg, open the in-line valves to the other two chambers.

Low Dose Film Developing Procedures for Kodak SO-163:

Two developing conditions, in particular, affect the resultant quality of films: the temperature of the developer and its agitation. The film developing sink was designed to optimize these conditions. The solutions temperature is maintained by a water bath; that temperature is maintained by properly setting a water mixing valve. Agitation is performed by bubbling dry nitrogen into the solutions. It is important to use nitrogen because it does not oxidize the developer as does room air (Fig. 4).

1. The water coming into the building is generally warmer than 68° Fahrenheit (20° C) but the air conditioning in the room often keeps the developer about to that temperature. Getting it close to the recommended temperature may take adding ice to the water-jacket sink around the chemical tanks or running water into the water jacket for a few minutes. If you need to run water in the water jacket close the red drain valve under the sink (Fig. 4) and turn on the chemicals waterbath valve. Do not touch the temperature mixing valve at this time because that is already set (Fig. 5).
2. The temperature of the developer is the most critical one. The other chemicals may be used within a range of 65° F to 80° F.
3. Just before you are ready to develop the film you need to set the nitrogen burst system. Go to the compressed gas cage on the south side of the building and open the in-line valve above the nitrogen bottle as well as the valve on the bottle. This is usually kept closed to prevent the bottle from running dry. Open the N₂ valve above the developer tank (Fig. 5), then turn the "cycle/off/continuous switch" on the agitation timer (Fig. 6) to continuous. Slowly open the dry nitrogen valve on the wall (Fig. 4) until you see a vigorous bubbling in the developer but make sure that it is not so vigorous that developer spills out over the tank. Then
set the switch to cycle. Agitation should occur for one second about every eight seconds. The duration and interval dials need not be changed unless those times are different. Turn the "cycle/off/continuous switch" to off until you are ready to use it.

4. Turn on the wash waterbath valve to fill up the water bath.

5. If you have loaded your films into the developing racks you are ready to go. Turn on the nitrogen agitation timer and make sure that the nitrogen valve above the developing tank is open. For each subsequent solution turn off the valve above the tank you have used and turn on the valve above the next tank. The water wash tank does not need agitation since it has running water.

6. The following times should be used to process your film:

   **Kodak D19 developer -- 12 minutes**
   **Water wash -- 1.5 minutes**
   **Kodak Rapid Fixer -- 4 minutes (Longer times will not hurt. You may turn on the lights after this step.)**
   **Water wash -- 30 seconds**
   **Kodak Hypo-Clearing Agent -- 2 minutes**
   **Water wash -- 5 minutes**

7. Put one capful of Kodak PhotoFlo into a tank and fill with water. This solution helps to prevent water spots on your film. Place the film racks into the PhotoFlo for 30 seconds and agitate gently. Remove the racks and shake off excess water.

8. If you have your films in the high-capacity racks you may need to take out every other film and put them in another rack to prevent the films from touching and sticking during drying. Put the racks in the film dryer and turn the timer to a position just short of "hold" and leave them there for an hour. It is not necessary to change the temperature dial.

9. Turn off all nitrogen valves and the nitrogen burst timer.

10. Thoroughly wash down all surfaces of the counter tops and the sinks then dry them with paper towels to prevent water spots on the equipment. Turn off the waterbath and chemical water bath valves and open the red drain valve beneath the sink.

11. Enter the number of films you processed in the log book and calculate the total for that batch of chemicals.

12. Close both the inline valve and the valve on the nitrogen bottle in the gas cage. Failure to do this will cause the bottle to empty which will also affect the operation of the microscopes which are hooked up to the same line.

13. Damp mop the floor to prevent any chemicals that may have splashed on the floor from drying. Clean up the darkroom and turn off all lights including the safelights.
Replacing the Chemicals:

1. If you use depleted chemicals you risk reducing the quality of your images, reducing their archivability or even possibly losing your work entirely. Monitoring the quality of the chemicals is a must.
2. The following guidelines should be used to determine if the chemicals should be changed:

   **Kodak D19 developer -- 250 sheet capacity**

   **Kodak Rapid Fixer -- Drop one drop of "Hypo-check" into the fixer. If the drop precipitates the fixer needs to be changed.**

   **Kodak Hypo-Clearing Agent -- Change this when you change the fixer.**

   **Kodak PhotoFlo -- Change this when you change the fixer. If in doubt, change it.**

3. It is legal to dispose of all of the chemicals down the sink EXCEPT for the fixer. It needs to be poured into the waste container that is stored in the wet lab and turned into the campus Environmental Health and Services.

4. Follow the directions on the chemical packages to make up new solutions. The following are guidelines for mixing up the dry chemicals:

   **Kodak D19 developer -- One package makes up a tank of Low Dose developer. This powder is not very soluble so it needs to be mixed in hot water and cooled down.**

   **Kodak Rapid Fixer -- Follow the directions on the package. One box is enough for one tank of solution.**

   **Kodak Hypo-Clearing Agent -- One 4 oz. package is enough for one tank of working solution. You may need to add a little more water so that the films in the racks are totally covered by the solution. The larger 17 oz. packets make up five gallons of working solution.**

5. Mark down in the log book that you changed the chemicals.