



Biosafety Tips

Karen B. Byers

Dana Farber Cancer Institute, Boston, Massachusetts

Biosafety Tips brings you practical approaches to biosafety or "news you can use." If you are looking for a useful and sensible solution to a biocontainment problem or perhaps a reference to help convince a skeptical researcher of the need for caution, this is the place to look. In this column I will share some biosafety insights for managing a variety of workplace situations. I welcome feedback and suggestions for future topics. Please e-mail them to karen_byers@dfci.harvard.edu or to the Editor, Ira F. Salkin, at irasalkin@aol.com.

This column describes how the Departments of Environmental Health and Safety (EH&S) and Maintenance joined forces to deal with moldy cold rooms in a new research building.

At the Dana Farber Cancer Institute, researchers are frequently reminded by the Biosafety Officer that good cold room storage habits minimize contamination and allergens in the research environment. At every annual biosafety training session one of the PowerPoint training slides shows moldy reagents and boxes in cold rooms. At this point in the presentation, I emphasize prompt removal of moldy reagents and dust accumulation. Researchers are reminded that plastic—not cardboard—storage boxes should be used in cold rooms, and this message is also included in an EH&S newsletter article with images of recommended plastic storage products and ordering information from online catalogs.

At the conclusion of one training session, a researcher, whose laboratory had been relocated to the new Smith Research Building, informed me that her new cold room was "very wet" in comparison to her previous cold room in the Dana Building. She also stated that reagent kits stored in their original containers for less than a month had become grossly

contaminated with mold in the new cold room; this had never been a problem in the Dana cold room.

I reported this at the next EH&S staff meeting and our Director assigned an EH&S Specialist to investigate the problem. Using a direct reading humidity monitor, the TSI® VeliCalc Plus®, the following readings were taken (Table 1).

For comparative purposes, humidity readings were taken on two floors in the Dana Building on March 8. The Dana 5 hallway reading was 32% RH and the cold room was 65% RH. On Dana 8, the hallway was 35% RH and the cold room was 68% RH. In the Smith Building, on the same day, the hallway was 30% RH and the cold room was 80% RH.

Clearly, the Smith Building cold rooms required dehumidification. The HVAC staff took a series of readings to independently confirm the problem, and worked with the cold room vendor to adjust the humidity with the existing systems. Meanwhile, some cold rooms had begun to smell moldy. Visual inspection revealed that mold had colonized the undercounter insulation of the stainless steel benches (Figure 1). One cold room was thoroughly disinfected; however, the mold had grown back over a 6-month period. The moldy undercounter insulation convinced the HVAC staff that a dehumidification system was required, because the same insulation material had remained uncontaminated for many years in the Dana Building cold rooms. When the HVAC staff surveyed the extent of contamination in the Smith Building cold rooms, they also removed a ceiling tile (Figure 2). Al Croteau, HVAC, used these images were used to support a budget request for mold remediation in the Smith cold rooms, followed by installation of a dehumidification system capable

Table 1
Smith Cold Room Conditions

ROOM #	COLD ROOM HUMIDITY (%RH)			HALLWAY HUMIDITY (%RH)		
	25-Feb	27-Feb	5-Mar	25-Feb	27-Feb	5-Mar
SM719	64	78	51	n/a	28	8
SM741	67	70	52	n/a	28	9
SM819	68.5	77.5	32	n/a	30	8
SM841	76	76	41	n/a	30	8
SM919	65	80	52	n/a	29	9
SM941	67	79	54	n/a	27	10
SM1019	57	73	44	n/a	30	10
SM1041	67	76	42	n/a	27	10
SM1123	78	66	43	n/a	29	9

NOTES: Humidity and temperature do not fluctuate significantly throughout the cold rooms. Outside hallway temperatures were consistent, ranging from 68° - 72°F. It snowed on February 27 and was sunny on March 5.

of keeping the rooms at 50% RH or lower. This expensive retrofit was justified by the potential reduction of mold contamination on research materials and to reduce the allergenic risk for staff.

This fiscal year contracts were signed for both mold remediation and the installation of the dehumidification system. A schedule was set up so that a cold room would be shut down every 2 weeks (although a longer interval between the cold room

shut-downs would have been better). There are nine cold rooms in the Smith Building. Smith research laboratories are on floors 5 through 11 and a back-up cold room is available on the mechanical floor (floor 4). The implementation plan involved having researchers move the contents of each Smith cold room to the spare cold room on the mechanical floor and then back after the remediation.

The project began with closing a cold room on a

Figure 1

Mold on Under-counter Insulation

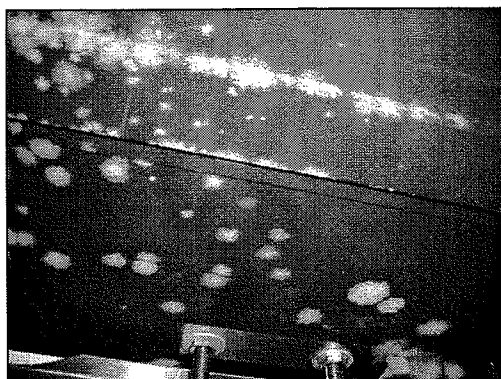


Figure 2

Cold Room Ceiling Tile



Friday. I soon learned that early on Friday mornings I should go to the research floor and prompt the decision-making process. [On Fridays the following dialogue often took place: "Let's get rid of this outdated media...Where is CR (owner's initials on stored cold room materials)?" "CR left 2 years ago?" "Where is the Principal Investigator (PI) of the lab where CR used to work? Let's find out if the PI still needs this, or whether we can throw it out."] Research labs then completed and attached the Safety Signoff sheet to the cold room door, indicating that the room was monitored for radioactive contamination and safe for non-research personnel to enter. The sheet was verified and signed by an EH&S safety specialist and the cold room was shut off by HVAC staff.

On Saturday, mold remediation contractors came in and set up a contained, negative-pressure workspace with HEPA filtration. Cold room ceiling tiles were removed and packaged for disposal. Heat was applied to remove the soundproofing insulation under the stainless steel sink, counter, and shelves, and 10% bleach was used to disinfect all surfaces. The plastic duct attached to the HEPA filter was routed above the ceiling tiles and finally vented into

the stairwell corridors (Figures 3 to 5). Researchers were informed about the containment process, and so did not express concern when the mold remediation crew dressed in Tyvek and full-face respirators and disappeared behind the plastic barrier. No odor complaints were received during the mold remediation process, even though many researchers worked in the laboratories over the weekend.

After mold remediation, the cold room floors were cleaned by Environmental Services and the dehumidifier was installed. This process required about 4 days. Then the refrigeration was turned on again and the temperature monitored over the weekend by the HVAC staff. If the temperature charts showed a steady 4°C on Monday, researchers moved their materials out of the backup cold room into their own cold room.

Although the process sounds simple, coordinating the transport of research materials for such a large number of researchers was challenging. Fortunately, the Smith cold room mold remediation/dehumidification project was deemed a success and was well-received by all involved. One research group wrote: "Thanks! We didn't have much to move into the

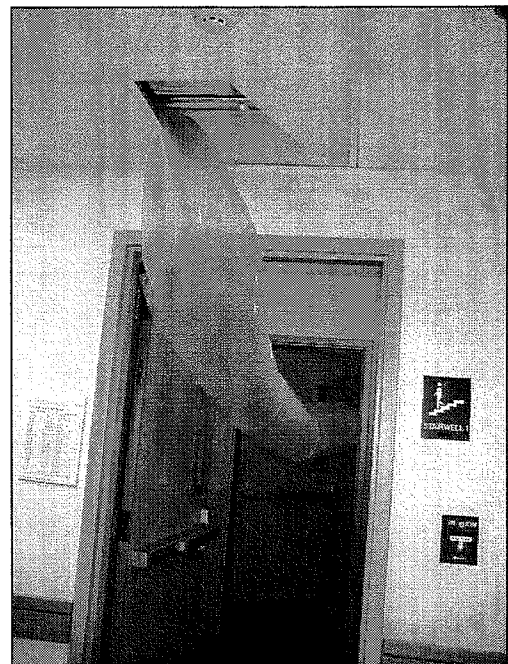
Figure 3

Cold Room Remediation in Progress



Figure 4

Exhaust into Stairwell



back-up cold room; we stored some things in fridges and discarded a lot of old stuff. Not a bad thing, this refurbishment." My favorite comment from a researcher was: "Thanks for getting our cold room cleaned. Now we have the best, spanking semi-new one in the Smith building! We will try to keep it that way." With the new dehumidification systems, the Smith Building cold rooms now run at or below 50% RH, so we anticipate that mold growth will be minimal in the future.

Acknowledgments

The humidity readings were taken by James Doughty, Environmental Health and Safety Specialist. The Director of Environmental Health and Safety is Elizabeth Gross, CIH. The cold room mold remediation/dehumidification project was conducted under the supervision of Al Croteau, Supervisor, Heating, Ventilation, Air Conditioning Specialist.

Figure 5
View from Stairwell

