



## STEM CELL LABORATORY (STCL)



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Access Instructions for 2309B Pratt Street Freezer Building JA3

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ACCESS INSTRUCTIONS FOR 2309B PRATT STREET FREEZER BUILDING JA3**

**Temporary Instructions for Entering 2309B Pratt Street**

**11-22-2011**

**If you need to go into the attic or if you will be checking or filling liquid nitrogen freezers, a handheld oxygen meter is required. If you don't have one, call OESO for an escort at one of these numbers (all 919): 684-5996; 684-2794; 417-0263.**

**If you are entering the main part of the building for maintenance tasks only, or to check on mechanical freezers, and you will not be doing anything with liquid nitrogen:**

- Open single door on left side of building. Open double doors on right.
- If the yellow light to the left of the double doors (outside the building) is on, do not enter the building. (You don't actually need to call 684-3232 - that number is provided so that passersby concerned about the yellow light will call E&O instead of 911. You may call E&O with questions.) To help the oxygen level return to normal, step inside the double doors for a moment and flip the switch on the power strip that is on the floor to your left. This will turn on a large fan in the middle room. Wait OUTSIDE the building until the yellow light turns off. (Note: the yellow light outside and the yellow light on the oxygen alarm in the middle room both mean that the concentration of oxygen in the building is unsafe (below 19.5%).)
- If the red light at the top of the oxygen monitor (in the middle room, visible through front window) is flashing, this means the oxygen sensor is not working properly. A handheld meter will be required. Leave the building immediately and call 684-3232 for repair of the oxygen monitor. Contact OESO for an escort at one of these numbers (all 919): 684-5996; 684-2794; 417-0263.
- If the yellow light at the double doors is off, and if there are no lights flashing at the top of the oxygen monitor in the middle room, you may go in. Turn on the large fan using the power strip that is on the floor just inside the double doors (to your left).
- If the oxygen alarm is sounding and the reading is between 19.5% and 19.8%, it is safe to be inside. This alarm level turns on extra ventilation. You may silence the horn by pressing the black "acknowledge" button. If the concentration goes below 19.5%, the horn will sound again (and the yellow lights at the monitor and double doors will turn on). It is safe to be in the building above 19.5% oxygen. Outside is 20.9% oxygen.
- When you are ready to leave, turn the fan off using the power strip switch near the double doors.
- Lock both doors.

**DUKE UNIVERSITY DUKE UNIVERSITY HEALTH SYSTEM**  
Durham, North Carolina 27710

**Occupational and Environmental Safety Office**

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**Occupational Hygiene & Safety Division**

**MEMORANDUM**

**To:** Robert Guerry, Director, Engineering and Operations

Barbara Waters-Pick, Manager, Stem Cell Laboratory

Dondi Pulse-Earle, Research Laboratory Specialist, Carolinas Cord Blood Bank

**From:** Courtney Stanion, Safety and Health Specialist

**Re:** 2309B Pratt Street - oxygen deficiency hazard

**Date:** 6 September 2011

As you know, the Occupational and Environmental Safety Office has been escorting employees into 2309B Pratt Street, which contains 17 liquid nitrogen freezers, for over two weeks, since an E&O employee experienced symptoms of oxygen deficiency and we learned that the oxygen monitoring system in that building was not working. On several occasions during this time, we have encountered an oxygen deficient atmosphere when we first opened the building.

A replacement oxygen monitoring system has been installed at 2309B Pratt St today. However, the following additional steps are needed to ensure employee safety in this building:

1. The HVAC system has a damper for fresh air, which is supposed to be triggered open by the O<sub>2</sub> sensor when it reaches a predetermined concentration. This damper is currently not working - this must be addressed as soon as possible. I recommend that the set point for opening the damper be at 19.8 - 20.0% O<sub>2</sub>. There is no need for an audible alarm to be triggered at this level; however, a visible warning is recommended if supported by the monitoring system. The ability of the system to trigger the damper should be tested initially and at least annually thereafter.
2. The non-functional vacuum-jacketed piping must be replaced as soon as possible. Doing this will allow the freezers to fill more quickly, meaning less nitrogen vapor entering the room and less chance for oxygen deficiency. This will also reduce the number of freezer alarms going to BAS and, in turn, will reduce BAS trips to this building.
3. The replacement monitoring system must be monitored by BAS with a signal that is distinct from the freezer alarms in this building. The BAS alarm should be triggered at 19.5% oxygen. BAS does not need to respond to these alarms, but should log the alarms in TMS, including a note about how long the oxygen deficiency lasts. The frequency of alarms should be reviewed weekly for the next several weeks by a responsible person within E&O - please let me know who is assigned to review the oxygen deficiency alarms.

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4. The new O<sub>2</sub> monitoring system must be tested/calibrated at least every three months. This must be tracked as a preventative maintenance task in TMS. Additionally, the Controls shop must provide a way for people in the building to tell that the system has been calibrated - this could be something as simple as a log sheet, tag or sticker with the date and initials of the employee performing the calibration.
5. The monitoring system alarm must be visible and audible from outside the building, and must be visibly and audibly different from other alarms in the building, so that personnel can tell that there is an oxygen deficient atmosphere before they enter the building. New signage should be created to communicate the meaning of the oxygen alarms specifically. The visible/audible alarm should be triggered at 19.5% O<sub>2</sub>. Additionally, personnel working inside the building must be able to see and hear the alarm.
6. Any employee entering this building to fill or check freezers must carry a hand-held O<sub>2</sub> meter. The reason for this is that the wall monitor only senses the O<sub>2</sub> concentration in one place, and personnel filling or checking the LN<sub>2</sub> freezers may create a local oxygen-deficient atmosphere where they are working. The departments performing this task must purchase their own handheld oxygen meters as soon as possible. Personnel who will be entering the building to fill or check freezers must be trained on the hazards of oxygen deficient atmospheres and use of their meters - please contact me to arrange training.
7. The freezers at Pratt Street must be repaired/replaced so that all of them will fill automatically and so that all of them can be closed. This will reduce the likelihood of employees encountering an oxygen deficient atmosphere because the freezers would each fill on a different schedule and an employee would not necessarily be present during filling. Keeping the freezers closed will reduce their usage of LN<sub>2</sub> and their contribution to the low oxygen atmosphere.
8. Employees may not enter this building while the oxygen alarm is sounding. Until many of these repairs are made, the large industrial fan that has been in the building for the last two weeks will be essential to make the building safe for entry. I would like someone from E&O (Michael Swaim?) to work with me to set up the fan so that it can be turned on by someone standing at the door.
9. OESO will work with building users over the next month or so to assess the effectiveness of the various repairs. If the changes do not effectively control oxygen deficiency throughout the building, OESO will work with E&O to determine additional steps to keep the building safe.

Please let me know if there are any questions or concerns related to these recommendations.

cc: Billie Biggs, Assistant Director, Engineering and Operations  
Mike Elks, Assistant Director, Engineering and Operations  
John Kramer, Assistant Director, Engineering and Operations  
Lee Wiggins, Staff Engineer, Engineering and Operations  
Timothy Strayhorn, BAS Supervisor, Engineering and Operations  
Michael Swaim, Cryogenic Refrigeration Specialist

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All dates and times are in Eastern Time.

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**Document Release**

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