Rooftop Safety Plan

OFFICE OF ENVIRONMENT, HEALTH & SAFETY

UNIVERSITY OF CALIFORNIA, BERKELEY

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Table of Contents

Overview

This plan provides guidance for workers that will perform invasive or non-invasive work on roofs of buildings across the University of California, Berkeley. The information and guidelines below will help you work safely in and around vent systems on roofs.

I. Applicable to All Types of Labs that Exhaust on the Roof

Before accessing the roof, pre-plan tasks:

A. Notify/check-in with Facility Services (FS) dispatch, supervisor, or another responsible person
B. Determine if your task is invasive into the HVAC system or non-invasive
C. Notify the Building Manager or Department Safety Coordinator (DSC)
D. Ask your supervisor if there are other hazards in the area
E. Review any applicable Job Safety Analysis, Standard Operating Procedures, and pertinent safety information
F. Know who to call in case of emergency and how to direct them to the location
G. Use the Integrated Safety Management (ISM) approach
H. Information & Training Resources:
    1. General safety & health information: ehs.berkeley.edu
    2. EHS 104 Laboratory Safety Awareness Training for Support Personnel
    3. Rad Worker II (LBNL training) or EHS 404 Radiation Safety Training for Non-Users for invasive work on Donner Hall roof
    4. If you are uncertain of which training is appropriate for your planned work, contact the Radiation Safety Team for further guidance radsafety@berkeley.edu.
    5. Hazard Communication EHS
    6. Fall protection training and inspection
    7. Lock out Tag out awareness and training
I. After finishing the work, notify/check-in with FS dispatch, supervisor, responsible person, and the building manager

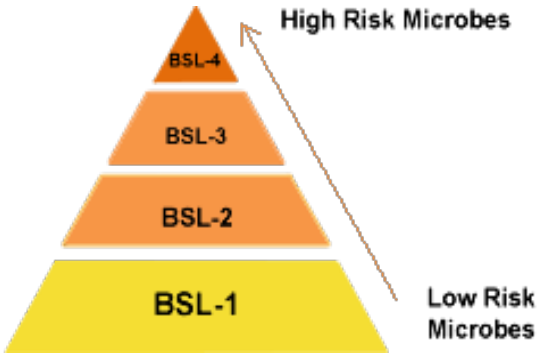
II. Labs that Perform Biological Research Under Chemical or Biological Hoods

There are four biosafety levels. Each level has specific controls for containment of microbes and biological agents. The primary risks that determine levels of containment are infectivity, severity of disease, transmissibility, and the nature of the work conducted. Origin of the microbe, or the agent in question, and the route of exposure are also important.

Each biosafety level has its own specific containment controls that are required for the following:

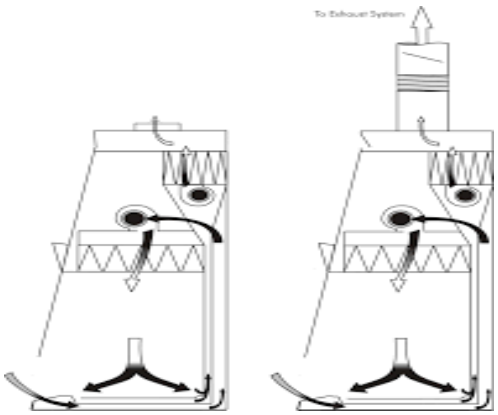
1) Laboratory practices
2) Safety equipment
3) Facility construction

The biosafety levels range from BSL-1 to BSL-4. Each biosafety level builds on the controls of the level before it. Every microbiology laboratory, regardless of biosafety level, follows standard microbiological practices.



A. **BSL-1 - Biological Safety Level 1**
B. **BSL-2 - Biological Safety Level 2**; The BSL-2 enclosures pull in clean air from the lab into the enclosure meaning samples are protected. The air is then HEPA filtered out of the enclosure to protect operators. The filters can range from things like HEPA to protect from organisms (e.g., lentivirus) or include charcoal to protect from harmful chemicals.

C. **Class II B2 cabinets** require a hard ducted connection since 100% of the air must be pulled out of the system using the building's exhaust. Class II A2 (A/B3) and sometimes B1's can have a thimble connection, but their blowers do not require the use of ducting.



D. **BSL-3 - Biological Safety Level 3**; Exhaust air cannot be recirculated, and the laboratory must have sustained directional airflow by drawing air into the laboratory from clean areas towards potentially contaminated areas, exhaust from BSL-3 lab in Li Ka-Shing on the roof is completely contained and HEPA filtered.

III. Labs with Radiation Hazard

A. Procedures for UC Berkeley Cell Sites

B. Radio Frequency Radiation Awareness Guide

C. Radio Frequency Safety:
https://www.fcc.gov/general/radio-frequency-safety-0
https://www.ehs.gatech.edu/radiation/rf

D. Elements of a Comprehensive RF Protection Program: Role of RF Measurements

E. Radio Frequency Exposure

F. Exposure Limits for Radiofrequency Energy: Three Models

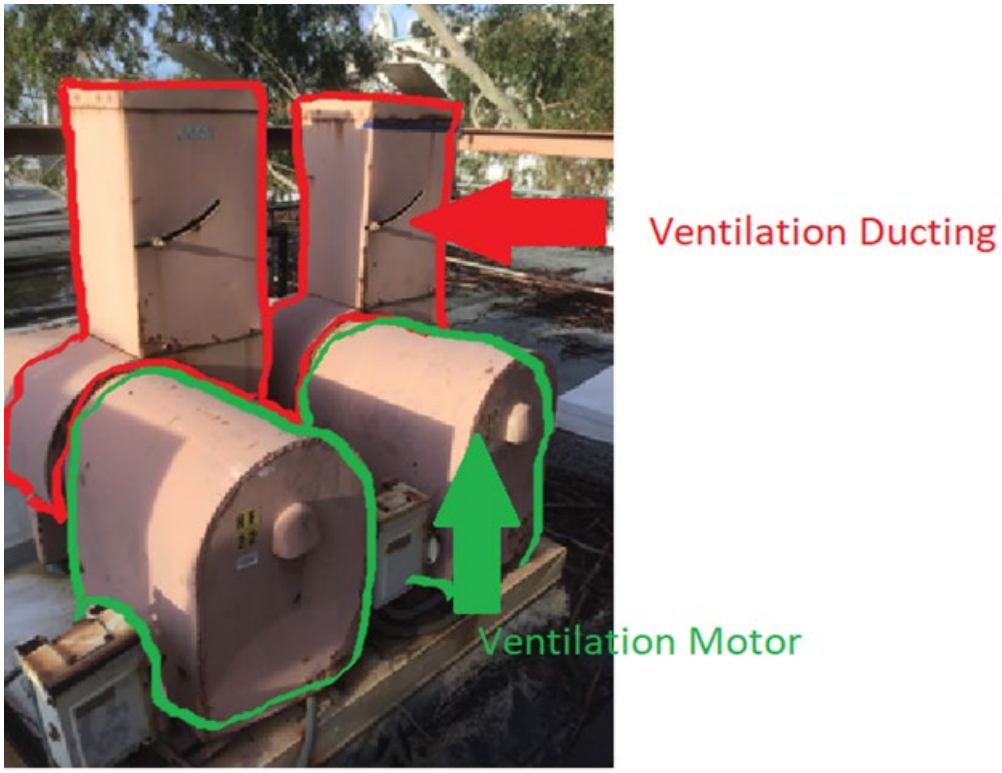
G. Microwaves, Radio Waves, and Other Types of Radiofrequency Radiation

See Appendix 1 for more information on radioactive hazard mitigation

IV. Appendix 1: Radioactive Hazard Mitigation Controls Breaching into Lawrence Berkeley National Laboratory (LBNL) Ventilation System

Ventilation Systems in Donner Hall

1. In an academic setting, the quantities and types of radiation used are generally at levels low enough that fire and medical response personnel can deal with severe threats to life, health, and/or property without concern for the radioactive materials and radiation present.*
2. Contact LBNL, Main Laboratory Phone Number: (510) 486-4000 https://www.lbl.gov/a-z-index/b/ before starting invasive work. Invasive tasks would cover any work that disturbs the internal surfaces of the ducting. See attached a picture that should help explain:



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Ventilation Systems in Donner Hall Cont'd, *Appendix 1*

3. The ventilation ducting consists of everything outlined in red in the above picture, the shaft leaving the motor to through the duct to the blower fan, down to the fume hood entrance. The outside of the ducting is alright to work around and touch since any potential hazard exists on the inside. It is not dissimilar from water in a pipe. Invasive work would be anything that required a worker to touch the inside of the ducting. If work was to occur inside of the duct, it would need to be radiologically evaluated to characterize any potential for radioactive contamination. Work on the motor itself would be alright, as the motor does not penetrate the ducting, only the motor shaft (which should have a disconnect from the blower).
4. Notify researchers when work is planned on or near north roof fume hood exhausts. Request a shutdown of all fume hoods and hood fans during the work. This is for the north roof not the few hoods connected to the south wing hoods.
5. LBNL groups would need to evaluate each job scope for the specific hazard(s) that may be present. For non-invasive work on the roof (e.g., cleaning leaves, gutters), the spaces external to the ventilation ducting do not require any radiological controls.
6. For work that enters the boundary of the ventilation ducting, or tasks that are not considered non-invasive, each task will need to be evaluated on a case-by-case basis.

V. Appendix 2: Li Ka-Shing

Basic vapor safety principles as expressed at the March 2019 Town Hall meeting with EH&S and the Occupational Health Clinic Chief.

VI. Appendix 3

Examples of Building Contacts:

College of Chemistry	Contact
Biosciences Div. Svs. Valley Life Sciences Bldg.	Contact
Stanley Hall	Contact
Regional Asset Managers	Contact Asset Management
Facilities Services	Contact

EH&S Contacts: Staff Directory

1. Supervisor, lab safety group
2. Supervisor, laboratory inspectors and leads the inspection program
3. Campus Chemical Hygiene Officer
4. Associate Industrial Hygienist, management of the Fume Hood program
5. Campus Biosafety Officer
6. Chemical Inventory Program Manager, and responsible for annual Cal/OSHA carcinogen reporting, City of Berkeley (COB) nano-material reporting and the HF calcium gluconate program
7. PPE Coordinator and manager of the Respirator Fit Testing program
8. Safety Engineering & Programs Specialist

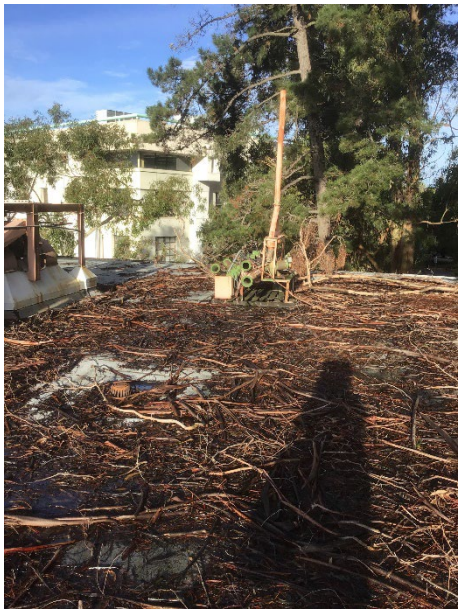
VII. Appendix 4: Additional Hazards to Consider while working on the Roof

Fall Protection: Please refer to the Fall Protection Program

Unprotected Edges

Slip/Trip/Fall

Cleaning rooftop debris - This is noninvasive work. Hood fans and fume hoods are not required to be shut down for this task. Personal fall protection or other means of fall protection such as temporary guardrails shall be used when working along the ledges.



Install temporary duct hose on drain vents to extend and redirect air flow, preventing roofers from inhaling bleach odors while they clean rooftop debris.

Checklist

1. Access and Structure Additional Information

YES	NO	
☐	☐	Are structural deficiencies visible from the roof/deck underside?
☐	☐	How do we access the roof? Internally or Externally
☐	☐	Are access points in good repair?
☐	☐	Is there a process for materials transport to the roof?

2. Unprotected Edges (highest Occupational Health and Safety violation)

YES	NO	
☐	☐	Does the roof have unprotected edges or open sides?
☐	☐	Are guard rails/parapets present?
☐	☐	If present, are guard rails taller than 39 inches?
☐	☐	Are roof walkways guarded?

3. Walkways and Roof Additional Information

YES	NO	
☐	☐	Are walkways present?
☐	☐	Is the walkway clearly visible?
☐	☐	Is the walkway free of trip hazards?
☐	☐	Are obstructions (piping, electrical, etc.) on the roof?

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Checklist Cont'd

4. Equipment Additional Information

Identify any equipment, tanks or piping present on the roof.

HVAC Gas or Natural Gas Lines Electrical Conduit Vent ducts

Identify laboratory sink and sewer vent lines

YES	NO	
☐	☐	Any extra considerations/operational needs required?

5. Openings Additional Information

YES	NO	
☐	☐	Do skylights/other openings have screens-- such as fall protection or bug/vermin screens?
☐	☐	Do vents/hatches/other openings have guardrails?
☐	☐	Any holes (gap or void > 12")? Note: The screen construction shall be of grillwork, with openings less than 12 inches in the least horizontal dimension.
☐	☐	Is there a risk of falling equipment/tools?

6. Other Considerations Additional Information

YES	NO	
☐	☐	Are communication protocols established?
☐	☐	Is basic signage present (access points, hatch warnings, etc.)?

VIII. References & Acknowledgements

Radiation Safety

- EH&S Radiation Safety Manual

Designing for Labs

- UC Safety Design Manual

§5154.1. Ventilation Requirements for Laboratory-Type Hood Operations

- www.dir.ca.gov/title8/5154_1.html

§5154.2. Ventilation Requirements for Biological Safety Cabinets (BSCs)

- www.dir.ca.gov/title8/5154_2.html

Greg Haet
HRA performed by ERM for UCB in 2009 and Latimer Hall Exhaust Hazard Communication (2000)

Jim De Zetter
Radiation Safety and Memorandum of Agreement between UC Berkeley and LBNL concerning Environment, Safety and Health (ESH) Policies and Procedures

Keith Newsted
from LBNL