Laboratory Design Considerations

A design process that integrates key decision makers (e.g., health and safety, end-users, facility operators) into the project should be used.

The laboratory shall be completely separated from outside areas (i.e., shall be bound by four walls and a roof or ceiling).

17 CCR
State of California, Department of Health Services, Radiologic Health Branch, Guide for the Preparation of Applications for Medical Programs (RH 2010 4/90)

Design of the laboratory and adjacent support spaces shall incorporate adequate separate facilities to store and/or consume food, drinks, and apply cosmetics.

UC Practice
Prudent Practices in the Laboratory
17 CCR
State of California, Department of Health Services, Radiologic Health Branch, Guide for the Preparation of Applications for Medical Programs (RH 2010 4/90)

Mechanical climate control should be provided as needed.

The lab shall be within normally acceptable thermal ranges prior to permanent occupancy. Freezers, incubators, autoclaves, etc. exhaust heat into a room. Failure to take this effect into consideration may result in an artificially warm working environment. Windows shall not be openable since the room air balance will be altered.

See the 'Laboratory Ventilation and Fume Hoods ' chapter of this document for laboratory ventilation design issues.
UC Practice

Supply and exhaust systems shall meet the requirements of ANSI/ASHRAE 62 and ANSI/AIHA Z9.5.

See the 'Laboratory Ventilation and Fume Hoods' chapter of this document for laboratory ventilation design issues.

UC Practice

When office and lab spaces are connected, offices should be net-positive air pressure compared to the lab, and airflow should enter via office spaces, and exit via hoods or other exhausts in lab spaces.

UC Practice

Laboratories should be designed with adequate workstation space, e.g., computers for instruments or data entry.

UC Practice

Laboratory benches’ standard depths are 30 inches for a wall bench, and 66 inches for an island bench. Bench lengths usually allow for 72 inches of free counter space per laboratory worker, in addition to the counter space allotted for equipment.

Desk-type work areas in laboratories shall be separate from areas where hazardous materials are used. Specifically, fume-hood openings shall not be located opposite desk-type work areas or located adjacent to a single means egress to an exit or to high traffic areas.

NFPA 45 Chapter 6?9.3

Workstations in the laboratory need to accommodate computer monitors, keyboards, and work holders, and should have height adjustable work surfaces to minimize injuries from repetitive-motion stress. The greatest potential ergonomic risk is from poorly designed laboratory workstations. When designing a ?knee hole,? place it under a height-adjustable work surface.

UC Practice
Ensure that casework has no vibration/movement or loading limitations, is seismically secure, interacts with laboratory equipment, is ergonomically designed, and is compliant with ADA requirements.

UC Practice

Floor loading should be no more than 100?125 pounds/in2. Heavy equipment should be located elsewhere.

UC Practice

Load-bearing columns should not be placed in open laboratory areas, but should be incorporated into lab benches, if possible.

UC Practice

Avoid wet sprinklers in ductwork; only fireproof material may be used in interstitial spaces.

UC Practice

Locate eyewash/safety shower near door. Do not include a floor drain for the shower.

See Emergency Equipment section of this document for eyewash/safety shower issues.

UC Practice

Where hazardous, biohazardous, or radioactive materials are used, each laboratory shall contain a sink for hand washing. The sink drain shall be connected either to a retention tank or building waste water.

NIH Biosafety in Microbiological and Biomedical Laboratories, BSL 2, D.1
NIH Guidelines for Research Involving Recombinant DNA Molecules, App. GII-B-4-d
All work surfaces (e.g., benchtops, counters, etc.) shall be impervious to the chemicals and materials used in the laboratory. The countertop should incorporate a marine edge to prevent runoff onto the floor. Epoxy resin or stainless steel countertops (depending on application) are optimum.

The lab bench work surface shall be resistant to chemicals and disinfectants. Glass fiber reinforced epoxy resin (fiberglass), plastic laminate, and wood are inappropriate choices because they aren't durable for heavy use and can be degraded by some chemicals.

California Department of Health Services, Radiologic Health Branch
NIH Biosafety in Microbiological and Biomedical Laboratories, BSL 2, D.3
NIH Guidelines for Research Involving Recombinant DNA Molecules, Appendix G-II-B-4-b

The laboratory shall be designed so it can be easily cleaned. Countertops shall be a seamless one-piece design to prevent contamination. Penetrations for electrical, plumbing, and other considerations shall be completely and permanently sealed. If the bench abuts a wall, it shall be coved or have a back splash against the wall. The countertop should incorporate a marine edge to prevent runoff onto the floor. Where appropriate to the type of planned lab work, benchtops shall be electrically non-conductive.

NIH Biosafety in Microbiological and Biomedical Laboratories, BSL 2, D.2
NIH Guidelines for Research Involving Recombinant DNA Molecules, App. GII-B-4-a

Laboratory flooring in chemical use areas and other high hazard areas (such as biological containment facilities) shall be chemically resistant and monolithic, and coved to the wall. Sealed concrete, epoxy, or sheet vinyl are suitable flooring materials. Floors in storage areas for corrosive or flammable liquids shall be liquid-tight.

A continuous floor reduces the potential of liquid absorption. Covings are recommended to facilitate cleanup. Surfaces should be as free of cracks, crevices, seams, and rough surfaces as possible to avoid surface-contamination traps.

Waxed and sealed vinyl floor tiles are discouraged.

State of California, Department of Health Services, Radiologic Health Branch, Guide for the Preparation of Applications for Medical Programs (RH 2010 4/90)
24 CCR 9 (CFC) 8003.1.7.2, 8003.14.1.2
The walls will be nonporous and painted with a durable, impervious finish in such a manner to facilitate decontamination. High-gloss paint is recommended.

UC Practice

Ports should be provided for obtaining samples of effluent from building laboratory drains.

UC Practice

Where the use of individual vacuum pumps is anticipated, vented cabinets with electrical receptacles and sound insulation should be provided. A one- to two-inch hole for the vacuum line hose from the cabinet to the countertop shall be provided.

UC Practice

Laboratory areas should be well-lit to avoid spills and trip hazards that could result in incidents or injuries.

UC Practice

NUREG 1556, Vol. 7, Appendix L
Safe Handling of Radionuclides, Section 3.3.5 (1973 ed.)
State of California, Department of Health Services, Radiologic Health Branch RH 2010 4/90