

Section 1.5: HAZARDOUS MATERIALS STORAGE**TABLE OF CONTENTS**

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A. Regulations

California Code of Regulations (“CCR”), Title 8, Section 5194, Toxics
California Code of Regulations, Title 24, Part 9, Uniform Fire Code
California Code of Regulations, Title 24, Part 2, Uniform Building Code

B. Scope

This design guide applies to the *storage* of hazardous materials. As noted in the introduction, the *use* of hazardous materials has direct bearing on the design of the laboratory; hence the research operations should be well understood in the planning phases when designing the laboratory’s hazardous materials storage.

C. Requirements

1. Laboratory design shall include spill control and secondary containment for the storage of hazardous materials liquids in accordance with the requirements of Uniform Fire Code Sections 8003.1.3.
CCR, Title 8, Section 5164

Notes:

- (a) Design must allow for substances which, when mixed, react violently, or evolve toxic vapors or gasses, or which in combination become hazardous by reason of toxicity, oxidizing power, flammability, explosibility, or other properties, to be separated from each other in storage by distance, by partition, or otherwise, so as to preclude accidental contact between them.
 - (b) Explosion control shall be provided as required by Uniform Fire Code Section 8003.1.7 for storage of non-exempt quantities of the following materials:
 1. Highly toxic flammable or toxic flammable gases when not stored in gas cabinets, exhausted enclosures or gas rooms.
 2. Combustible dusts.
 3. Class 4 oxidizers.
 4. Unclassified detonable and Class 1 organic peroxides.
 5. Pyrophoric gases.
 6. Class 3 and 4 unstable (reactive) materials.
 7. Class 2 and 3 water-reactive solids and liquids.
2. When the hazardous materials stored in a control area are not in excess of the amounts specified in the tables below, such storage shall conform to the Building Code requirements for Group B Occupancy. (*Please refer to Table 3-D, Table 3-E*)

CCR, Title 24, Part 2, Section 304
CCR, Title 24, Part 2, Section 307
CCR, Title 24, Part 2, Table 3-D, 3-E
CCR, Title 24, Part 9, Table 8001.13-B
 3. When the hazardous materials stored in a control area exceed the amounts specified in Table 3-E below, such storage shall conform to the Building Code requirements for Group H, Division 7 (“H-7”) Occupancy.

CCR, Title 24, Part 2, Section 307
CCR, Title 24, Part 2, Table 3-E
 4. When the hazardous materials stored in laboratories and similar areas used for scientific experimentation or research are not in excess of the tables below and are

not otherwise classified as Group B Occupancies, shall conform to the Building Code requirements for Group H, Division 8 (“H-8”) Occupancy. *(Please refer to Table, H-8 Occupancy Storage Exempt Amounts for Lab Suites).*

CCR, Title 24, Part 2, Section 307
CCR, Title 24, Part 2, Table 3-D.1, 3-I

(Notes: A laboratory suite is a space up to 10,000 square feet (929m²), bounded by not less than a one-hour fire-resistive occupancy separation within which the exempt amounts of hazardous materials may be stored, dispensed, handled or used. Up through the third floor and down through the first basement floor, the quantity in this table shall apply. Fourth, fifth and sixth floors and the second and third basement floor level quantity shall be reduced to 75 percent of this table. The seventh through the 10th floor and below the third basement floor level quantity shall be reduced to 50 percent of this table.)

D. **Procedures**

The following permitting and reporting procedures have design and project approval implications for any facilities project.

1. California Building Code Chemical Inventory Report Procedure As noted in this and other sections, the quantity of hazardous chemicals planned for use and storage within a project area has a direct impact on how the project is designed. This procedure should be implemented at the point that a form I is submitted. The end result of the procedure is a summarized report showing the quantities of hazard classes planned for a project compared to the California Building Limits shown in Appendix 1 of this section. Contact the Stanford fire Marshal for further information.
2. Hazardous Materials Business Plan permit

County of Santa Clara Ordinance B11
City of Palo Alto Municipal Code Chapter 17

Every building at Stanford that stores chemicals must have a Hazardous Materials Business Plan permit from the city or county of jurisdiction before chemicals can be brought into the building. The Hazardous Materials Program Division of the Environmental Health and Safety Department submits these plans in order obtain a permit. However, it is the project proponent’s responsibility to provide the necessary information to EH&S for inclusion in the plan. An annual permit fee is required based on the quantities of materials stored.

3. BAAQMD New Source exemption or permit evaluation

BAAQMD Rule 2, regulation 5

Laboratory ventilation and fume hoods and some other laboratory equipment are considered sources of air pollution. All “new or modified sources” must obtain an “authority to construct” from the Bay Area Air Quality Management District (BAAQMD) unless the source is exempt.

All teaching laboratories are categorically exempt. Research laboratory projects with less than 25,000 net square feet or 50 fume hoods that implement “good laboratory practices” are categorically exempt. Research laboratory projects with greater than 25,000 net square feet or 50 fume hoods must implement “good laboratory practices” and pass a risk screen conducted by the University and reviewed by the BAAQMD to

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be exempt. If the risk screen is not passed various mitigations must be considered. Generally even large laboratory projects pass the risk screen. Contact the Environmental Programs Division of Environmental Health and Safety for guidance and assistance.

4. Hazardous Waste Generator "permit" for "off campus" facilities

Projects within the "campus site" are covered by the University's existing Hazardous Waste Generator "permit". Projects that are "off site" must obtain a Hazardous Waste Generator "permit" before procedures that result in chemical wastes can be conducted. Contact the Hazardous Waste Division of Environmental Health and Safety for guidance and assistance.

5. Regional Water Quality Control Plant permit documentation requirements

All projects must be reviewed by the Stanford Utilities Department if a new connection is made to the sanitary sewer. The University holds a comprehensive permit for the main campus within the County of Santa Clara boundaries. Separate permits are held for the Medical School areas within the City of Palo Alto boundaries and for "off campus" facilities. The Stanford Utilities Department Environmental Quality staff must review all projects involving wet lab construction or renovation. It is the project's responsibility to provide the information necessary for obtaining the permits. Sewer connections cannot be made until the building permit documentation has been submitted to the Stanford Utilities Department Environmental Quality staff. The Stanford Utilities Environmental Quality staff will coordinate the review and submittals with the Palo Alto Regional Water Quality Control Plant, as necessary.

E. Tables

Table 3-D (Storage)

MATERIAL		Solid-lbs.(cu. ft.)	Liquid Gallons (lbs.)	Gas cu. ft.	
Combustible Liquid					
II	Base	N/A	120	N/A	
	Sprinklered (no Cabinet)	N/A	240	N/A	
	Cabinet (non-sprink.)	N/A	240	N/A	
	Cabinet, Sprinklered	N/A	480	N/A	
III-A	Base	N/A	330	N/A	
	Sprinklered (no Cabinet)	N/A	660	N/A	
	Cabinet (non-sprink.)	N/A	660	N/A	
	Cabinet, Sprinklered	N/A	1320	N/A	
III-B	Base	N/A	13200	N/A	
	Sprinklered (no Cabinet)	N/A	N.L.	N/A	
	Cabinet (non-sprink.)	N/A	26400	N/A	
	Cabinet, Sprinklered	N/A	N.L.	N/A	
Combustible Fiber					
Loose	Base	(100)	N/A	N/A	
	Sprinklered (no Cabinet)	(100)	N/A	N/A	
	Cabinet (non-sprink.)	(100)	N/A	N/A	
	Cabinet, Sprinklered	(100)	N/A	N/A	
Baled	Base	(1000)	N/A	N/A	
	Sprinklered (no Cabinet)	(1000)	N/A	N/A	
	Cabinet (non-sprink.)	(1000)	N/A	N/A	
	Cabinet, Sprinklered	(1000)	N/A	N/A	
Cryogenic	Base Sprinklered (no Cabinet)	N/A	45	N/A	
		N/A	45	N/A	
	Cabinet (non-sprink.)	N/A	45	N/A	
		N/A	45	N/A	
Explosives	Base Sprinklered (no Cabinet)	0	0	N/A	
		1	(1)	N/A	
	(see note below)	Cabinet (non-sprink.)	0	0	N/A
		Cabinet, Sprinklered	2	(2)	N/A
Flammable Solid	Base Sprinklered (no Cabinet)	125	N/A	N/A	
		250	N/A	N/A	
	Cabinet (non-sprink.)	250	N/A	N/A	
		Cabinet, Sprinklered	500	N/A	N/A
Flammable Gas	Base	N/A	15	750	
	Sprinklered (no Cabinet)	N/A	30	1500	
	Cabinet (non-sprink.)	N/A	30	1500	
	Cabinet, Sprinklered	N/A	60	3000	

Note: One pound of black sporting powder and 20 pounds of smokeless powder are permitted in either sprinkled or non-sprinkled buildings.

Table 3-D (Storage)-Continued

Flammable Liquid				
I-A	Base	N/A	30	N/A
	Sprinklered (no Cabinet)	N/A	60	N/A
	Cabinet (non-sprink.)	N/A	60	N/A
	Cabinet, Sprinklered	N/A	120	N/A
I-B	Base	N/A	60	N/A
	Sprinklered (no Cabinet)	N/A	120	N/A
	Cabinet (non-sprink.)	N/A	120	N/A
	Cabinet, Sprinklered	N/A	240	N/A
I-C	Base	N/A	90	N/A
	Sprinklered (no Cabinet)	N/A	180	N/A
	Cabinet (non-sprink.)	N/A	180	N/A
	Cabinet, Sprinklered	N/A	360	N/A
Flammable Liquid (Combination)				
	Base	N/A	120	N/A
	Sprinklered (no Cabinet)	N/A	240	N/A
	Cabinet (non-sprink.)	N/A	240	N/A
	Cabinet, Sprinklered	N/A	480	N/A
Organic Peroxide, unclassified, detonatable				
	Base	0	0	N/A
	Sprinklered (no Cabinet)	1	(1)	N/A
	Cabinet (non-sprink.)	0	0	N/A
	Cabinet, Sprinklered	2	(2)	N/A
Organic Peroxide				
I	Base	5	(5)	N/A
	Sprinklered (no Cabinet)	10	(10)	N/A
	Cabinet (non-sprink.)	10	(10)	N/A
	Cabinet, Sprinklered	20	(20)	N/A
II	Base	50	(50)	N/A
	Sprinklered (no Cabinet)	100	(100)	N/A
	Cabinet (non-sprink.)	100	(100)	N/A
	Cabinet, Sprinklered	200	(200)	N/A
III	Base	125	(125)	N/A
	Sprinklered (no Cabinet)	250	(250)	N/A
	Cabinet (non-sprink.)	250	(250)	N/A
	Cabinet, Sprinklered	500	(500)	N/A
IV	Base	500	(500)	N/A
	Sprinklered (no Cabinet)	1000	(1000)	N/A
	Cabinet (non-sprink.)	1000	(1000)	N/A
	Cabinet, Sprinklered	2000	(2000)	N/A
V	Base	N.L.	N.L.	N/A
	Sprinklered (no Cabinet)	N.L.	N.L.	N/A
	Cabinet (non-sprink.)	N.L.	N.L.	N/A
	Cabinet, Sprinklered	N.L.	N.L.	N/A

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Table 3-D (Storage)-Continued

MATERIAL		Solid-lbs.(cu. ft.)	Liquid Gallons (lbs.)	Gas cu. ft.
Oxidizer				
4	Base	0	0	N/A
	Sprinklered (no Cabinet)	1	(1)	N/A
	Cabinet (non-sprink.)	0	0	N/A
	Cabinet, Sprinklered	2	(2)	N/A
3	Base	10	(10)	N/A
	Sprinklered (no Cabinet)	20	(20)	N/A
	Cabinet (non-sprink.)	20	(20)	N/A
	Cabinet, Sprinklered	40	(40)	N/A
2	Base	250	(250)	N/A
	Sprinklered (no Cabinet)	500	(500)	N/A
	Cabinet (non-sprink.)	500	(500)	N/A
	Cabinet, Sprinklered	1000	(1000)	N/A
1	Base	4000	(4000)	N/A
	Sprinklered (no Cabinet)	8000	(8000)	N/A
	Cabinet (non-sprink.)	8000	(8000)	N/A
	Cabinet, Sprinklered	16000	(16000)	N/A
Oxidizer-Gas				
	Base	N/A	15	1500
	Sprinklered (no Cabinet)	N/A	30	3000
	Cabinet (non-sprink.)	N/A	30	3000
	Cabinet, Sprinklered	N/A	60	6000
Pyrophoric				
	Base	0	0	0
	Sprinklered (no Cabinet)	4	(4)	50
	Cabinet (non-sprink.)	0	0	0
	Cabinet, Sprinklered	8	(8)	100
Unstable Reactive				
4	Base	0	0	0
	Sprinklered (no Cabinet)	1	(1)	10
	Cabinet (non-sprink.)	0	0	0
	Cabinet, Sprinklered	2	(2)	20
3	Base	5	(5)	50
	Sprinklered (no Cabinet)	10	(10)	100
	Cabinet (non-sprink.)	10	(10)	100
	Cabinet, Sprinklered	20	(20)	200
2	Base	50	(50)	250
	Sprinklered (no Cabinet)	100	(100)	500
	Cabinet (non-sprink.)	100	(100)	500
	Cabinet, Sprinklered	200	(200)	1000
1	Base	N.L.	N.L.	750
	Sprinklered (no Cabinet)	N.L.	N.L.	1500
	Cabinet (non-sprink.)	N.L.	N.L.	1500
	Cabinet, Sprinklered	N.L.	N.L.	3000

Water Reactive				
3	Base	5	(5)	N/A
	Sprinklered (no Cabinet)	10	(10)	N/A
	Cabinet (non-sprink.)	10	(10)	N/A
	Cabinet, Sprinklered	20	(20)	N/A
2	Base	50	(50)	N/A
	Sprinklered (no Cabinet)	100	(100)	N/A
	Cabinet (non-sprink.)	100	(100)	N/A
	Cabinet, Sprinklered	200	(200)	N/A
1	Base	125	(125)	N/A
	Sprinklered (no Cabinet)	N.L.	N.L.	N/A
	Cabinet (non-sprink.)	250	(250)	N/A
	Cabinet, Sprinklered	N.L.	N.L.	N/A

Table 3-E (Storage)

MATERIAL	Solid-lbs.(cu. ft.)	Liquid Gallons (lbs.)	Gas cu. ft.
*Corrosives			
Base	5,000	500	810
Sprinklered (no Cabinet)	10,000	1,000	1620
Cabinet (non-sprink.)	10,000	1,000	1620
Cabinet, Sprinklered	20,000	2,000	3240
Highly Toxics			
Base	10	(10)	0
Sprinklered (no Cabinet)	20	(20)	0
Cabinet (non-sprink.)	20	(20)	20
Cabinet, Sprinklered	40	(40)	40
Irritants			
Base	N.L.	N.L.	**810
Sprinklered (no Cabinet)	N.L.	N.L.	**1620
Cabinet (non-sprink.)	N.L.	N.L.	**1620
Cabinet, Sprinklered	N.L.	N.L.	**3240
Sensitizers			
Base	N.L.	N.L.	**810
Sprinklered (no Cabinet)	N.L.	N.L.	**1620
Cabinet (non-sprink.)	N.L.	N.L.	**1620
Cabinet, Sprinklered	N.L.	N.L.	**3240
Other Health Hazards			
Base	N.L.	N.L.	**810
Sprinklered (no Cabinet)	N.L.	N.L.	**1620
Cabinet (non-sprink.)	N.L.	N.L.	**1620
Cabinet, Sprinklered	N.L.	N.L.	**3240

Table 3-E (Storage)-Continued

Toxics			
Base	500	(500)	810
Sprinklered (no Cabinet)	1,000	(1000)	1620
Cabinet (non-sprink.)	1,000	(1000)	1620
Cabinet, Sprinklered	2,000	(2000)	3240

*For stationary lead-acid battery systems, see the Fire Code.

**The quantities allowed in a sprinklered building are not limited when exhaust ventilation is provided in accordance with the Fire Code. See Table 8001.15-B, Footnote 12.

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H-8 Occupancy Storage Exempt Amounts per Lab Suite, 1998 California Building Code

			Solid lbs. (Cu. Ft.)	Liquid Gallons (Lbs.)	Gas Cu. Ft.
3-D1	1.1II	Combustible Liq. - II			
		In Sprinklered Buildings, not in cabinets	NA	120	NA
		In Sprinklered Buildings, within cabinets	NA	240	NA
3-D1	1.1IIIA	Combustible Liq. - IIIA			
		In Sprinklered Buildings, not in cabinets	NA	330	NA
		In Sprinklered Buildings,	NA	660	NA
3-D1	1.1IIIB	Combustible Liq. - IIIB			
		In Sprinklered Buildings, not in cabinets	NA	13200	NA
		In Sprinklered Buildings, within cabinets	NA	26400	NA
3-D1	1.2	Combustible Dust			
		In Sprinklered Buildings, not in cabinets	1	NA	NA
		In Sprinklered Buildings, within cabinets	1	NA	NA
3-D1	1.3	Loose Combustible Fiber			
		In Sprinklered Buildings, not in cabinets	(100)	NA	NA
		In Sprinklered Buildings, within cabinets	(100)	NA	NA
3-D1	1.3 Baled	Combustible Fiber			
		In Sprinklered Buildings, not in cabinets	(1000)	NA	NA
		In Sprinklered Buildings, within cabinets	(1000)	NA	NA
3-D1	1.4	Flam. Or Oxid. Cryogens			
		In Sprinklered Buildings, not in cabinets	NA	45	NA
		In Sprinklered Buildings, within cabinets	NA	45	NA
3-D1	2.1	Explosives			
		In Sprinklered Buildings, not in cabinets	1	(1)	NA
		In Sprinklered Buildings, within cabinets	2	(2)	NA

H-8 Occupancy Storage Exempt Amounts per Lab Suite, 1998 California Building Code

			Solid lbs. (Cu. Ft.)	Liquid Gallons (Lbs.)	Gas Cu. Ft.
3-D1	3.1	Flammable Solids			
		In Sprinklered Buildings, not in cabinets	125	NA	NA
		In Sprinklered Buildings, within cabinets	250	NA	NA
3-D1	3.2	Flammable Gas			
		In Sprinklered Buildings, not in cabinets	NA	15	750
		In Sprinklered Buildings, within cabinets	NA	30	1500
3-D1	3.3IA	Flammable Liquid - IA			
		In Sprinklered Buildings, not in cabinets	NA	30	NA
		In Sprinklered Buildings, within cabinets	NA	60	NA
3-D1	3.3IB	Flammable Liquid - IB			
		In Sprinklered Buildings, not in cabinets	NA	60	NA
		In Sprinklered Buildings, within cabinets	NA	120	NA
3-D1	3.3IC	Flammable Liquid - IC			
		In Sprinklered Buildings, not in cabinets	NA	90	NA
		In Sprinklered Buildings, within cabinets	NA	180	NA
3-D1	3.3IIABC	Flammable Liquid Comb.			
		In Sprinklered Buildings, not in cabinets	NA	120	NA
		In Sprinklered Buildings, within cabinets	NA	240	NA
3-D1	4.1	Org. Peroxide - Detonable			
		In Sprinklered Buildings, not in cabinets	1	(1)	NA
		In Sprinklered Buildings, within cabinets	2	(2)	NA
3-D1	4.2.I	Org. Peroxide - Class I			
		In Sprinklered Buildings, not in cabinets	5	(5)	NA
		In Sprinklered Buildings, within cabinets	10	(10)	NA
3-D1	4.2.II	Org, Peroxide - Class II			
		In Sprinklered Buildings, not in cabinets	50	(50)	NA
		In Sprinklered Buildings, within cabinets	100	(100)	NA

H-8 Occupancy Storage Exempt Amounts per Lab Suite, 1998 California Building Code

			Solid lbs. (Cu. Ft.)	Liquid Gallons (Lbs.)	Gas Cu. Ft.
3-D1	4.2.III	Org. Peroxide - Class III			
		In Sprinklered Buildings, not in cabinets	125	(125)	NA
		In Sprinklered Buildings, within cabinets	250	(250)	NA
3-D1	4.2.IV	Org. Peroxide - Class IV			
		In Sprinklered Buildings, not in cabinets	500	(500)	NA
		In Sprinklered Buildings, within cabinets	500	(500)	NA
3-D1	4.2.V	Org. Peroxide - Class V			
		In Sprinklered Buildings, not in cabinets	NL		NA
		In Sprinklered Buildings, within cabinets	NL	NL NL	NA
3-D1	4.3.1	Oxidizer (S or L) - Class 1			
		In Sprinklered Buildings, not in cabinets	1000	(1000)	NA
		In Sprinklered Buildings, within cabinets	2000	(2000)	NA
3-D1	4.3.2	Oxidizer (S or L) - Class 2			
		In Sprinklered Buildings, not in cabinets	250	(250)	NA
		In Sprinklered Buildings, within cabinets	500	(500)	NA
3-D1	4.3.3	Oxidizer (S or L) - Class 3			
		In Sprinklered Buildings, not in cabinets	10	(10)	NA
		In Sprinklered Buildings, within cabinets	20	(20)	NA
3-D1	4.3.4	Oxidizer (S or L) - Class 4			
		In Sprinklered Buildings, not in cabinets	1	(1)	NA
		In Sprinklered Buildings, within cabinets	2	(2)	NA
3-D1	4.4	Oxidizing Gas			
		In Sprinklered Buildings, not in cabinets	NA	15	1500
		In Sprinklered Buildings, within cabinets	NA	30	3000
3-D1	5.1	Pyrophoric			
		In Sprinklered Buildings, not in cabinets	4	(4)	50
		In Sprinklered Buildings, within cabinets	8	(8)	100

H-8 Occupancy Storage Exempt Amounts per Lab Suite, 1998 California Building Code

			Solid lbs. (Cu. Ft.)	Liquid Gallons (Lbs.)	Gas Cu. Ft.
3-1	TOXIC	Toxic			
		In Sprinklered Buildings, not in cabinets	500	50	0
		In Sprinklered Buildings, within cabinets	500	50	650
3-1	IRRIT	Irritant			
		In Sprinklered Buildings, not in cabinets	5000	500	650
		In Sprinklered Buildings, within cabinets	5000	500	650
3-1	SENS	Sensitizer			
		In Sprinklered Buildings, not in cabinets	5000	500	650
		In Sprinklered Buildings, within cabinets	5000	500	650
3-1	OTHER- HL	Other – Health Hazards			
		In Sprinklered Buildings, not in cabinets	5000	500	650
		In Sprinklered Buildings, within cabinets	5000	500	650

*Cabinets shall be approved storage cabinets, approved exhausted gas cabinets, exhausted enclosures or fume hoods as applicable