Biological & Agricultural Engineering Department

Laboratory & Chemical Safety Training Packet

Created by

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Chemical Lab Safety Rules

Daily Procedures

- **NO SMOKING in buildings or within 25 feet of lab or building exits.**
- **Food, drinks, and chewing gum are not advised in a chemical lab. Nothing should go into your mouth while in the lab.**
- **Wearing shorts or tight capris are discouraged when working with chemicals. COVERED SHOES ARE REQUIRED WHEN WORKING WITH CHEMICALS.**
- **Long hair should be pulled back around heat sources and moving parts.**
- **Clean up workspace in the lab.**
- **WASH YOUR HANDS before you leave, eat, or use the bathroom.**
- **No children in the lab when a hazardous chemical experiment is going on. And definitely NO UNATTENDED KIDS IN THE LAB!**
- **NO ADMITTANCE IN LAB AFTER HOURS WITHOUT SUPERVISION BY TRAINED LSU PERSONNEL (grad students, research associates, teaching lab coordinator, PI)!**

General Safety

- **Online safety training, safety consolations can be made with the LSU Environmental, Health and Safety Office (https://sites01.lsu.edu/wp/chs/)**
- **Be alert to unsafe conditions and reactions. Call attention to hazards so that corrections can be made ASAP. Contact your graduate advisor, the current lab manager, research associate, or the BAE main office.**
- **Use laboratory equipment only for its designed purposes.**
- **All equipment should be "off" when not in use unless specified.**
- **Avoid distracting or startling anyone working in the laboratory. Practical jokes or risky horseplay will not be tolerated at anytime in the lab.**
- **LABEL ALL CONTAINERS CLEARLY AND CORRECTLY!**
  - NAME of Chemicals – spelled out (Ex: Water NOT H_2O)
  - DATE MADE
  - PERSON who made the solution
  - PERCENT make up of ingredients (Ex: 70% Ethanol, 0.01M Sodium Hydroxide, 1:4 Ethyl Acetate/Water)
- **Know how to find and interpret material safety data sheets (MSDS).**
- **Know the hazardous material classification (NFPA).**
  - **Blue - Health**
  - **Red - Flammable**
  - **Yellow - Reactivity**
  - **White – Special Hazards**

- Chemical Hazard Types:
  - TOXIC -- make you sick if you breath, swallow or touch them
  - ACID – burn or damage human skin, eyes, nose or lungs and dissolve metal pH 0-4
  - CORROSIVE – dissolves metal; burn or damage human skin, eyes, nose or lungs (ex. ammonia)
  - FLAMMABLE – burn or ignite easily
  - SOLVENTS – removes protective oils or lubricants on skin and respiratory hazards
  - OXIDIZING – produce oxygen when mixed with organics or solvents to create fire hazards; also irritating to skin, eyes, nose and lungs.
  - BASE or ALKALI or CAUSTIC – burn the skin, eyes, nose, and respiratory tract
  - COMBUSTIBLE – burn above 100°F or at FLASH POINT
  - ASPHYXIANT – a non-toxic gas (like nitrogen) that replaces the oxygen in the air –> fainting or death
  - CYROGEN – at very low temperature (LN2) and will freeze skin immediately
  - CARCINOGEN – cancer risk increase
  - TERATOGEN – birth defect increase
- Beware of incompatible chemical mixtures!
- Always ADD ACID TO WATER, WATER TO BASE!
- Chemical Storage:
  - Flammable/Solvent Chemicals should be stored in established Flammable Cabinets for overnight storage.
  - Acid and Caustic Chemicals should be stored in their respectively labeled cabinets.
  - General Storage Chemicals are to be placed in the general storage of cabinets, personal cabinets, and should not be left on the workbenches for extended time periods (days).
  - Hygroscopic chemicals should be stored in desiccators or air-tight/vacuum environment.

- **Transporting Chemicals – If you must transport a chemical between buildings, place in a protective tote, box or bottle carrier.**
- **MAKE SURE GAS CYLINDERS ARE RESTRAINED TO WALL OR BENCH BRACKET. Make sure supply valves on the hood are shut off before leaving.**
- **Safety goggles should be worn:**
  - **when using hazardous chemicals/materials, especially chemicals requiring ventilation**
  - **when using the Instron, Vitrodyne and other tension or compression applying instruments at risk of creating projectiles**
  - **when working with power tools**
  - **when cutting wires or**
  - **when you feel you need to while in the lab.**
- **Pick the right glove for the job. If you don't know which to choose ask!**
- **ASK BEFORE DOING IF YOU ARE REALLY UNSURE!!!!!**
- **MAKE IT A POINT TO ONLY HANDLE DANGEROUS CHEMICALS WHEN ANOTHER TRAINED LAB PERSON IS WITHIN THE BUILDING!!!**

<u>Waste Disposal</u>

- **Broken glass should be discarded into the proper bin (box) marked for glass disposal. When glass boxes are full, seal the lid and transport to dumpster. (Team lift)**
- **NEVER DUMP HAZARDOUS OR ACID WASTE INTO SINK! Consult the MSDS and PI/research associate on how to dispose of a chemical properly.**
- **Do not dump food or drink containers into lab trash cans, even if consumed outside the lab!**
- **For BIOHAZARD wastes, ask your graduate advisor, the current manager, research associate for proper disposal method. Common disposal methods are disinfection with bleach, autoclaving in bags, or pickup by the EHS.**

Emergency Procedures

- INFORM current lab manager IMMEDIATELY of any injuries or spills.

- Know the location of:
  - Fire Extinguisher - _____
  - Eyewashes - _____
  - Shower - _____
  - First Aid Kit - _____
  - Phone - _____
  - Brooms & Dust Pan - _____

- EMERGENCY NUMBERS: 911

8-3153	BAE MAIN OFFICE
8-3231	LSU POLICE
8-6271	Student Health Center

LAB NUMBER: _____

PI/Lab Manger: _____

- For Small ACID SPILL (<25ml):
  1. Make sure you have on gloves, glasses, coats, and respirator.
  2. Shake SPILL-X-A powder to surround and then onto the spill until the liquid is covered.
  3. Allow ~5 minutes to absorb acid and cool reaction. Should form a paste like solid. Test with pH paper strip or meter to confirm neutralization.
  4. Sweep remains into dustpan and dispose into trash.

- For Small CAUSTIC SPILL (<25ml):
  5. Make sure you have on gloves, glasses, coats, and respirator.
  6. Shake SPILL-X-C powder to surround and then onto the spill until the liquid is covered.
  7. Allow ~5 minutes to absorb caustic and cool reaction. Should form a paste like solid. Test with pH paper strip or meter to confirm neutralization.
  8. Sweep remains into dustpan and dispose into trash.

- **For Small SOLVENT SPILL (<25ml):**
  9. **Make sure you have on gloves, glasses, coats, and respirator.**
  10. **Shake SPILL-X-S powder to surround and then onto the spill until the liquid is covered.**
  11. **Allow ~5 minutes to absorb solvent. Should leave a dry powdery residue.**
  12. **Sweep remains into dustpan and dispose into trash.**

- **For Small Mercury Spills (Thermometer):**
  - **Evacuate people out of the lab if they haven't been in contact with the mercury and keep the area quarantined to reduce foot traffic. Notify Anna, the research associate, and your graduate advisor.**
  - **Close the interior and exterior doors and lower the hood glass.**
  - **Use gloves, lab coat and eyeglasses.**
  - **Contain the spill. Surround or block off the mercury to keep it from spreading onto sloped or porous surfaces. Divert all mercury away from floor drains, cracks, or crevices that may impact groundwater, surface water, and soils. Pushing the drops with a sheet of paper (that you are willing to dispose of) works well to consolidate the drops.**
  - **Use an eye dropper or transfer pipet to pick up the drops of mercury and place in a container for hazardous waste disposal. The eyedropper, sheet of paper and gloves are also considered hazardous waste and must also be collected and labeled for pick up. See lab manager or Anna for details.**
  - **Open the lab to ventilation and keep people away from the lab for a minimum of one hour. (DEQ regulations)**

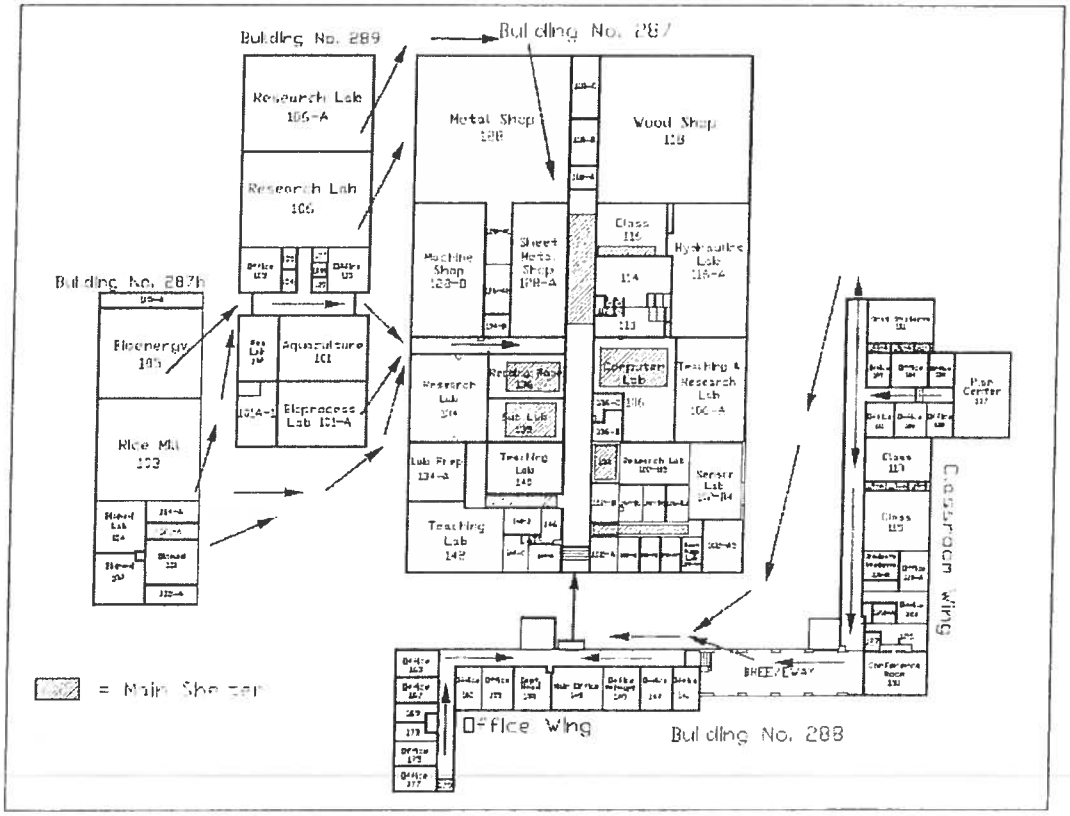
- **Needle or Sharp Object Punctures:**
  - **Have someone notify current lab manager immediately**
  - **Bleed the puncture lightly if possible and wash area thoroughly with soap and water. Alcohol or Iodine pads are not suggested to use if the sharp object was in contact with chemicals reactive to alcohol or iodine.**
  - **Dispose of sharp object in biohazard sharps container.**
  - **Seek medical assistance if need be. (Student Health Center 8-6271)**
  - **Make sure your principal investigator is notified of incident.**

- **Blood Borne Pathogens and OPIMs:**
  - **Blood Borne Pathogens (BBP) are diseases that are transported in the blood and are readily transmittable if one is exposed to infected blood, bodily fluid containing blood, or tissue. OPIMs or Other Potential Infectious Materials also pose a risk of infection in the contact of blood, tissue, or bodily fluids.**
  - **OSHA Regulatory Standard 29 CFR 1910.1030 covers rules and you can find on LSU-OES website:**

    https://sites01.lsu.edu/wp/ehs/biological-safety/
  - **Routes of exposure:**
    - **Needle sticks**
    - **Skin abrasions**
    - **Sexual interactions**
  - **RULES OF THUMB: Treat all tissue, bodily fluids (except for sweat) as potential carriers of BBPs or OPIMs! WASH HANDS FREQUENTLY!**
  - **As a minimum, gloves, protective clothing (lab coats) and eye protection should be worn at all times when there is a reasonable potential for exposure to a BBP or an OPIM. Change PPE frequently or decontaminate frequently!**
  - **Notify current lab manager IMMEDIATELY if you are exposed.**
  - **If fluids or tissues potentially containing BBPs or OPIMs are spilled:**
    - **Make sure you have your PPE on!**
    - **Contain spill with absorbent materials.**
    - **Place used absorbent materials and other contaminated disposable materials in appropriate biohazard bags (red usually) and do NOT dispose of in regular trash!**
    - **Disinfect area of spill with Germicide or 10% bleach solution.**
    - **Discard or decontaminate PPE**
  - **If expose is from a needle puncture, bleed the puncture lightly if possible and wash area thoroughly with soap and water. Alcohol pads are recommended to use if BBP can be damaged by alcohol and there is no apparent chemical interaction with the chemical that the BBP was suspended in.**
  - **Seek medical assistance if need be. (Student Health Center 8-6271)**
  - **Make sure your principal investigator is notified of incident. An incident report should be filed, and employer should be expected pay for blood testing after exposure events.**

- In case of a <u>bench top fire</u>:
  1. ALERT people in lab.
  2. ACTIVATE alarm.
  3. USE fire extinguisher keeping you between the fire and the door.

     DO NOT USE WATER ON CHEMICALS OR ELECTRONICS!
  4. GET OUT IF IN DANGER and MEET group at either FRONT LAWN of E.B. Doran or BACK FENCE by P. Taylor Hall
  5. CALL 9-911 on land-line phones or 911 on cell phone!
- In case of a large fire, fume problem or explosion:
  1. ALERT people in lab to evacuate.
  2. ACTIVATE alarm.
  3. EVACUATE closing door behind you.
  4. CALL 9-911 on land-line phones or 911 on cell phone.
  5. MEET group at either FRONT LAWN of E.B. Doran or BACK FENCE by P. Taylor Hall
- Tornado Warnings:
  - Shelter in place or take shelter in the following shaded areas:



  - Post Tornado Warning – LSU official will give the all clear to leave the shelter areas. Meet group at either FRONT LAWN of E.B. Doran or BACK FENCE by P. Taylor Hall if safe to do so.

- **Hurricane Warnings:**
  The BAE departmental facilities are not deemed safe enough to be hurricane shelters. Please evacuate PRIOR to hurricane arrival. Contact LSU information for appropriate shelter areas on campus: 800-516-6444 or www.lsu.edu.

My Copy:

I, _____, have read, understood, and will follow the aforesaid Chemical Safety Rules for the Biological and Agricultural Engineering Department at LSU.

_____

Trainee Signature Date

_____

Trained by -- Signature Date

No Food or Drink in lab!

National Fire Protection Association - NFPA

RED = FIRE

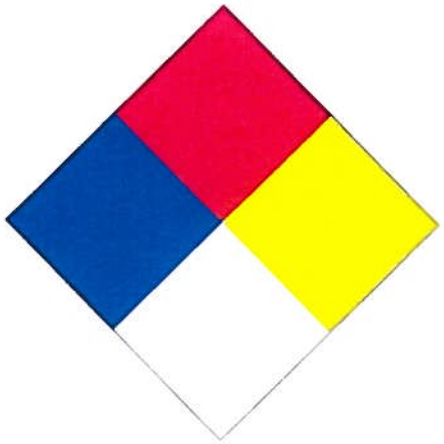
Red Background
Flammability

4 - flash point < 73 °F
3 - flash point < 100 °F
2 - flash point 100 oF - 200 °F
1 - flash point > 200 °F
0 - will not burn

BLUE = HEALTH

Blue Background
Health Hazard

4 - deadly
3 - extreme danger
2 - hazardous
1 - slightly hazardous
0 - normal material



YELLOW = EXPLOSIVE

Yellow Background
Reactivity

4 - explosive at room temp
3 - shock and heat may detonate
2 - violent reaction with water
1 - unstable if heated, not violent
0 - not reactive with water

White Background
Specific Hazard

oxidizer OX
acid ACID
alkali ALK
corrosive CORR
use NO WATER

Chemical Labels

- All Chemical Containers must be Labeled with either the original label or a new label.
- Includes Transferred Chemicals and Solutions
- New Label must include:

Chemical Name:

Hazard(s):

Date:

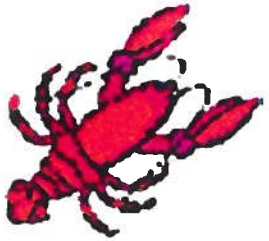
Manufacturer or Lab Owner:

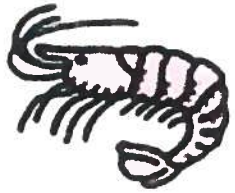
Acid (pH 0-4) into Water

Water into Base (pH10-14)

Think Alphabetically! (A goes first, B goes second)

Do NOT
Discard Any Hazardous Chemicals into the Sink





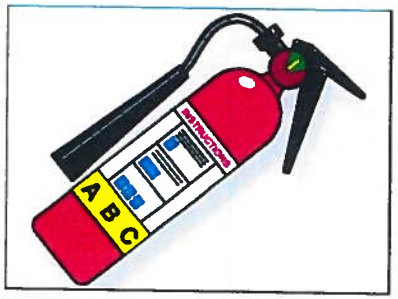
Lab Bench FIRE!

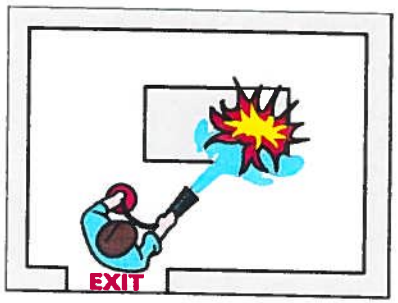
1. Alert people in lab!

2. Activate Alarm!

3. Use Fire Extinguisher!

DO NOT USE WATER ON CHEMICALS!!





4. GET OUT IF IN DANGER and Call 911 !!

MAJOR FIRE!

Alert People in Lab to Evacuate

Activate Alarm

GET OUT!! **DO NOT TRY TO BE A HERO!**

Close Lab Doors Behind You

Call 911

Meet Up with Your Group Outside!

EMERGENCY ASSISTANCE

911

LSU POLICE

8-3231

STUDENT HEALTH CENTER

8-6271

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When in doubt ASK!!

It is a lot more fun than a trip to the Emergency room,

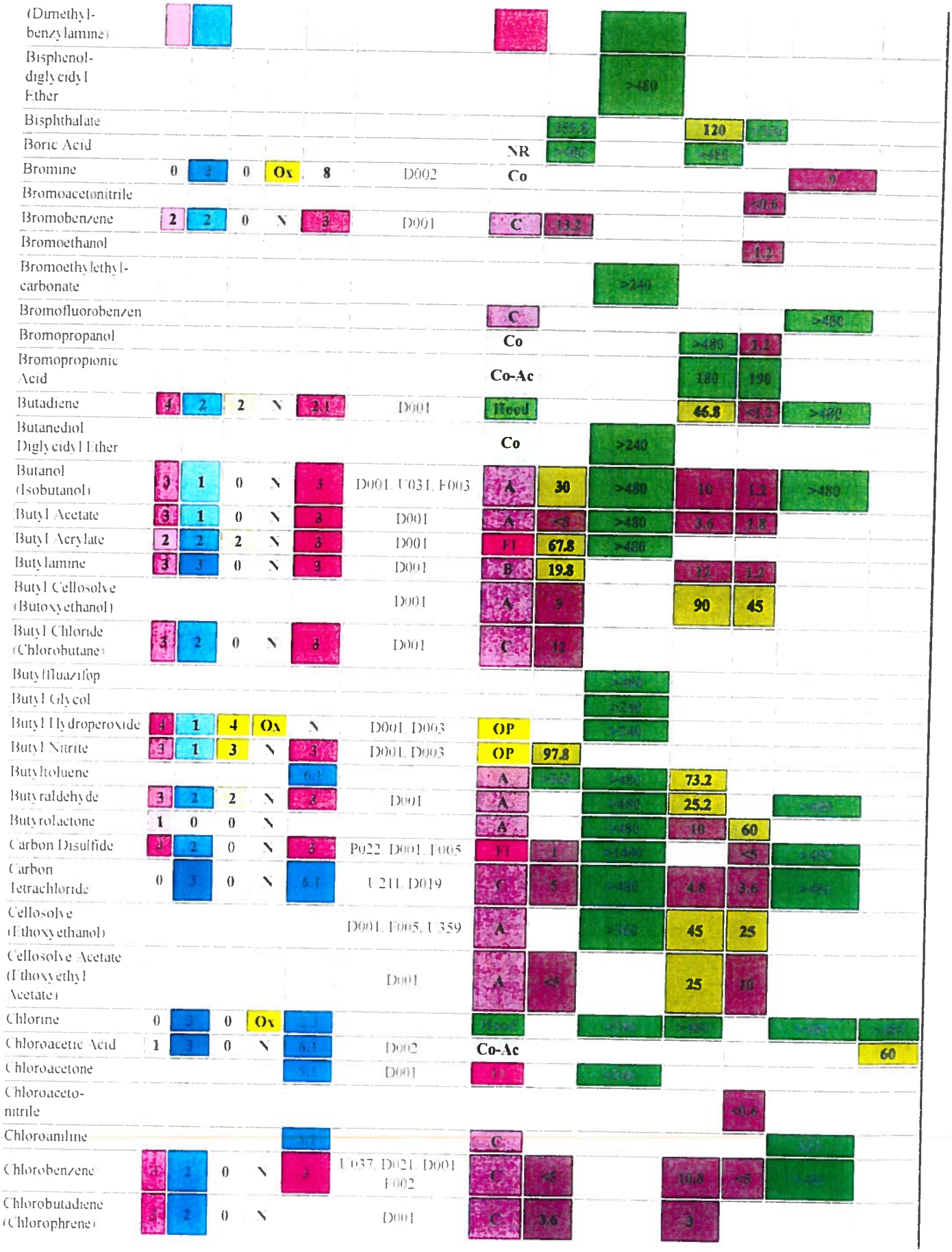
I promise!

Oklahoma State University Chemical Guide A-X

Breakthrough time, totally immersed at room temperature, in minutes
<14.9 minutes
>15 but <179.9 minutes
>180 minutes

Chemical	NFPA 704 Fire	NFPA 704 Health	NFPA 704 Reactivity	NFPA 704 Other	DOT Class	Waste Codes	Category	Gloves: Nitrile	Gloves: 4-H / Silver Shield	Gloves: Neoprene	Gloves: Latex	Suits: Tychem (TM) 9400	Suits: Saranex
Acetaldehyde	4	2	2	N	3	U001, D001	A	<0.6	>360	10.2	2		
Acetic Acid	2	2	0	N	8	D002	Co-Ac	8	>480	360	21	180	>4000.2
Acetic Anhydride	2	2	1	N	8	D002	Co		>480	210	3	>480	
Acetone	3	1	0		3	U002, F003, D001	A	2	>1440	2.4	2.4	>480	33
Acetonitrile (Methyl Cyanide)	3	3	0	N	3	D001	B	<6	>1440	<10.8	<0.6	>480	>480
Acetophenone	2	1	0	N		U004	A		>480				
Acetyl Chloride	3	3	2	WR	3	U006, D001, D002, D003	Fl					160	37.2
Acrolein	3	3	3	N	6.1	P003, D001	Fl	4.2	>480			>480	
Acrylamide	2	3	2	N	6.1	U007	P		>240				
Acrylic Acid	2	3	2	N	8	U008, D001	Fl		>240	70	80	79	
Acrylonitrile	3	4	2	N	3	U009, D001	Fl	<6	>480			>480	22.8
Aldehyde					3	D001	A	4	>360				
Allyl Alcohol	3	3	1	N	6.1	P005	Fl			94.8		>480	>480
Allylamine	3	3	1	N	6.1	D001	Fl		15		<1.2		
Allyl Chloride	3	3	1	N	3	D001	Fl		>240				
Ammonia	1	3	0	N	2.3	D002	Co-Ba		110			35	
Ammonium Fluoride					6.1		Co	>360	>240	>360	>360		
Ammonium Hydroxide					2.3	D002	Co-Ba	360		360	90	160	
Amyl Acetate (Isoamyl Acetate)	3	1	0	N	3	D001	A	<6		6.4	6.4	>480	
Amyl Alcohol	3	1	0	N	3	D001	A	30		321	7.2		
Amyl Nitrile	2	2	0	Ox	3			175.8		46.8			
Aniline	2	3	0	N	6.1	U012	B	18	>1440	30	25	>480	>480
Benomyl						U271	P		>240				
Benzaldehyde	2	2	0	N	9		A	<6	>480	39	10		
Benzene	3	2	0	N	3	U019, D001, F005, D018	A	4.2	480	1.2	0.6	>480	10.2
Benzenesulfonic Acid							NR		>240	>1200			
Benzethonium Chloride							NR			>480	>480		
Benzonitrile (Phenyl Cyanide)					6.1		NR				<0.6	>480	
Benzophenone Tetracarboxylic Dianhydride							NR		>240				
Benzoyl Chloride	2	3	2	WR	8		Fl			15			
Benzyl Alcohol	1	2	0	N			A		>480				
Benzyl Cyanide	1	2	0	N			Fl		>240				
Benzyl-dimethylamine	2	2	0	N	8		Fl		>240				

4 m.l 4 m.l 22 m.l 3 m.l


(Dimethyl-benzylamine)
Bisphenol-diglycidyl Ether
Bisphthalate
Boric Acid
Bromine
Bromoacetonitrile
Bromobenzene
Bromoethanol
Bromoethylethyl-carbonate
Bromofluorobenzen
Bromopropanol
Bromopropionic Acid
Butadiene
Butanediol Diglycidyl Ether
Butanol (Isobutanol)
Butyl Acetate
Butyl Acrylate
Butylamine
Butyl Cellosolve (Butoxyethanol)
Butyl Chloride (Chlorobutane)
Butylfluazifop
Butyl Glycol
Butyl Hydroperoxide
Butyl Nitrite
Butyltoluene
Butyraldehyde
Butyrolactone
Carbon Disulfide
Carbon Tetrachloride
Cellosolve (Ethoxyethanol)
Cellosolve Acetate (Ethoxyethyl Acetate)
Chlorine
Chloroacetic Acid
Chloroacetone
Chloroaceto-nitrile
Chloroaniline
Chlorobenzene
Chlorobutadiene (Chlorophrene)
D002
D001
D001, U031, F003
D001
D001
D001
D001
D001
D001, D003
D001, D003
D001
D001
P022, D001, F005
U 211, D019
D001, F005, U 359
D001
D002
D001
U037, D021, D001 F002
D001
NR
Co
C
Co
Co-Ac
Reed
Co
A
A
A
FI
B
A
C
OP
OP
A
A
A
A
FI
C
A
A
Co-Ac
C
C
C
120
46.8
30
67.8
19.8
90
45
73.2
25.2
10
60
4.8
3.6
45
25
25
10
60
10.8
3
19

Chloroethanol (Ethylene Chlorohydrin)	2	3	0	N	6.1	D001	Hood		>240	298.8		>480	
Chloroform	0	2	0	N	6.1	U044, D022	C	2.4	10	0.6	0.6	>480	
Chloromethyl Methyl Ether						U046	FI					305	
Chloronaphthalene	1	1	0	N		U047	P	174	>480		<5		
Chloronitropropane											1.5		
Chloropropanol											<0.6		
Chloropropene	4	2	2	N	3	D001	C		>240				
Chlorosulfonic Acid	0	3	2	WR	8		NR						349.8
Chlorotoluene (Benzyl Chloride)	2	2	1	N	3	P028	FI	15	>480			>480	
Chromic Acid	0	3	1	Ox	8	D001, D002, D007	Ox	240	>240	75	70.2		
Citric Acid						N	Keep			>360	>360		
Cleaning Agent	2	0	0	N					>480				
Copper										>360			
Creosote	2	2	0	N		U051	FI		>240	270			
Cresol	2	3	0	N	6.1	U052	FI	<5	>240	>60	13.8		>180
Crotonaldehyde	3	3	2	N	6.1	D001, U053	FI			21			
Cyclohexane	3	1	0	N	3	U056, D001	A	360	>480	6	1.8	>480	
Cyclohexanol	2	1	0	N			A	360	>480	150	10		
Cyclohexanone	2	1	0	N	3	U051, D001, F003	A	<5	>480				
Cyclohexylamine	3	2	0	N	8	D001	B		>240	36	1.2		
Cyclopentanone	3	2	0	N	3	D001	A		>240				
Cypermethrin							NR		>240				
Decanal (Decyl Aldehyde)							NR			240			>480
Deep Woods Off (R)									>240				
Diacetone Alcohol (Hydroxy Methyl Pentanone)	2	1	0	N	3	D001	A		>240	300	15		
Diaminodiphenyl-methane (Methylene-dianiline)					6.1		NR		>1440			>480	
Diamylamine	2	3	0	N		D001	B	>480		129			
Dibromoethane (Ethylene Dibromide)	0	3	0	N	6.1	U067	FI	27	>480	4.8	<1.2	>480	7.8
Dibutylamine	2	3	0	N		D001	B	>480					
Dibutyl Ether (Butyl Ether)	3	2	1	N	3	D001	A		>480			396	
Dibutyl Phthalate (Butyl Phthalate)							A	30	>480	120	16.8	>480	
Dichloroaniline	1	3	0	N	6.1		NR					216	
Dichlorobenzene	2	2	0	N	6.1	D027, U072, F002, U070, U071	P	<5	>240				
Dichlorobutene					8	D001	C	2.4	>240	10.2			>1440
Dichloroethane (Ethylene Dichloride)					3	D028, U076, D001, U077	C	3.4	144	1.8	0.6	>480	
Dichloroethylene	3	2	2	N	3	D001, D029, U078	C	9.2	>420				
Dichloromethane					6.1	U080, F002	C		>480			318	

Dichloropropene	3	3	0	N	3	D001	C					>480	
Diesel					3	D001	A	>240				195	
Diethanolamine							B	>480	>240	>480			
Diethylacetamide							NR		>480				
Diethylamine	3	3	0	N	3	D001	B	<5	60		<5	>480	43.8
Diethylamino-ethanol					3	D001	B	>480					
Diethylenedioxide (Dioxane)	3	2	1	N	3	D001, U108	A	<5	>480	6.4	2.4		49.6
Diethylenetriamine	1	3	0	N	8		B		>240	>480			
Diethyl-nitrosoamine							NR		>240				
Diethylphthalate						U088	A		>240				
Diisobutylamine					3	D001	B	>480		52.2			
Diisobutyl Ketone					3	D001	A	120	>360	15	15		
Diisopropylamine	3	3	0	N	3	D001	B	195		40.2			
Dimercapto-thiodiazole									>240				
Dimethylacetamide							B	<5	>240		15	>480	64.2
Dimethylamine	4	3	0	N	2.1	D001	Hood			>480	1.8		
Dimethylamino-propylamine						D001	B			28.8	0.6		
Dimethylaniline					6.1		B		>240				
Dimethylbutylamine					3			81					
Dimethylcyclo-hexylamine					8	D001	B		>480				
Dimethyl-ethanolamine (Dimethyl-aminoethanol)					8	D001	B	>480	350	235.2	4.8		
Dimethylethylamine									9				
Dimethylformamide					3	D001	B	<5	>1440	1.2	25	226	
Dimethylhydrazine	3	3	1	N	6.1	D001, U099, U098	FI	6		37.8	3.6	>480	
Dimethylmercury									60		0.25		
Dimethyl Sulfate	2	4	0	N		U103	FI		>240			>480	
Dimethylsulfoxide						U103	FI	28.2	>480	60	79.8	314	
Dimethyl-vinylchloride								9					
Dinol									>240				
Dinoseb						P020	P		>240				
Dioctylphthalate						U107	A			>360	<5		
Dipentene					3	D001	A		>480				
Diphenyl-cyclopropenone									>240				
Diphenylmethane-Diisocyanate					6.1		NR					>480	
Diphthalate									[illegible]				
Diquat Dibromide							NR		>240				
Divinylbenzene	2	2	2	N			FI	60	>480				
Dodecane							A		>480				
Dynasylan									>480				
Epichlorohydrin	3	3	2	N	6.1	U041, D001	FI	19.8	>240	15	<1.2	>480	57
Epoxybutane (Butylene Oxide)					3	D001	A			4.2			

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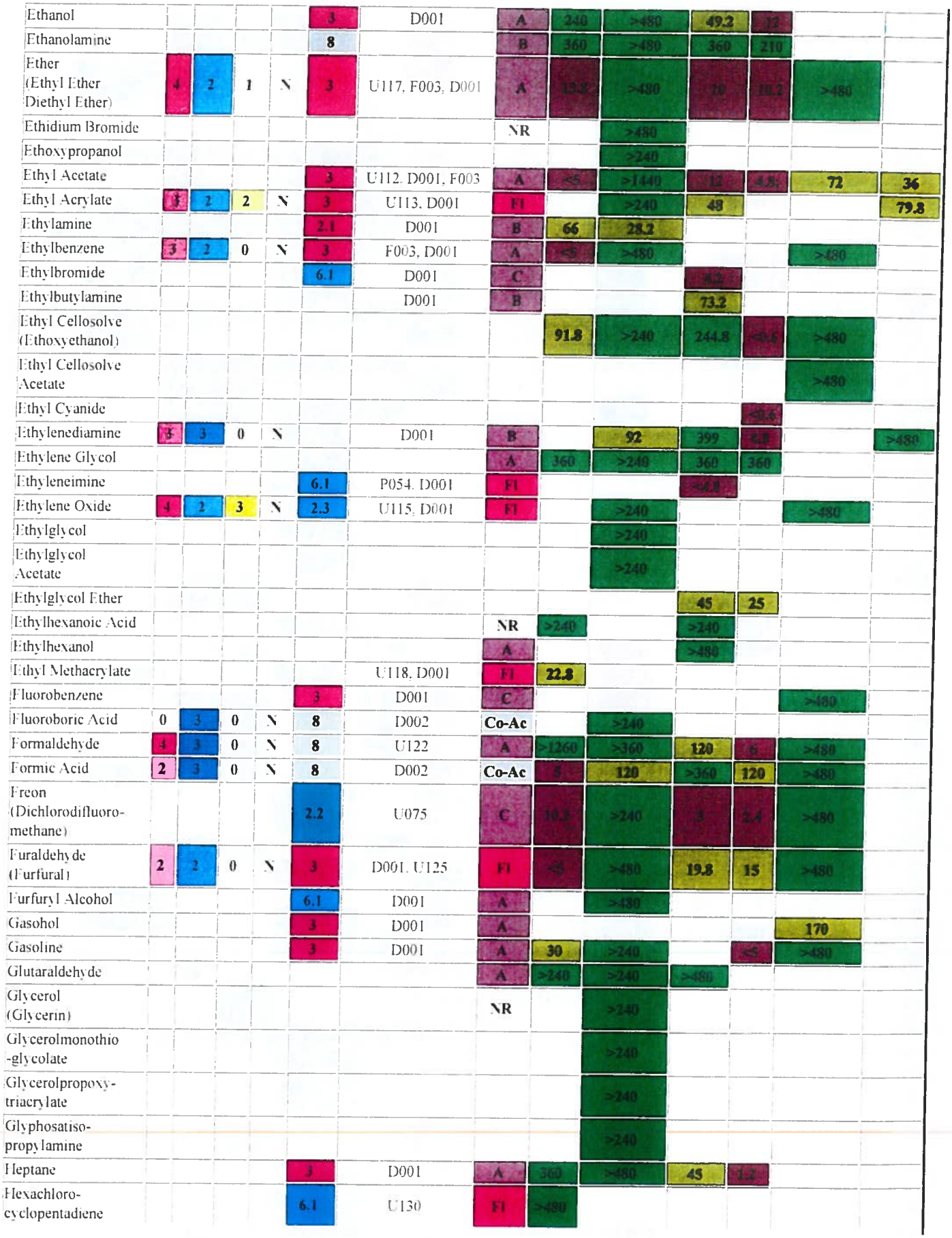

Ethanol					3	D001	A	240	>480	49.2	12				
Ethanolamine					8		B	360	>480	360	210				
Ether (Ethyl Ether Diethyl Ether)	4	2	1	N	3	U117, F003, D001	A	13.2	>480	70	10.2	>480			
Ethidium Bromide							NR		>480						
Ethoxypropanol									>240						
Ethyl Acetate					3	U112, D001, F003	A	<5	>1440	12	4.8	72	36		
Ethyl Acrylate	3	2	2	N	3	U113, D001	FI		>240	48			79.8		
Ethylamine					2.1	D001	B	66	28.2						
Ethylbenzene	3	2	0	N	3	F003, D001	A	<5	>480			>480			
Ethylbromide					6.1	D001	C			4.2					
Ethylbutylamine						D001	B			73.2					
Ethyl Cellosolve (Ethoxyethanol)								91.8	>240	244.8	<0.6	>480			
Ethyl Cellosolve Acetate												>480			
Ethyl Cyanide											<0.6				
Ethylenediamine	3	3	0	N		D001	B		92	399	4.8		>480		
Ethylene Glycol							A	360	>240	360	360				
Ethyleneimine					6.1	P054, D001	FI			<2.8					
Ethylene Oxide	4	2	3	N	2.3	U115, D001	FI		>240			>480			
Ethylglycol									>240						
Ethylglycol Acetate									>240						
Ethylglycol Ether										45	25				
Ethylhexanoic Acid							NR	>240		>240					
Ethylhexanol							A			>480					
Ethyl Methacrylate						U118, D001	FI	22.8							
Fluorobenzene					3	D001	C					>480			
Fluoroboric Acid	0	3	0	N	8	D002	Co-Ac		>240						
Formaldehyde	4	3	0	N	8	U122	A	>1260	>360	120	6	>480			
Formic Acid	2	3	0	N	8	D002	Co-Ac	5	120	>360	120	>480			
Freon (Dichlorodifluoro-methane)					2.2	U075	C	10.3	>240	3	2.4	>480			
Furaldehyde (Furfural)	2	2	0	N	3	D001, U125	FI	<5	>480	19.8	15	>480			
Furfuryl Alcohol					6.1	D001	A		>480						
Gasohol					3	D001	A					170			
Gasoline					3	D001	A	30	>240		<5	>480			
Glutaraldehyde							A	>240	>240	>480					
Glycerol (Glycerin)							NR		>240						
Glycerolmonothio -glycolate									>240						
Glycerolpropoxy-triacrylate									>240						
Glyphosatiso-propylamine									>240						
Heptane					3	D001	A	360	>480	45	1.2				
Hexachloro-cyclopentadiene					6.1	U130	FI	>480							

Hexamethyl-disilazane	3	2	1	N		D001	Fl		>240	50	15		
Hexamethylene Diisocyanate					6.1		H					>480	
Hexamethyl-phosphoramide							NR	90					
Hexane					3	D001	A	78.6	>1440	3.6	4.8	>480	
Hydraulic Fluid						N	MP	>240	>480		<5		
Hydrazine	3	3	3	N	8	U133, D001	Fl	>480	126	>960	150	>480	
Hydrochloric Acid (Muriatic Acid)					8	D002	Co-Ac	360	>360	360	390	>480	300
Hydrocyanic Acid (Hydrogen Cyanide)	4	4	2	N	6.1	P063	Hood		>240			94	
Hydrofluoric Acid					8	U134, D002	Co-Ac	120	15	60	90	67	190.2
Hydrogen Chloride	0	3	0	N	2.3	D002	Hood					>480	
Hydrogen Peroxide	0	2	3	Ox	5.1	D001	Ox	>360	>240	4.8	>480		
Hydrogen Phosphide						P096	Hood			10.2	30		
Hydroquinone					6.1		NR	>360	>240	>360	>360		
Hydroxyethyl-acrylate									>240				
Hydroxyethyl-trimethylammonium Hydroxide									>240				
Hydro-xymethacrylate									>240				
Imino-bispropylamine							B			>480	6		
Isophorone	2	2	0	N					>240				
Isoprene	4	2	2	N	3			52.2		16.2			
Jet Fuel					3	D001	A		>240			>480	
Kerosene					3	D001	A	>360		>360	<5		
Lactic Acid						D002	Co-Ac	>360		>360			
Lauric Acid							NR	>360		>360	>360		
Limonene						D001	A			64.8		>480	
Lubrication Oil						N	MP		>240				
Malathion							NR		>240				
Maleic Acid	1	3	1	N	8		NR	>360		>360	>360		
Mercaptoethanol						D001	Hood		>240				
Mercuric Chloride					6.1	D009	P-Hg					>480	
Mercury					8	U151, D009	P-Hg		>480			>480	
Methacrylic Acid	2	3	2	N	8		NR	10.2	>480				
Methacrylonitrile					3	U152, D001	H	7			<1.2		
Methanesulfonic Acid						D002	Co-Ac			>240			
Methanol					3	D001, F003, U154	A	10.8	>480	15	1.8	92	>480
Methoxyethanol									>240				
Methoxyethyl Acetate									>240				
Methoxymethyl-pentanone					3		A			99			
Methoxypropanol					3	D001	A		>240				
Methoxypropyl-acetate									>240				
Methyl acetate					3	D001	A		>480		<1.2		

Methyl Acrylate	3	2	2	N	3	D001	Fl				15	12			
Methylamine	4	3	0	N	2.1	D001	Hood	>480	114	270	25.2	105			
Methylamino-propylamine										63	3				
Methyl Bromide	1	3	0	N	2.3	U029	Hood				<5		>480		
Methyl Butyl Ether					3	D001	A	5	>480		<5	>480			
Methyl Cellosolve						D001	A	40.2	>240	25	20				
Methyl Chloride	4	2	0	N	2.1	U045, D001	C				8.6	>480			
Methyl Chloroacetate					6.1		C						>480		
Methylenabls												>480			
Methylenebis									>240						
Methylenebis Diphenylmethane Diisocyanate							NR		>480						
Methylene Dichloride (Methylene Chloride)	1	2	0	N		F002, U080	C	3.8	114	0.6					
Methylethanolamine							B			>480					
Methyl Ethyl Ketone					3	D035, D001, F005, U159		3.8	>1440	2.4	1.2	>480	9		
Methyl Ethyl Ketone Peroxide					N	U160, D001, D003	OP			>240	45				
Methylethyl-ketoxime												>480			
Methyl Glycol Ether										25	20				
Methylhexanone (Methyl Isoamyl Ketone)					3	D001	A	<5	>480			120			
Methyl Iodide					6.1		C	0.6	123	0.6	1.2				
Methyl Isobutyl Ketone					3	U061, D001, F003	A	12		15	6				
Methyl Isocyanate					6.1	P064, D001	Fl			0.6	0.6	>480			
Methyl Mercaptan					2.3	U153, D001	Hood					>480			
Methyl Methacrylate	3	2	2	N	3	D001, U062	Fl	<5	>480		<1.2	>480			
Methyl Norbornene Dicarboxylic Anhydride (Memtetrahydro-phthalic Anhydride)					8		NR		>240						
Methyl Pentyl Ketone									>240						
Methylpyrrolidone							B	<5	>240		75				
Methyltrichloro-silane	3	3	2	WR	3	D001	Fl		>240						
Mineral Oil						N	MP	>240							
Mineral Spirits						D001	A	>360		90	<5	>480	>10.2		
Monoethanolamine	2	2	0	N	8			360	>480	360	50				
Monoethylamine	4	3	0	N	2.1			66	28.2						
Morpholine	3	2	0	N	3	D002	B	<5	>480		20				
Mustard Gas (Dichlorodiethyl Sulfide)							P		>240						
Naphathalene	2	2	0	N	4.1	U165	Fl		>240						

Naphtha					3	D001	A	>360	>480	15	<5									
Naphthylamine					6.1	U167, U168	P		>240											
Nickel										>360										
Nicotine					6.1	P075	P		>240			>480								
Ninhydrin							NR		>240											
Nitric Acid	0	3	1	Ox	8	D002, D001	Co-Ac	6	34.8	79.8	<5	>480	106.8							
Nitrobenzene	2	3	1	N	6.1	F004, D036, U169	B	<5	>1440	40.2	4.8	>480								
Nitrodiphenylamine							NR		>240											
Nitroethane	3	1	3	N	3	D001	B		>480	49.2	1.8									
Nitrogen Tetroxide					2.3	D002	Ox					>480	24							
Nitroglycerol (Nitroglycerin)					1.1	P081, D003	Ox		>240											
Nitroglycol									>240											
Nitrohydrochloric Acid (Aqua Regia)					8	D002	Co-Ac			45	<5									
Nitromethane	3	1	4	N	3	D001	B	30	>480	60	<0.2	>480								
Nitropropane	3	1	2	N	3	U171, D001	B	12	>480	6	1.8									
Nonylphenol							NR			>1200										
Octane (Isooctane)					3	D001	A	360		60	<5									
Octanol							A	360		360	30									
Oleic Acid							NR	>360		60	30									
Ortho Toluidin									>480											
Osmium Tetroxide					6.1	P087	Hydr													
Oxalic Acid	1	2	0	N			NR	360	>480	360	360	>480								
Palmitic Acid							NR	30		>360	4.8									
Parathion					6.1	P089	P		>240											
Pentachlorophenol	0	3	0	N	6.1	U027	P	>360	>480	6	<5									
Pentane					3	D001	A	1.8	>480	6.6	0.6									
Pentylalcohol									176											
Perchloric Acid	0	3	3	Ox	5.1	D001, D002	Ox	>360	>240	>360	>360									
Perchloroethylene					6.1				>480		<5									
Petroleum Ether						D001	A	>360	>480											
Phenol	2	3	0	N	6.1	U188	A	31.8	130	40.2	16.2	>480								
Phenolphthalein							NR	>360		>480	>480									
Phosphoric Acid	0	3	0	N	8	D002	Co-Ac	>360	>240	>360	>360	>480	>480							
Phosphorus Oxychloride	0	3	2	W	8	D002, D003	Co		>240	<0.6			50.4							
Phosphorus Trichloride	0	3	2	W	8	D002, D003	Co					>480								
Phthalic Acid					8		NR		>360											
Picoly Chloride Hydrochloride									>240											
Picric Acid	2	3	4	N	1.1	D001	P			150	<5									
Polychlorinated Biphenyl	1	2	0	N	9	PCB, PCB1, PCB2	P		>480	>480	4.8	>480	120							
Polyethylene Glycol							NR		>480											
Polyol							NR		>480											
Potassium Acetate							NR					>360								
Potassium Chromate						D001, D007	Ox					>480								
Potassium Hydroxide	0	3	1	N	8	D002	Co-Ba	>360	>360	>360	79.8									

Potassium Permanganate					5.1	D001	Ox		>240					
Promethazine Hydrochloride							NR	>480						
Propanol (Isopropanol)					3	D001	A	30	>480	90	72			
Propanolamine (Monoiso-propanolamine)										>480	30			
Propiolactone											19.8			
Propionaldehyde	3	2	2	N	3	D001	A			12				
Propiophenone							A		>240					
Propylacetate					3	D001	A	16.8	>480		4.8			
Propylamine	3	3	0	N	3	U194, D001	B			13.8				
Propylenediamine (Diaminopropane)	3	2	0	N		D001	B			271.9	8			
Propyleneglycol							NR		>240		>360			
Propyleneglycol-monoethylether-acetate									>240					
Propylene Oxide	2	4	2	N	3	D001	A		>240		<0.6	>480		
Propyl Ether (Isopropyl Ether)								>60		42.6	3.6			
Propylmethacrylate								60						
Propyl Nitrate	3	2	3	Ox		D001, D003	OP		>240					
Propyzamide									>240					
Pyridine	3	2	0	N	3	U196, F005, D038	B	5.4	>480	1.8	2.4			
Pyrrolidine					3	D001	B					407		
Quinoline					6.1		NR		>240					
Roundup (R) (Glycophase)							NR		>240					
Rubber Solvent					3					30	<5			
Silicon Etch										>360	<5			
Silver Cyanide					6.1	D003, D011, P104	P-Cn		>240					
Sodium Cyanide	0	3	0	N	6.1	D003, P106	P-Cn					>480		
Sodium Hydroxide	0	3	1	N	8	D002	Co-Ba	360	>480	360	360	>480	>480	
Sodium Hypochlorite					5.1	D001	Ox	360	>240	360	360			
Stoddard Solvent	2	0	0	N		D001	A	>240		180	<5	>480		
Stripper									132					
Styrene	3	2	2	N	3	D001	FI	30	>1440	32	10.2	>480	43.2	
Sulfur Dioxide	0	3	0	N	2.3	D001	Ox					>480		
Sulfuric Acid (Oleum)	0	3	2	WR	8	D002	Co-Ac	0	120	70.2	<5	>480	330	
Tannic Acid							NR	>360		>360	>360			
Tetrachloroethane					6.1	U208, U209	C	13.2		4.8	1.8			
Tetrachloro-ethylene	0	2	0	N	6.1	U210, F002, D039	C	5	>1440	5	<1.2	>480	2.8	
Tetraethylene-pentamine					8		NR			>480	106			
Tetraethylortho-silicate					3				>480					
Tetrafluoroboric Acid									>240					

2.6

Tetrafluoroethylene	4	2	3	N	2.1	D001	Hood			>480			
Tetrahydrofuran	3	2	1	N	3	D001, U213	A	0.6	>480	1.2	1.2	>480	1.8
Tetramethylammonium Hydroxide					8		NR		>240				
Tetramethylenediamine							NR	108					
Thinner						D001	A		>240				
Thioglycolic Acid (Mercaptoacetic Acid)					8	D002	Hood		>240				
Thiophene					3	D001	Hood		>360				
Thiourea						U219	P		>240				
Toluene	3	2	0	N	3	D001, F005, U220	A	<5	>1440	1.2	0.6	>480	<4.8
Toluene Diisocyanate	1	3	2	N	6.1	U223	P	227	>480		7	>480	
Toluenesulfonic Acid					8		NR			>480			
Toluidine	2	3	0	N	6.1	U328, U053	P					>480	
Transmission Oil						N	MP		>240				
Triallylamine					3	D001	B	>480		63			
Tributylphosphate							NR		>240				
Trichloroacetonitrile							C			67.2			
Trichlorobenzene					6.1		C	<5		60	4.8	>480	60
Trichloroethane	1	3	0	N	6.1	U227, F002, U226	C	1.8	>480	2.4	1.2	>480	
Trichloroethanol							C					>480	19.2
Trichloroethylene	2	2	0	N	6.1	U228, D040, F002	C	<5	>1440	1.8	0.6	>480	<1.2
Trichloropropane							C	21					
Tricresylphosphate					6.1		NR	60		>360?	45		
Triethanolamine							B	>480	>240	>360?	60		
Triethylamine	3	2	0	N	3	U404, D001	B	>480		37.2			
Triethylene Diamine							NR		>240				
Triethylene Tetramine					8		B	>480	>240	>480			
Trifluoroacetic Acid					8	D002	Co-Ac		>240				
Trifluoroethanol								7.2		[illegible]	[illegible]	>480	
Tripropylamine					3	D001	B	>480		>480			
Tripropylene Glycol Diacrylate									>240				
Turpentine					3	D001	A	30			<5		
Valeronitrile										40.8	1.8		
Vinyl Acetate	1	2	2	N	3	D001	[illegible]		>480			>480	
Vinyl Chloride	4	2	2	N	2.1	D001, D043	Hood	[illegible]	>480			>480	
Vinylcyclohexane						D001	[illegible]	[illegible]					
Vinylidenefluoride						D001	Hood			<1.2	<1.2		
Vinylpyrrolidone							NR		>240				
Xylene	3	[illegible]	0	N	3	U239, D001, F003	A	<5	>1440	3	1.2	>480	
								<14.9 minutes					
								>15 but <179.9 minutes					
								>180 minutes					

DOT Classification		Category	
Explosive 1.1	1.1	Mixed CHO Compounds	A
Explosive 1.2	1.2	Acid - Heavy Metal	Ac-HM
Explosive 1.3	1.3	Nitrogenated Hydrocarbons	B
Explosive 1.4	1.4	Halogenated Hydrocarbons	C
Explosive 1.5	1.5	Corrosive	Co
Explosive 1.6	1.6	Corrosive - Acidic	Co-Ac
Flammable Gas	2.1	Corrosive - Basic	Co-Ba
Nonflammable Gas	2.2	Explosive	Ex
Poison Gas Toxic Gas	2.3	Flammable	Fl
Flammable Liquid	3	Keep under Fume Hood	Hood
Flammable Solid	4.1	Keep for other uses	Keep
Spontaneously Combustible	4.2	Motor Pool Recycling	MP
Dangerous when Wet	4.3	None	N
Oxidizer	5.1	Non-Regulated	NR
Organic Peroxide	5.2	Organic Peroxide	OP
Poison Toxic	6.1	Oxidizer	Ox
Infectious Substance	6.2	Poison	P
Radioactive Material	7	Poison - Cyanide	P - Cn
Corrosive Material	8	Poison - Mercury	P - Hg
Misc Hazardous Materials	9	Poison - Heavy Metal	P - HM
		Water Reactive	WR

The permeation times are based on the lowest common denominator of the following sources. They are intended only as a guide. The suitability of each product must be determined by the user through their own testing. Neither this guide nor any statement made by Oklahoma State University should be construed as a warranty or that any product is fit for a particular purpose.

4H® Chemical Protection Guide, Nov '97
ACGIH Guidelines for the Selection of Chemical Protective Clothing, 3rd ed., Feb '87
Ansell Edmont® Chemical Resistance Guide, 5th ed. '90
Best® Intermittent Chemical Exposure Guide for Best® N-Dex Nitrile Gloves, '94
Driver's Guide to Hazardous Materials, Am. Trucking Association, '96
DuPont® TyFax Data Service TyChem 9400, May '94
Fire Protection Guide on Hazardous Materials, 10th ed., '91
Fisher Scientific Catalogue, '95 '96
Hazardous Materials 151, J.J. Keller&Assoc., '92
Sorensen, Brenda, Sr. Haz-Mat Tech, OSU-EHS
http://www.des.umd.edu/ls/gloves.html, Oct. '97
http://www.chs.okstate.edu/links/ntsdr.htm, Nov. '97

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Contact EHS

Last Update 11/20/97

OHIO STATE THE OHIO STATE UNIVERSITY College of Biological Sciences
Chemical Safety

Chemical Safety

PARTIAL LIST OF INCOMPATIBLE CHEMICALS
(REACTIVE HAZARDS)

TOO OFTEN CHEMICALS ARE STORED ALPHABETICALLY. THIS CAN LEAD TO EXPLOSIVE OR TOXIC ALPHABET SOUP.
SUBSTANCES IN THE LEFT COLUMN SHOULD BE STORED AND HANDLED SO THAT THEY CANNOT ACCIDENTALLY
CONTACT CORRESPONDING SUBSTANCES IN THE RIGHT COLUMN UNDER UNCONTROLLED CONDITIONS.

SOURCE: Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Research Council, Washington, D.C., 1995.

CHEMICAL	INCOMPATIBILITY
Acetic acid	Chromic acid, nitric acid, hydroxyl compounds, ethylene glycol, perchloricacid, peroxides, permanganates
Acetone	Concentrated nitric and sulfuric acid mixtures
Acetylene	Chlorine, bromine, copper, fluorine, silver, mercury
Alkali and alkaline earth metals (lithium, sodium, potassium)	Water, carbon tetrachloride or other chlorinated hydrocarbons, carbon dioxide, halogens, powdered metals (e.g.,aluminum or magnesium)
Ammonia(anhydrous)	Mercury (e.g., in manometers), chlorine, calcium hypochlorite, iodine, bromine, hydrofluoric acid (anhydrous)
Ammonium nitrate	Acids, powdered metals, flammable liquids,chlorates, nitrates, sulfur, finely divided organic or combustible materials
Aniline	Nitric acid, hydrogen peroxide
Arsenical materials	Any reducing agent
Azides	Acids
Bromine	See Chlorine
Calcium oxide	Water
Carbon (activated)	Calcium hypochlorite, all oxidizing agents

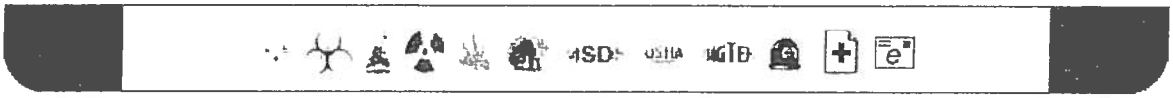
Carbon tetrachloride	Sodium, Chlorates, Ammonium salts, acids, powdered metals, sulfur,finely divided organic or combustible materials
Chlorine	Ammonia, acetylene, butadiene, butane, methane, propane (or other petroleum gases), hydrogen, sodium carbide, benzene, finely divided metals, turpentine
Chlorine dioxide	Ammonia, methane, phosphine, hydrogen sulfide
Chromic acid and chromium	Acetic acid, naphthalene, camphor, glycerol, alcohol, flammable liquids in general
Copper	Acetylene, hydrogen peroxide
Cumene hydroperoxide	Acids (organic or inorganic)
Cyanides	Acids
Flammable liquids	Ammonium nitrate, chromatic acid, hydrogen peroxide, nitric acid, sodium peroxide, halogens
Fluorine	Isolate from everything
Hydrocarbons (e.g.,butane,propane, benzene)	Fluorine, chlorine, bromine, chromic acid, sodium peroxide
Hydrocyanic acid	Nitric acid, alkali
Hydrofluoric acid (anhydrous)	Ammonia (aqueous or anhydrous)
Hydrogen peroxide	Copper, chromium, iron, most metals or their salts, alcohols, acetone, organic materials, aniline, nitromethane, combustible materials
Hydrogen sulfide	Fuming nitric acid, oxidizing gases
Hypochlorites	Acids, activated carbon
Iodine	Acetylene, ammonia (aqueous or anhydrous), hydrogen
Mercury	Acetylene, fulminic acid, ammonia
Nitrates	Sulfuric acid
Nitric acid (concentrated)	Acetic acid, aniline, chromic acid, hydrocyanic acid, hydrogen sulfide, flammable liquids, flammable gases, copper, brass, any heavy metals
Nitrites	Potassium or sodium cyanide.
Nitroparaffins	Inorganic bases, amines
Oxalic acid	Silver, mercury
Oxygen	Oils, grease, hydrogen, flammable: liquids, solids, or gases
Perchloric acid	Acetic anhydride, bismuth and its alloys, alcohol, paper, wood, grease, oils

Peroxides, Organic	Acids (organic or mineral), avoid friction, store cold
Phosphorus (white)	Air, oxygen, alkalis, reducing agents
Phosphorus pentoxide	Water
Potassium	Carbon tetrachloride, carbon dioxide, water
Potassium chlorate	Sulfuric and other acids
Potassium perchlorate	(see Sulfuric and other acids also chlorates)
Potassium permanganate	Glycerol, ethylene glycol, benzaldehyde, sulfuric acid
Selenides	Reducing agents
Silver	Acetylene, oxalic acid, tartaric acid, ammonium compounds, fulminic acid
Sodium	Carbon tetrachloride, carbon dioxide, water
Sodium Chlorate	Acids, ammonium salts, oxidizable materials, sulfur
Sodium nitrite	Ammonium nitrate and other ammonium salts
Sodium peroxide	Ethyl or methyl alcohol, glacial acetic acid, acetic anhydride, benzaldehyde, carbon disulfide, glycerin, ethylene glycol, ethyl acetate, methyl acetate, furfural
Sulfides	Acids
Sulfuric acid	Potassium chlorate, potassium perchlorate, potassium permanganate (similar compounds of light metals, such as sodium, lithium)
Tellurides	Reducing agents
Water	Acetyl chloride, alkaline and alkaline earth metals, their hydrides and oxides, barium peroxide, carbides, chromic acid, phosphorous oxychloride, phosphorous pentachloride, phosphorous pentoxide,sulfuric acid, sulfur trioxide

15 Reasons Not to Store Your Chemcials Alphabetically

INCOMPATABILE CHEMICALS	POSSIBLE REACTIONS
Acetic Acid - Acetaldehyde	Small amounts of acetic acid will cause the acetaldehyde to polymerize releasing great quantities of heat.
Acetic Anhydride - Acetaldehyde	Reaction can be violently explosive.
Aluminum Metal - Ammonium Nitrate	A Potential Explosive
Aluminum - Bromine Vapor	Unstable nitrogen tribromide is formed: explosion may result.
Ammonium Nitrate - Acetic Acid	Mixture may result in ignition, especially if acetic acid in concentrated.

Cupric Sulfide - Cadmium Chlorate	Will explode on contact.
Hydrogen Peroxide - Ferrous Sulfide	A vigorous, highly exothermic reaction.
Hydrogen Peroxide - Lead II or IV Oxide	A violent, possibly explosive reaction.
Lead Sulfide - Hydrogen Peroxide	Vigorous, potentially explosive reaction.
Lead Perchlorate - Methyl Alcohol	An explosive mixture when agitated.
Mercury II Nitrate - Methanol	May form Hg fulminate- an explosive.
Nitric Acid - Phosphorous	Phosphorous aburns spontaneously in presence of nitric acid.
Potassium Cyanide - Potassium Peroxide	A potentially explosive mixture if heated.
Sodium Nitrate - Sodium Thiosulfate.	A mixture of the dry materials may result in explosion.



III. SAFETY PLAN

Overview of Safety Plan:

Description of departmental safety topics and issues of safety concern within unit ⍰ Strategies for safe practices and training ⍰ Strategies for immediate events and emergencies

Description of departmental safety topics and issues of safety concern within unit:

The Biological and Agricultural Engineering Department is contained in a 4-building complex at the corner of **South Stadium Road** and **Tower Drive** on the LSU-Baton Rouge campus (see Figure 1), along with the Wilson Laboratories (western half of 2nd floor) and the LA House complex on Gourrier Lane between Nicholson Drive and River Road.

Departmental Map:

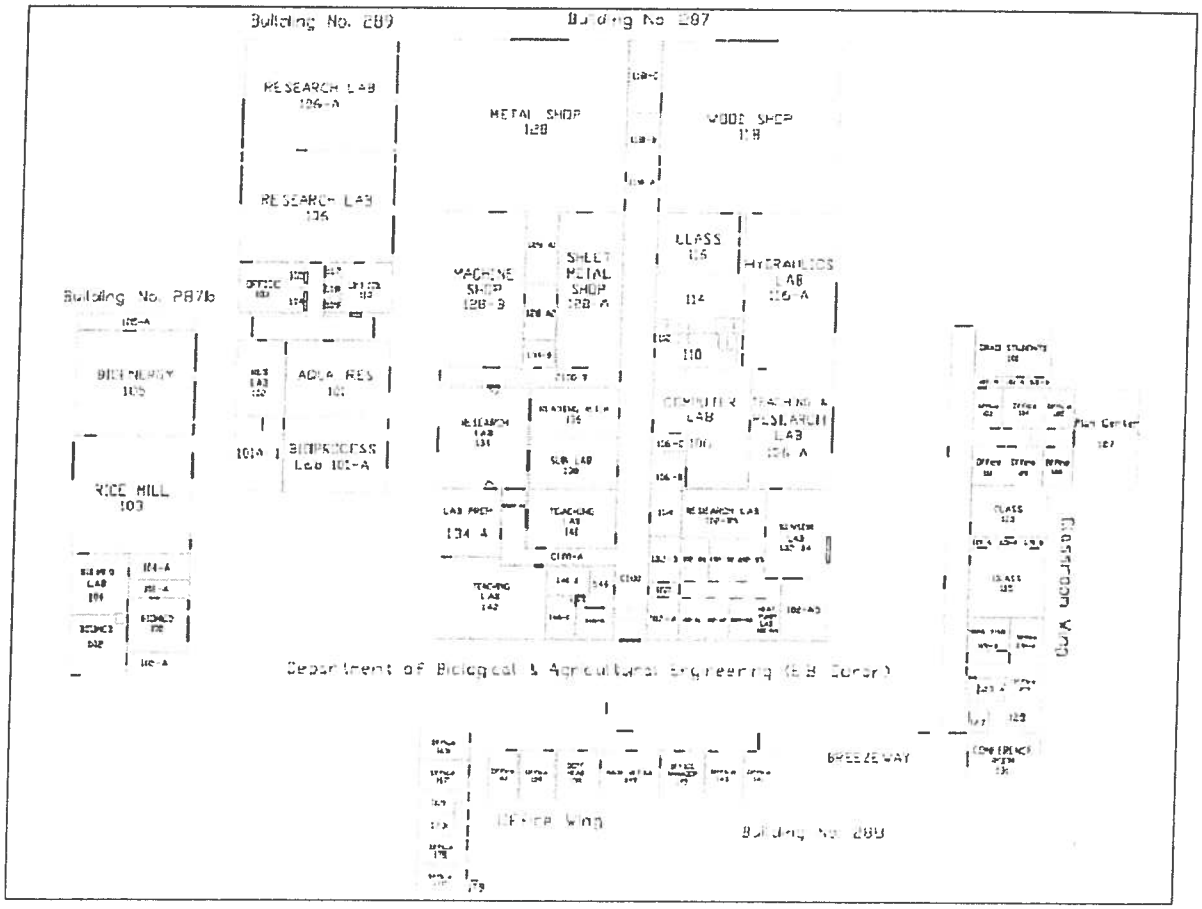


Figure 1: Biological and Agricultural Engineering Department Building Layout

People involved with the department:

- Faculty – Research and Extension
- Staff – Administrative, Research and Teaching
- Students – Graduate and Undergraduate

High priority safety concerns:

- Emergency egress strategy
- Security issues - controlled access after hours
- Employee and student safety education
- Chemical safety
- Shop safety
- Annual internal review of laboratories

Emergency Exit or Egress Strategy: The departmental calling tree (see below) will be activated in emergencies where building evacuations is necessary. The persons appointed below are responsible to relay the message to evacuate, as long as they are able to do so without risk of serious injury.

In an Emergency

1. Activate Fire alarm
2. Call LSU Emergency 911
3. Call Main Office 225—578-3153
   a. Angela Singleton
   b. Donna Elisar
   c. David Constant

Priority #1 – North Wing – Angela Singleton – Contact Maurice Wolcott – 578-8291
Priority #2 – Ag Metals Building – Angela Singleton - Contact Tom McClure – 578-1078
Priority #3 – Lab Buildings 287b and 289 - Donna Elisar – Contact Tom McClure – 578-1078
Priority #4 – Office Wing - David Constant – 578-1062 - Contact all office wing personnel
Priority #5 – Outside – Angela Singleton or Donna Elisar – Contact AgCenter

Evacuation Routes: The following figure shows the paths of evacuation from the BAE campus facilities. Maps of the evacuation routes will be posted in each laboratory and hallway within the department facilities.

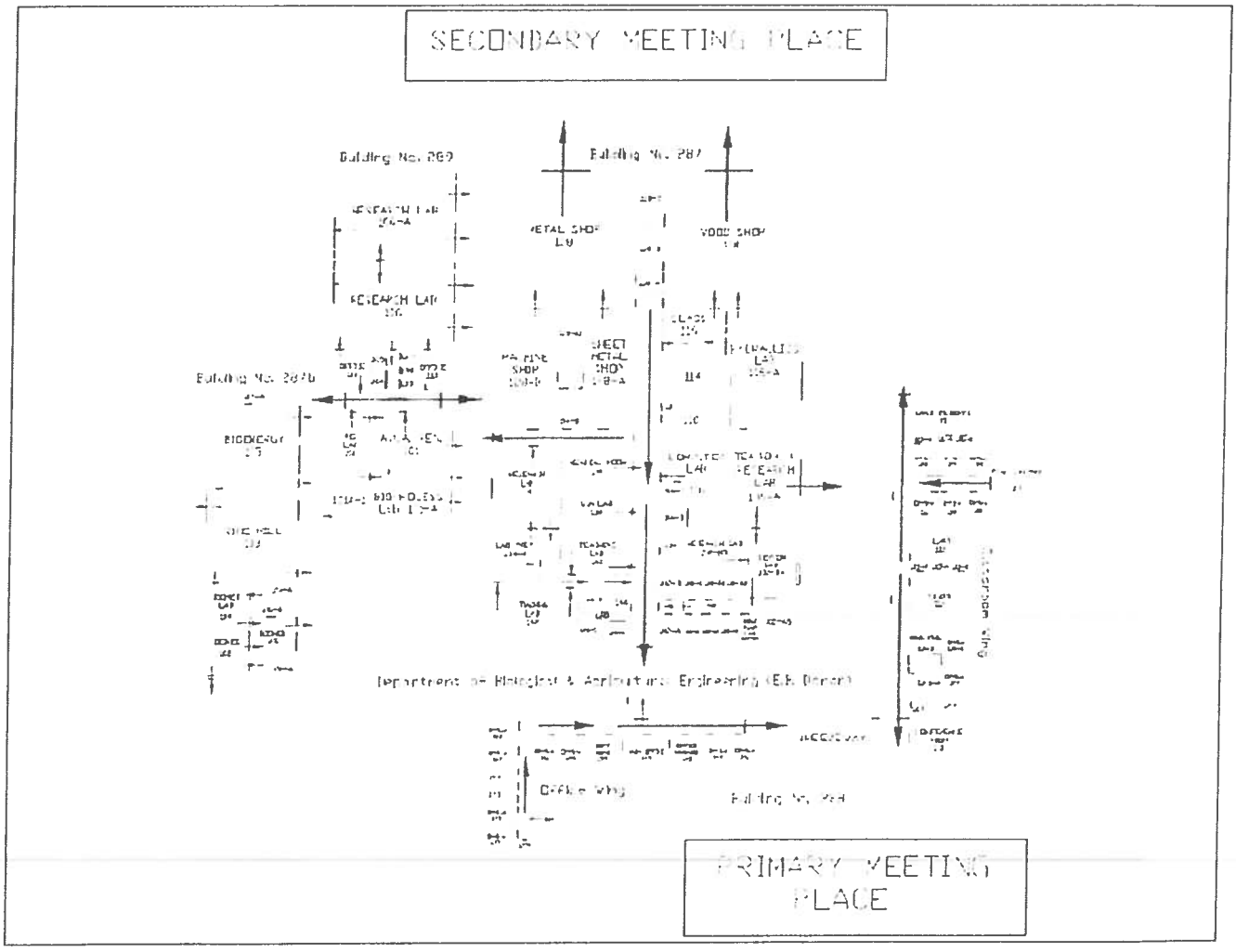


Figure 2: Evacuation Routes for the Biological and Agricultural Engineering Campus Facilities

Security issues:
Exterior doors will be locked at 4:30pm on the weekdays by Tom McClure, Angela Singleton or appointed person. Exterior doors will remain locked during the weekends. (Weekdays: 4:30pm – 7:30am and weekends will be called "After Hours" from here throughout.) Windows are to be closed during After Hours. The responsibility of closing windows falls to individual room managers or stewards.

After Hours Policy for Undergraduate Students:
The Department of Biological and Agricultural Engineering (BAE) recognizes the demands of an undergraduate education in engineering and realizes that project work within the department is critical to the future success of our graduates. Therefore the department personnel believe that undergraduate students majoring in Biological Engineering should have access to the departmental facilities during after-hours. **The undergraduate students of the department should realize, though, that admittance into the BAE facilities "after hours" is a privilege, which will be revoked if the guidelines in Table 3 are violated.** The following rules have been established for the safety of undergraduate students and departmental personnel during after-hours: (policy is subject to change without notice)

- **Consequences for After Hours Violations by Undergraduate Students:**
  - First offense: The first time a student has violated one of the five after hours guidelines will merit a warning. A warning will consist of a memorandum naming the student and briefly describing the violation. This memorandum will be given to the BAE departmental office to add to the student's records.
  - Second offense: After the first offense, if the student violates one of the five after hours guidelines again, the student will be banned from after-hours admittance except for circumstances where a supervisor from the departmental personnel is willing to usher the student around. A list of banned from after-hours students will be distributed to departmental personnel to assist in enforcing this policy.
  - Keys are to be returned to the key master Angela Singleton, upon the termination of employment of departmental personnel (faculty, associates, graduate students, staff, and student workers).
  - Safety for labs managed by absent professors:
    - Should the principal investigator of a BAE research lab be absent from the facilities for more than two weeks, a temporary lab manager should be appointed by the faculty member to observe daily safety functions in his/her lab. The BAE departmental office should be notified of the person appointed in case changes to the emergency procedures need to be modified.

Table 3 - After Hours Guidelines for Undergraduate Students of Biological Engineering

1. No undergraduate students in the building after hours (Weekdays: 4:30 pm – 7:30am and weekends) without the "in- facility" supervision from departmental personnel unless written consent by faculty member is provided. (Departmental personnel consist of BAE employed faculty, graduate students, research associates, staff, and student workers. "In-facility" supervision means the supervisor must be located within departmental facilities.)
2. No chemical laboratory access should be granted to undergraduate students without "in- facility" supervision from trained departmental personnel. (Chemical safety training will be performed within the department.)
3. No shop access should be granted to undergraduate students without "in-room" supervision from trained departmental personnel. ("In-room" supervision means the supervisor must be located within the room of the shop during use of tools. Supervisor should also be trained on tools that will be used.)

4. No student is allowed to be in the departmental buildings alone. A "buddy system" with other BAE students or departmental personnel is encouraged. 5. Keys may be loaned to undergraduate students through their respective BAE faculty supervisor. An Operations List will be distributed along with the keys describing responsibilities of building security required to practice when in possession of departmental keys. 6. Exterior doors will NOT be propped open or unlocked and left unattended by anyone "after hours."

Safety Training for Employees and Students:

- o Upon initiating employment, an employee of the Biological and Agricultural Engineering Department should complete the new employee orientation form from LSU Office of Occupational and Environmental Safety with their supervisor
- o The departmental personnel are encouraged to attend CPR and first aid training if they are medically able and willing.
- o Graduate students, as departmental personnel, should complete the new employees orientation form (website link above) with their respective supervisors. The completed form should be submitted to the BAE main office so it may be added to the graduate student's records. Addition training recommended:
  - General security issues addressed previously in this BAE safety plan
  - Shop training (see below)
  - Chemical safety training (see below)
  - Undergraduate students training:
  - General security issues addressed previously in this BAE safety plan
  - Shop training (see below)
  - Chemical safety training (see below)

Chemical Safety

- o The department chemical safety plan should fall in accordance with the LSU Chemical Safety Hygiene Plan and the Standard Operating Procedures of Chemical Safety
- o General chemical safety should be discussed with approved chemical lab trainer and departmental safety form signed before trainee is allowed use of chemicals. (Approved chemical lab trainers: Dr. Dorin Boldor, Ms. Anna Dugas, Dr. Steven Hall, Dr. Daniel Hayes, Dr. Todd Monroe, Dr. Cristina Sabliov, and Dr. Chandra Theegala)
- o Signed chemical safety forms should be turned into the research lab manager. Chemical safety forms can be accessed on (W:/) departmental drive under the Safety folder.
- o Material Safety Data Sheet (MSDS) can be found on the departmental drive (W:/), at the LSU Office of Occupational and Environmental Safety, and a printed copy of commonly used chemicals should be on hand in the laboratories within the BAE department.
- o ALL mixed chemicals not in their original containers should be labeled with:
  - NAME of Chemicals – spelled out (Ex: Water NOT H2O)
  - DATE MADE
  - PERSON who made the solution
  - PERCENT make up of ingredients (Ex: 70% Ethanol, 0.01M Sodium Hydroxide, 1:4 Ethyl Acetate/Water)
- o ALL gas cylinders will be restrained securely to wall or bench-top as described by the LSU Office of Occupational and Environmental Safety (www.oes.lsu.edu).
- o **Students are not to use the chemicals without training or without supervision from trained departmental personnel.**

Shop Safety

- o General shop safety should be discussed with approved shop trainer and departmental safety form signed before trainee is allowed use of equipment. (Approved shop trainer: Tom McClure)
- o Signed safety forms should be turned into Tom McClure.
- o Proper use of shop equipment should be demonstrated by an approved shop trainer on an individual or small group basis.
- o **Students are not to use the shop equipment without training or without supervision from trained departmental personnel at any time!**

Safety Committee Reviews - Annual checks of individual labs for:

- o MSDS printed copies of commonly used chemicals
- o Evidence of chemical training of students
- o Labeled chemicals
- o Currently calibrated ventilation hoods
- o Gas cylinders correctly restrained

Other Strategies for Safe Practices:

- o Locations of first aid kits, fire extinguishers/blankets, eye washes, showers, and security alarm shut offs will be mapped out on facility layout. Maps will be dispensed to departmental personnel once completed.
- o Departmental safety meeting once a semester to reassess safety plan and its enforcement.

Strategies for immediate events and emergencies:

LSU emergency text message is recommended for faculty and staff cell phone users.

Exit or Egress Strategy: The departmental calling tree (see above) will be activated in emergencies where building evacuations is necessary. The persons appointed on the calling tree are responsible to relay the message to evacuate, as long as they are able to do so without risk of serious injury. Evacuation routes will be posted in laboratories and hallways of the departmental facilities (see Figure 2 previously).

Fire Drills and Warnings:

- o Activate departmental calling tree (above)
- o Activate nearest fire alarm
- o In case of a bench top fire:
  1. ALERT people in lab.
  2. ACTIVATE alarm.
  3. USE fire extinguisher keeping you between the fire and the door. Do not use water on chemicals or electronics!
  4. GET OUT IF IN DANGER and CALL 9-911!
- o In case of a large fire, fume problem or explosion:
  1. ALERT people in lab to evacuate.
  2. ACTIVATE alarm.
  3. EVACUATE closing door behind you. (see Figure 3)
  4. CALL 9-911.
  5. MEET group at either FRONT LAWN of E.B. Doran or BACK FENCE by P. Taylor Hall

Tornado Warnings:

o Departmental calling tree should be activated (see above).

o Possible shelter areas shown in Figure 3:

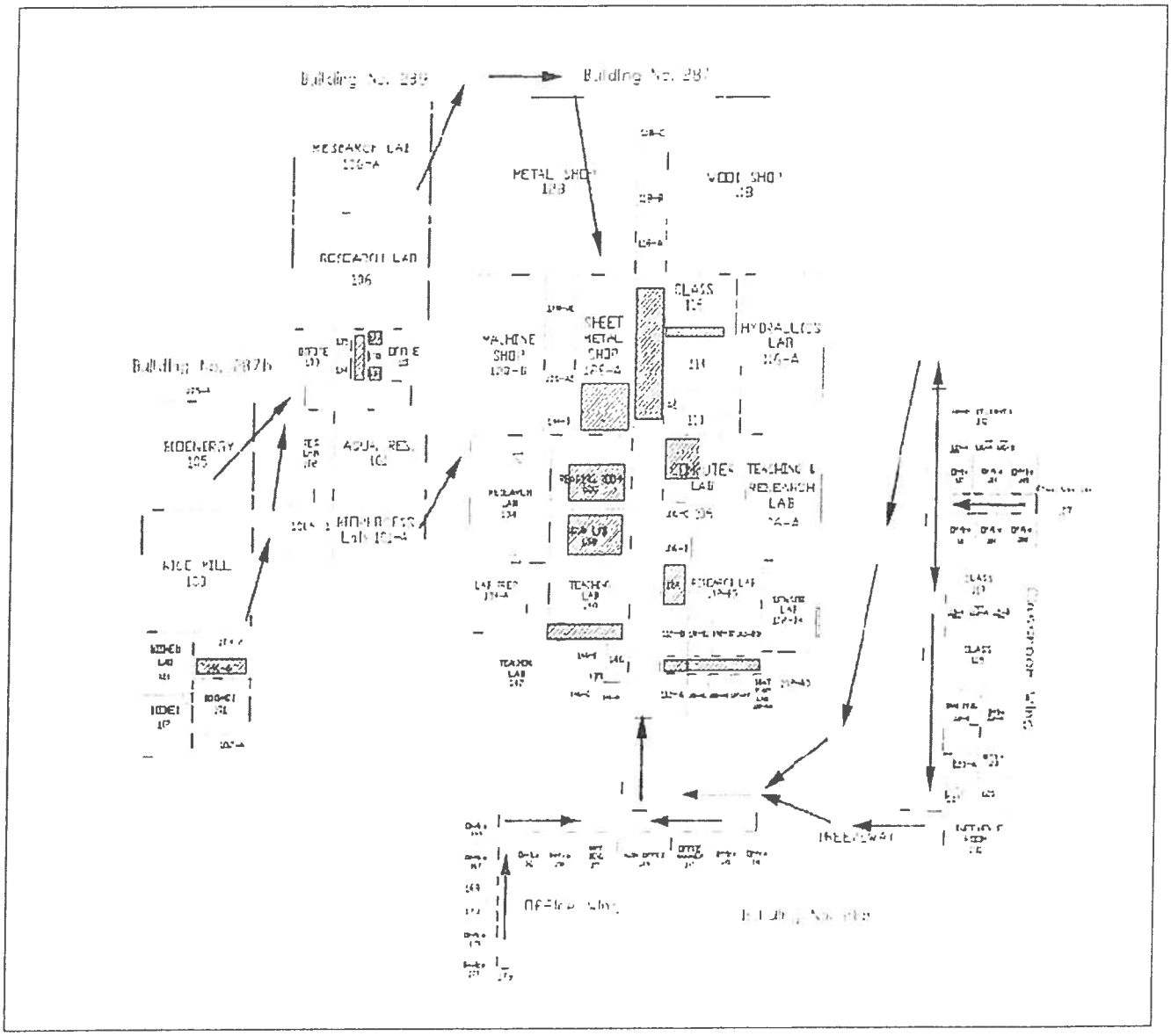


Figure 3: Shelter Areas and Routes for the Biological and Agricultural Engineering Campus Facilities

o Post Tornado Warning – LSU official will give the all clear to leave the shelter areas. Meet group at either FRONT LAWN of E.B. Doran or BACK FENCE by P. Taylor Hall if safe to do so.

Hurricane Warnings:

o The campus departmental facilities are not deemed safe enough to be hurricane shelters. Please evacuate PRIOR to hurricane arrival. Contact LSU information for appropriate shelter areas on campus: **800-516-6444** or **www.lsu.edu**.

o ***Emergency Shutdown Plan:***

In the event of a hurricane warning, a few emergency shutdown procedures will be performed in order to minimize damage and to increase the speed of restoring operations.

1. Emergency Shutdown Managers:
   - E. B. Doran – Donna Elisar and Angela Singleton
   - Ag Metals, Building 289 -- Tom McClure

- Building 287b – Tom McClure
- LaHouse – Claudette Reichel and Kyle Huffstickler

2. Responsibilities include:
   - Proper equipment shutdown including freezers and incubators, if power outage is likely
   - Water, gas and heat sources shut off
   - Removal of Laptops, PC external hard drives or backup discs
   - Windows and doors locked with security alarms activated, unless a fire emergency

o LSU and AgCenter officials must okay the admittance into the BAE departmental facilities after the hurricane.

Power outages:

o Remain calm and stay where you are, if you can do so safely.
o Switch off equipment, like centrifuges and shop equipment to prevent sudden turn on when power is resumed.
o Keep temperature controlled units, like incubators, refrigerators, and freezers closed.
o Call of the BAE main office, especially if the power outage is local to your location.

Hazardous materials spills – campus wide:

o Exit and Egress Strategy activated (Figures 2 and 3)

Terrorist or evil intent events:

o Take responsibility of reporting unusual behavior observed.
o Contact BAE main office if you are suspicious of person(s) roaming the department facilities.
o Contact 911 if suspicious person(s) appear to be malicious (e.g., carrying weapon, aggressive or angry, etc.)
o Biological Threats:
- Contact 911 and BAE main office
- Quarantine the exposure area – do not let anyone other than emergency officials to enter the area of exposure.

o Bomb Threats:
- By phone:
  - Write down everything that is said
  - Note exact time of call ⍰ Listen for background noises, Determine characteristics of caller (age, gender, accent, vocal tone)
  - Call 911 immediately after call
- Suspicious object:
  - Do NOT handle object (bag, letter, parcel, etc)
  - Call BAE main office and 911
  - Evacuate the area