Chemical Control Banding Methodology

The following table can be used to determine, in general terms, the hazard controls that are needed based on general laboratory operations. To use the following table, work across the ‘Conceptual Hazard Level’ and ‘Chemicals Used’ rows to match the chemicals, processes or hazards present in the lab space, then go down the column to identify the various safety measures appropriate for this Chemical Safety Level.

DESCRIPTOR OR CONTROL	**CHEMICAL SAFETY LEVEL 1**	**CHEMICAL SAFETY LEVEL 2**	**CHEMICAL SAFETY LEVEL 3**	**CHEMICAL SAFETY LEVEL 4**
CONCEPTUAL HAZARD LEVEL	Laboratory hazards equivalent to typical household use of chemicals	Laboratory hazards equivalent to academic lab settings (restricted hazardous chemical inventory; well-established procedures in place)	Moderate or varying laboratory hazards within a narrow range (open hazardous chemical inventory; evolving procedures)	Novel hazards or severe established hazards (high hazard chemicals or processes without well-established procedures)
CHEMICALS USED	Consumer products in consumer packaging; may receive but not open chemical packages	Low concentration acids/bases, lower alcohols, solid salts, simple asphyxiant compressed gases	Typical chemical inventory for a research lab, such as flammable solvents, corrosives, inorganic salts, toxics, flammable gases. Limited amounts (mg quantities) of air or water reactive, pyrophoric materials	Air/water reactive, phyrophoric materials or gases. Explosives or potentially explosive compounds, highly toxic materials (in any state of matter)
TRAINING REQUIREMENTS *(prerequisite for people working in the lab)*	Observe label and warning signs	General lab safety training in addition to warning labels and signs	Laboratory hazards require laboratory-specific safety training	Laboratory access restricted to people accompanied by experienced personnel

SUPERVISION REQUIREMENTS *(safety responsibilities for lab leader(s); based on highest active lab hazard or process)*	Awareness of work being conducted	Constant supervision or working alone based on specific restrictions	Peer presence or working alone based on specific restrictions	Peer presence (no working alone)
OVERSIGHT REQUIREMENTS	[1]Weekly self-inspections; [2]self-audits three times per year	[1]Weekly self-inspections; [2]self-audits three times per year	[1]Weekly self-inspections; [2]self-audits three times per year; [3]monthly drop byes; [4]risk-based institutional review schedule	[1]Daily self-inspections; [2]self-audits three times per year; [3]monthly drop byes; [4]risk-based institutional review schedule
PLANNING REQUIREMENTS *(based on highest rated chemical involved)*	Process-specific plans written and the presence of other chemicals prohibited	Written procedures including safety protocols	Written procedures including safety protocols must be peer reviewed	Written procedures including safety protocols approved by supervisor
GENERAL PPE REQUIREMENTS (EYE AND SKIN EXPOSURE)	Coverage of legs and feet; other PPE as determined by PPE hazard assessment	CL1 PPE plus eye protection	CL2 PPE plus lab coat	CSL3 plus flame resistant lab coat
SPECIFIC PPE REQUIREMENTS (HAND AND RESPIRATORY PROTECTION) *(Process specific)*	No gloves or gloves as recommended in the manufacturers' instructions	Activity-specific gloves, such as nitrile, vinyl or latex disposable gloves would be typical	Activity-specific gloves, such as nitrile, vinyl or latex disposable gloves would be acceptable for an incidental small quantity splash. Neoprene or butyl rubber may be needed for immersion in solvents, or similar situations	Activity-specific gloves, such as flame resistant if using pyrophoric liquids, neoprene if using large quantities

DESCRIPTOR OR CONTROL	CHEMICAL SAFETY LEVEL 1	CHEMICAL SAFETY LEVEL 2	CHEMICAL SAFETY LEVEL 3	CHEMICAL SAFET LEVEL 4
GENERAL VENTILATION REQUIREMENTS/ ENGINEERING CONTROLS	None or low ventilation specifications	Moderate ventilation/ local exhaust ventilation (snorkels) or other source control	Fume hoods, local exhaust ventilation (snorkels), limited glove box use	Fume hood, local exhaust ventilatio (snorkels), glove/d box, enclosed reac

EMERGENCY RESPONSE PROTOCOLS	Institutional-specific response protocols	Institutional-specific response protocols; people with knowledge of incident have responsibility to provide information to responders; trained personnel can contain and remediate small spills	Institutional-specific response protocols; may have advanced lab response protocol to make the situation safe while evacuating	Institutional-specif response protocol specific pre-planning is require

[1] Self-inspection: quick review of physical surroundings; may or may not use a formal checklist
[2] Self –audit: more comprehensive review of the CSL and other documentations; uses a checklist
[3] Drop by: informal review, consult, check-in by institutional representative
[4] Risk-based institutional review: formal review by lab by an institutional representative; uses a checklist, document issues for correction, escalate issues to upper management as necessary

Chemical Control Banding Methodology 2

The following tables can be used to evaluate the hazards and hazard controls for chemicals. The first table is used to determine the chemical safety level (CSL) based on the physical characteristics of the chemical. This information can be found on the Safety Data Sheet. The second table is used to determine the general protection guidelines for the chemicals. Note that this methodology is not appropriate for addressing hazards that may arise from *processes* or *equipment*, such as use of pressure vessels, hot plates, ovens, compressed gas cylinders, etc.

Hazard	General Description of Hazards	Fire	Reactivity	Acute Toxicity	Chronic Toxicity
CSL 1	Laboratory hazards equivalent to typical household use of chemicals	Flashpoint above 140 F	No chemical changes expected in the process	All chemicals have no or low toxicity and occupational exposure limits (OEL) > 500 ppm; not an irritant or sensitizer	None known

CSL 2	Laboratory hazards equivalent to academic lab settings (restricted hazardous chemical inventory; well-established procedures in place)	Flashpoint above ambient (73 F), expected concentration <10% of the lower explosive limit	No known incompatibilities between chemicals being used	All chemicals have known toxicities and 10 ppm < OEL < 500 ppm	Specific target organs or irreversible effects suspected
CSL 3	Moderate or varying laboratory hazards within a narrow range (open hazardous chemical inventory; evolving procedures)	Flashpoint at or below ambient. Expected concentration >10% of the lower explosive limit	Chemicals with known reactions or contamination hazards present	Unknown toxicities or OEL < 10 ppm; severely irritating or corrosive; sensitizers	Specific target organs or irreversible effects probable
CSL 4	Novel hazards or severe established hazards (high hazard chemicals or processes without well-established procedures)	Pyrophorics, air or water reactives, etc.	High hazard reactions in use; potential deflagration or detonation hazard	OEL < 1 ppm; very toxic on single exposure; reproductive hazard; carcinogens	Irreversible toxicities require use of designated areas

	Facility	**Training**	**Oversight**	**PPE**	**Response Protocol**
CSL 1	Any room, general ventilation	Read the label or manufacturer's instructions	Generic self-inspection guidelines	Covered legs and feet; other PPE as determined by PPE hazard assessment	No unusual hazmat concerns

CSL 2	Ventilated lab room; local exhaust (snorkels) for source control	General lab safety training in addition to training on warning signs and labels and lab safety protocols	Constant supervision or working alone based on specific restrictions	Activity-specific gloves, such as nitrile, vinyl or latex disposable gloves would be typical, eye protection, other PPE as determined by PPE hazard assessment	Respond as to general alarm, people with knowledge of incident have responsibility t provide information to responders; trained personnel can contain and remediate sma spills
CSL 3	Lab room with exhaust ventilation (fume hood, glove boxes, etc.)	CSL 2 lab-specific safety training. Generic training for unexpected events.	Process training and external audits	Activity-specific gloves, such as nitrile, vinyl or latex disposable gloves would be typical, eye protection, other PPE as determined by PPE hazard assessment	Institutional-specific response protocols; may have advance lab response protocol to make the situation safe while evacuati
CSL 4	Specifically designed lab	CSL3 plus practice before working with live materials	CSL3 plus written standard operating procedures and specific oversight processes	CSL3 plus process-specific PPE	CSL3 plus specific pre-planning is required; coordination with first responder

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