

Laboratory Hazard Assessment Checklist

This form is a modified version of the Laboratory Hazard Assessment Tool (LHAT) developed by UCLA's Office of Environment, Health and Safety (<http://www.ehs.ucla.edu>). It should be completed for each research laboratory in the Department of Chemistry at Wayne State University by the faculty member responsible for that facility. The checklist should also be completed for each undergraduate level laboratory class in chemistry by a faculty member teaching the class. The tool identifies hazards to employees and students and specifies personal protective equipment (PPE) to protect employees and students during lab activities.

Date:	Course:
Person(s) Completing Form:	Room(s) where laboratory experiments are prepared and/or conducted:

The OSHA Laboratory Standard 29 CFR 1910.1450 and the MIOSHA Standard 1212 part 431 both require employers to provide employees with information and training to ensure that they are apprised of the hazards present in their work area. Use of appropriate PPE is required at Wayne State University when working with hazardous materials as stated in the university's Chemical Hygiene Plan.

<http://research.wayne.edu/oehs/pdf/chemical-hygiene-plan.pdf>

"Personal protective equipment (PPE) shall be used as necessary to augment the protection provided by engineering controls, experiment design, standard operating procedures, and good work practices. PPE should not be used as the primary means of controlling hazardous chemical exposure! Selection of PPE shall take into account a variety of factors including the identification of the hazard and task-specific conditions, the routes of exposure (inhalation, skin absorption, eye or skin contact, and/or ingestion), and the performance of the PPE material in providing a barrier to these hazards." (Section 11, page 19)

"All other personal protective equipment such as face shields, lab coats, shoe covers, etc. specified by the Principal Investigator must be used as directed." (Section 11, page 20)

"PPE such as laboratory coats must be removed immediately upon significant contamination." (Section 11, page 20)

"Laboratory workers should know the location and proper use of personal PPE, including lab coats, gloves, and eye protection". (Section 9.b, page 18)

Chemical Hazards (See WSU Chemical Hygiene Plan for additional information on policies related to these materials)

YES	NO	Question	Activity	Potential Hazard	Recommended PPE
<input type="checkbox"/>	<input type="checkbox"/>	C01	Working with small volumes (<4 liters) of corrosive liquids.	Eye or skin damage.	Safety goggles. Chemical-resistant gloves (4). Lab coat and chemical-resistant apron. Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	C02	Working with corrosive or acutely toxic liquids or other materials which creates a splash hazard. (1)	Poisoning, increased potential for eye and skin damage.	Safety goggles. Chemical-resistant gloves (4). Lab coat and chemical-resistant apron. Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	C03	Working with small volumes (<4 liters) of organic solvents or flammable organic compounds.	Skin or eye damage, potential poisoning through skin contact.	Safety glasses or goggles. Chemical-resistant gloves. Lab coat. (4) Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	C04	Working with large volumes (≥4 liters) of organic solvents, small to large volumes of very dangerous solvents, or work which creates a splash hazard. (1)	Major skin or eye damage, potential poisoning through skin contact. Fire.	Safety goggles. Chemical-resistant gloves. Flame-resistant lab coat (e.g. Nomex). (4) Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	C05	Working with toxic or hazardous chemicals (solid, liquid, or gas). (1, 2)	Skin or eye damage, potential poisoning through skin contact.	Safety glasses (goggles for large (≥4 liters) quantities). Chemical resistant gloves. Lab coat. (4) Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	C06	Working with Acutely Toxic Chemicals (1, 2)	Spills, splashes, ingestion, inhalation, absorption. Chemicals pose a high level of immediate health risk	Safety glasses or goggles, gloves, lab coat, long pants/skirt and closed toe shoes. Further PPE and appropriate training may be required for specific Acutely Toxic chemicals. (4)
<input type="checkbox"/>	<input type="checkbox"/>	C07	Working with an apparatus with contents under pressure or vacuum.	Eye or skin damage.	Safety glasses or goggles, face shield for high risk activities. Chemical-resistant gloves. Lab coat, chemical-resistant apron for high risk activities. (4) Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	C08	Working with air or water reactive chemicals.	Severe skin and eye damage. Fire.	Work in inert atmosphere, when possible. Safety glasses or goggles. Chemical-resistant gloves. Lab coat, flame resistant lab coat for high risk activities (e.g. Nomex). Chemical-resistant apron for high risk activities. (4) Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	C09	Working with potentially explosive chemicals.	Splash, detonation, flying debris, skin and eye damage. Fire.	Safety glasses, face shield, and blast shield. Heavy gloves. Flame-resistant lab coat (e.g. Nomex). (4) Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	C10	Working with low and high temperatures	Burns, splashes. Fire.	Safety glasses. Lab coat. Thermal insulated gloves, when needed. Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	C11	Minor chemical spill cleanup	Spills, splashes, ingestion, inhalation, absorption. High hazard cancer-causing agents	Safety glasses or goggles, chemical-resistant gloves, lab coat, long pants/skirt and closed toe shoes. Further PPE and specific training may be required for each Regulated Carcinogen. Laboratory hoods, glove boxes and negative pressure environments are required. (4)

Chemical Hazards (See WSU Chemical Hygiene Plan for additional information on policies related to these materials)

YES	NO	Question	Activity	Potential Hazard	Recommended PPE
<input type="checkbox"/>	<input type="checkbox"/>	C12	Working with Regulated Carcinogens	Spills, splashes, ingestion, inhalation, absorption. High hazard cancer-causing agents	Safety glasses or goggles, chemical-resistant gloves, lab coat, long pants/skirt and closed toe shoes. Further PPE and specific training may be required for each Regulated Carcinogen. Laboratory hoods, glove boxes and negative pressure environments are required. (3,4)
<input type="checkbox"/>	<input type="checkbox"/>	C13	Working with Select Carcinogens	Spills, splashes, ingestion, inhalation, absorption. Potential cancer-causing agents	Safety glasses or goggles, chemical-resistant gloves, lab coat, long pants/skirt and closed toe shoes. Further PPE and specific training may be required for specific Select Carcinogen. (3,4)
<input type="checkbox"/>	<input type="checkbox"/>	C14	Working with Listed Carcinogens	Spills, splashes, ingestion, inhalation, absorption. High hazard cancer-causing agents	Safety glasses or goggles, chemical-resistant gloves, lab coat, long pants/skirt and closed toe shoes. Further PPE and specific training may be required for each Listed Carcinogen. Laboratory hoods, glove boxes and negative pressure environments are required. (3,4)
<input type="checkbox"/>	<input type="checkbox"/>	C15	Working with Reproductive Toxins	Spills, splashes, ingestion, inhalation, absorption. Agents that affect reproductive capabilities, cause mutation and adversely affect fetal development	Safety glasses or goggles, chemical-resistant gloves, lab coat, long pants/skirt and closed toe shoes. Further PPE and appropriate training may be required for specific Reproductive Toxins.(3,4)

Laser Hazards (see WSU Laser Safety Guide for additional information on policies related to the use of lasers)

YES	NO	Question	Activity	Potential Hazard	Recommended PPE
<input type="checkbox"/>	<input type="checkbox"/>	L01	Open Beam - Performing alignment, trouble-shooting or maintenance that requires working with an open beam and/or defeating the interlock(s) on any Class 3 or Class 4 laser system. (6)	Eye damage	Appropriate protective eyewear, wavelength and optical density based on individual beam parameters. Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	L02	Open Beam - Viewing a Class 3R laser beam with magnifying optics (including eyeglasses). (6)	Eye damage	Appropriate protective eyewear, wavelength and optical density based on individual beam parameters. Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	L03	Open Beam - Working with a Class 3B laser open beam system with the potential for producing direct or specular reflections. (6)	Eye damage, skin damage.	Appropriate protective eyewear, wavelength and optical density based on individual beam parameters, appropriate skin protection. (7) Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	L04	Open Beam - Working with a Class 4 laser open beam system with the potential for producing direct, specular, or diffuse reflections. (6)	Eye damage, skin damage.	Appropriate protective eyewear, wavelength and optical density based on individual beam parameters, appropriate skin protection. (7) Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	L05	Non-Beam - Handling dye laser materials, such as powdered dyes, chemicals, and solvents.	Cancer, explosion, fire.	Gloves, safety glasses, flame-resistant lab coat or coveralls. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	L06	Non-Beam - Maintaining and repairing power sources for large Class 3B and Class 4 laser systems.	Electrocution, explosion, fire.	Electrical isolation mat, flame-resistant lab coat or coveralls. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	L07	Enclosed Beam - Using a Class 1 device housing a Class 3B or Class 4 enclosed or embedded laser with the potential for beam exposure during a Service Event.	Eye damage, skin damage.	Appropriate protective eyewear, wavelength and optical density based on individual beam parameters, appropriate skin protection. Long pants/skirt and closed-toe shoes

Biological Hazards (see WSU Biosafety Manual for additional information on policies related to these materials)

YES	NO	Question	Activity	Potential Hazard	Recommended PPE
<input type="checkbox"/>	<input type="checkbox"/>	B01	Working with human blood, body fluids, tissues, or bloodborne pathogens (BBP). (5)	Exposure to infectious material.	Safety goggles with face shield or facemask plus goggles, nitrile gloves, lab coat or gown. Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	B02	Working with preserved animal and/or human specimens	Exposure to infectious material or preservatives	Safety glasses or goggles, protective gloves such as light latex or nitrile for unpreserved specimens (select protective glove for preserved specimens according to preservative used), lab coat or gown. Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	B03	Working with radioactive human blood, body fluids, or bloodborne pathogens (BBP) (5)	Cell damage, potential spread of radioactive contaminants, or potential BBP exposure.	Safety glasses or goggles for protection from splash or other eye hazard, nitrile gloves for broken skin or skin rash, lab coat or gown. Long pants/skirt and closed-toe shoes.
<input type="checkbox"/>	<input type="checkbox"/>	B04	Working with agents or recombinant DNA classified as Biosafety Level 1 (BSL-1)	Eye or skin irritation.	Safety glasses or goggles for protection from splash or other eye hazard, nitrile gloves for broken skin or skin rash, lab coat or gown. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	B05	Manipulation of cell lines, viruses, bacteria, or other organisms classified as Biosafety Level 2 (BSL-2). (5)	Exposure to infectious material, particularly through broken skin or mucous membranes	Safety glasses or goggles for protection from splash or other eye hazard, nitrile gloves, lab coat or gown. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	B06	Manipulation of infectious materials classified as Biosafety Level 2 facility with BSL-3 practices (BSL-2+) (5)	Exposure to infectious materials with high risk of exposure by contact or mucous membranes.	Safety glasses or goggles for protection from splash or other eye hazard, nitrile gloves (double), surgical mask.. Long pants/skirt and closed-toe shoes. Lab coats must be disposable and have a solid front (e.g. tie back or wrap around gowns).
<input type="checkbox"/>	<input type="checkbox"/>	B07	Working with live animals (Animal Biosafety Level 1, ABSL-1)	Animal bites, allergies	Safety glasses or goggles for protection from splash or other eye hazard, nitrile or vinyl gloves for broken skin or skin rash, lab coat or gown. Consider need for wire mesh glove. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	B08	Working with live animals (Animal Biosafety Level 2, ABSL-2.) (5)	Animal bites, exposure to infectious material, allergies.	Safety glasses or goggles for protection from splash or other eye hazard, nitrile or vinyl gloves, lab gown, hair cover, shoe covers, surgical mask. Consider need for wire mesh glove. Long pants/skirt and closed-toe shoes

Nanomaterial Hazards (see OEHS guidance on Respiratory Protection)

YES	NO	Question	Activity	Potential Hazard	Recommended PPE
<input type="checkbox"/>	<input type="checkbox"/>	N01	Working with engineered nanomaterials. (8)	Inhalation exposure, dermal exposure.	Goggles, gloves, lab coat. Long pants/skirt and closed-toe shoes

Physical Hazards (see OEHS Tool Box Safety Talks for additional information)

YES	NO	Question	Activity	Potential Hazard	Recommended PPE
<input type="checkbox"/>	<input type="checkbox"/>	P01	Working with cryogenic liquids.	Major skin, tissue, or eye damage.	Face shield plus safety goggles for large volumes, impermeable insulated gloves, lab coat. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	P02	Removing freezer vials from liquid nitrogen.	Vials may explode upon rapid warming. Cuts to face/neck and frostbite to hands.	Face shield plus safety glasses/goggles, impermeable insulated gloves, lab coat. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	P03	Working with very cold equipment or dry ice.	Frostbite, hypothermia.	Safety glasses, insulated gloves (possibly warm clothing), lab coat. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	P04	Working with hot liquids, equipment, open flames (autoclave, Bunsen burner, water bath, oil bath).	Burns resulting in skin or eye damage.	Safety glasses or goggles for large volumes, insulated gloves (impermeable insulated gloves for liquids, steam), lab coat. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	P05	Glassware washing.	Lacerations.	Heavy rubber gloves, lab coat. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	P06	Working with loud equipment, noises, sounds, alarms, etc.	Potential ear damage and hearing loss.	Earplugs or ear muffs as necessary.
<input type="checkbox"/>	<input type="checkbox"/>	P07	Working with a centrifuge.	Imbalanced rotor can lead to broken vials, cuts, exposure.	Safety glasses or goggles, lab coat, latex, vinyl, or nitrile gloves. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	P08	Working with a sonicator.	Ear damage, exposure.	Safety glasses or goggles, lab coat, latex, vinyl, or nitrile gloves, ear plugs. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	P09	Working with sharps.	Cuts, exposure.	Safety glasses or goggles, lab coat, latex, vinyl, or nitrile gloves. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	P10	Working with compressed gases	Eye or skin damage	Safety glasses or goggles, face shield for high risk activities, lab coat, gloves. Long pants/skirt and closed-toe shoes

Radiological Hazards (see WSU Radiation Safety Manual for additional information)

The PPE mentioned here are the minimum to be used while working with these potential hazards. Depending on the activity/volume of use, the PPE requirements will vary. Researchers must contact OEHS to review their protocols prior to initiating their laboratory experiments.

YES	NO	Question	Activity	Potential Hazard	Recommended PPE
<input type="checkbox"/>	<input type="checkbox"/>	R01	Working with radioactive materials or waste.	Cell damage, potential spread of radioactive materials.	Safety glasses or goggles for splash hazard, impermeable gloves, lab coat. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	R02	Working with radioactive materials in hazardous chemicals (corrosives, flammables, liquids, powders, etc.)	Cell damage or spread of contamination plus hazards for the specific chemical.	Safety glasses (or goggles for splash hazard), light chemical-resistant gloves, lab coat. Note: Select glove for the applicable chemical hazards above. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	R03	Working with ultraviolet radiation.	Conjunctivitis, corneal damage, skin redness	UV face shield and goggles, lab coat. Long pants/skirt and closed-toe shoes
<input type="checkbox"/>	<input type="checkbox"/>	R04	Working with infrared equipment (e.g. glass blowing).	Cataracts, burns to cornea	Appropriate shaded goggles, lab coat. Long pants/skirt and closed-toe shoes

Note: When working with materials that have a mixed hazard (e.g. chemical and biological) the most stringent personal protective equipment (PPE) requirements should be followed. The PI or OEHS should be consulted if there is any uncertainty about what PPE to use.

Footnotes:

1. Use a chemical fume hood or other engineering control whenever possible. *Activities not conducted inside a chemical fume hood or with another engineering control (such as a local exhaust at the workbench) should be evaluated to determine if the activity presents a respiratory hazard. In this case a respirator may be required and a respiratory protection program must be in place per the OEH&S Respiratory Protection Program. Guidance can be found at <http://research.wayne.edu/oehs/health-safety/respirators.php> .* In addition to engineering controls and PPE, consider personal clothing that provides adequate skin coverage.
2. Dusty solids should be separately evaluated for the need to use respiratory protection.
3. Contact OEHS (<http://research.wayne.edu/oehs/contact.php>) for additional information on training requirements for this type of hazard.
4. Chemical-resistant gloves are to be selected based on the specific chemical(s) used. Refer to the Safety Data Sheet for the chemical for additional information.
5. Use a Biosafety cabinet to minimize exposure. Activities that cannot be conducted inside Biosafety cabinet should be separately evaluated by the OEH&S Biosafety Officer, Richard Pearson (rjpearson@wayne.edu). All work involving biological agents classified as BSL-2 must be reviewed by the WSU Biosafety Committee (IBC). Principal investigators are required to submit a Biological Agent User Application form (<http://research.wayne.edu/oehs/bio-safety/applications.php>) to the IBC in order to initiate the approval process. Projects involving BSL-3, BSL-4, ABL-3 or ABL-4 are prohibited at WSU.
6. Flow Cytometry System (FACS) machines, laser copiers, and laser pointers are not currently subject to general or specific PPE requirements. Safe operation of this equipment is the primary measure by which potential injury is prevented.
7. Appropriate skin protection can include lab coat, gloves, sun block, and barrier cream.
8. Working with dry engineered nanomaterials (e.g. synthesizing, storage) should be separately evaluated for respiratory protection.

WSU OEHS Sites for Additional Information on Safety

- Chemical Safety : <http://research.wayne.edu/oehs/chemical/index.php>
- Biological Safety: <http://research.wayne.edu/oehs/bio-safety/index.php>
- Radiation Safety: <http://research.wayne.edu/oehs/rad-safety/index.php>
- Non-Ionizing Radiation (Lasers, MRIs): <http://research.wayne.edu/oehs/lab-safety/lasers.php>
- Controlled Substances: <http://research.wayne.edu/oehs/lab-safety/controlled-substances.php>
- General Health and Safety Toolbox Talks: <http://research.wayne.edu/oehs/health-safety/toolbox-talks.php>
- Hazardous Waste Management: <http://research.wayne.edu/oehs/hazardous/index.php>

Appendix A: Selection of Proper Personal Protective Equipment

A-1: Lab Coat Selection, Use, and Care

A.1 Lab Coat Uses

When properly used, lab coats:

- Provide protection of skin and personal clothing from incidental contact and small splashes.
- Prevent the spread of contamination outside the lab (provided they are not worn outside the lab).
- Provide a removable barrier in the event of an incident involving a spill or splash of hazardous substances or accidental exposure to an open flame.

A.2 Limitations of Lab Coats

In general, protective clothing, including lab coats, should not be used as a substitute for engineering controls such as a fume hood, a glove box, process enclosure, etc., or as a substitute for good work practices and personal hygiene. For significant chemical handling, it will be necessary to supplement lab coat use with additional protective clothing, for example, a rubber or vinyl apron for handling large quantities of corrosives or hydrofluoric acid, or it may be preferable to use chemical resistant coveralls for full body protection. Conversely, the use of engineering controls such as fume hoods do not preclude the need for wearing the proper PPE, including goggles and lab coats. When selecting a lab coat, it is appropriate to decide if it is serving as protection against a flammability hazard, exposure to a toxic substance, a chemical spill or splash, a biological hazard or simply a barrier to protect street clothes.

Some known limitations of lab coats include:

- Lab coats are not designed to be the equivalent of chemical protection suits for major chemical handling or emergencies.
- With the exception of language in the OSHA bloodborne pathogen standard¹ pertaining to use of lab coats for protection of work clothes from blood or other potentially infectious material, there are no design or test criteria specified in regulations or guidelines specific to lab coats. What this means is that:
 - Lab coats are not tested for typical conditions that might be encountered in a research lab with respect to chemical use, or combined research activities.
 - There is little or no information provided by manufacturers or distributors about the capability of a lab coat for a combination of hazards. A coat that is described as “flame resistant”, such as treated cotton, may not be chemical resistant or acid resistant.
 - A coat that is advertised as flame resistant has not been tested using criteria involving flammable chemicals on the coat. The term “flame resistant” refers to the characteristic of a fabric that causes it not to burn in air. The testing criteria involves applying an open flame to the bottom edge of a strip of fabric in a test chamber for 12 seconds and then looking at char length, after flame, and after glow, testing the self-extinguishing properties of the fabric. The flame resistance test criteria were intended to simulate circumstances of a flash fire, or electric arc flash, not a chemical fire.

B. Selection

B.1 Hazard Assessment

With the limitations above in mind, lab coats are made of different materials, and it is important to select a coat or coats of appropriate material for the types of hazards in the lab. The first step in this selection process is to determine the types of hazards that exist in your lab and the reasons for the lab coats. The Laboratory Hazard Assessment Checklist should be completed by the faculty member in charge of the research laboratory or undergraduate teaching laboratory.

B.2 Choosing the Right Lab Coat

While there are many different style features, from a protection standpoint the best coats have the following characteristics:

- Tight cuffs (knitted or elastic)
- Snap closures on the front for easy removal in case of contamination

¹ OSHA 29CFR 1910.1030(d)(3)(i) Provision. When there is occupational exposure, the employer shall provide, at no cost to the employee, appropriate personal protective equipment such as, but not limited to, gloves, gowns, laboratory coats, face shields or masks and eye protection, and mouthpieces, resuscitation bags, pocket masks, or other ventilation devices. Personal protective equipment will be considered “appropriate” only if it does not permit blood or other potentially infectious materials to pass through to or reach the employee’s work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time which the protective equipment will be used.

- Coats with different properties are easy to tell apart (ex: FR coats should have outer markings clearly identifying them as FR coats and can be ordered in a different color than other coats present in the lab)
- Proper fit
- Appropriate material for hazards to be encountered

Once you determine hazards, you can review information on some typical lab coat materials, with guidance on use and limitations, in the Lab Coat Table at the end of this document to help determine the best materials for your lab. As noted above, there are limited specifications for lab coat materials with respect to typical lab use scenarios, and most of the information is anecdotal. As more information becomes available, this table will be updated.

One coat may not work for all lab operations. Some people may want to provide a basic poly/cotton blend coat for most operations, but have available lab coats of treated cotton or Nomex for work involving pyrophoric materials, extremely flammable chemicals, large quantities of flammable chemicals, or work around hot processes or operations. If chemical splash is also a concern, use of a rubber apron over the flame resistant lab coat is recommended. Lab coat materials may be made of materials for limited reuse, or disposable one time use.

B.3 Flame Resistant (FR) Lab Coats

Work with pyrophoric, spontaneously combustible, or extremely flammable chemicals presents an especially high potential for fire and burn risks to the skin. OEHS recommends the use of fire retardant or fire resistant (FR) lab coats to provide additional skin protection where the individual will be working with these chemicals. The primary materials used for FR lab coats are FR-treated cotton or Nomex. Further information is available in Table I, as well as from the OEHS Office and WSU Science Stores.

C. Getting a Lab Coat

The Supervisor/PI is responsible for assuring that required PPE, including lab coats, is available, used, and maintained. Lab coats can be purchased from many sources through Science Stores. The WSU Chemistry Department provides the first reusable lab coat to each graduate student entering the graduate program. Table I includes ordering information for a variety of coat styles. Science Stores has a washer and dryer available in the basement of Science Hall. There is a small charge to the PI's group account for use of these facilities.

D. Lab Coat Use

When lab coats are in use, the following should be observed:

- Wear lab coats that fit properly. Lab coats are available in a variety of sizes. Some lab coat services also offer custom sizes (e.g., extra long sleeves, tall, or woman's fit). Lab coats should fasten close to the collar to provide optimal protection.
- Lab coats should be worn fully buttoned or snapped with sleeves down.
- Wear lab coats only when in the lab or work area. Remove lab coats when leaving the lab/work area to go home, to lunch, to the restroom, or meetings in conference rooms, etc.
- Used lab coats must remain within your research laboratory and should not be transferred to other laboratories. (For example, personal protective equipment including lab coats that are used in a BSL-2 facility must remain within the facility and are not to be transferred to other locations.)

D.1 Spill or Splash

In the event of a significant spill of a hazardous material on the lab coat, remove the coat immediately. If skin or personal clothing is impacted, it will be necessary to proceed to an emergency shower. Remove any contaminated clothing, and shower. Generally, significantly contaminated coats and clothing will be considered a hazardous waste, and must be managed based on the type of contamination. If you have questions about significance of contamination from a specific incident, contact the OEHS Office <http://research.wayne.edu/oehs/index.php> or (313) 993-7678.

If your coat becomes contaminated, please notify Walter Pociask, OEHS (313) 993-7655 to request information on proper disposal. If the coat must be discarded, document the loss of the coat and contact Science Stores (313) 577-3098 to order a replacement.

D.2 Emergency Fire Involving Lab Coat or Clothing

The action will depend on the circumstances of the fire. If only the lab coat is on fire, remove it, leave the area, and call

(313) 577-2222 or activate a fire alarm. If both lab coat and clothing are on fire, shout for help then stop, drop, and roll, or proceed to an emergency shower (if close by) to extinguish the fire. If the area is also on fire, leave the area, closing doors as you leave, stop drop and roll, or proceed to hallway safety shower, if available. Activate fire alarm or call the WSU Public Safety (7-2222 from campus phones or (313) 577-2222 from cell phones).
Seek follow-up medical attention.

E. Lab Coat Cleaning

Personnel are not allowed to launder lab coats at home. Clean non-disposable soiled lab coats routinely by use of the washer and dryer located near Science Stores. Soiled lab coats should only be transported through the buildings in secondary containment (e.g. – a closed plastic bag) in order to prevent contamination of areas outside of the research laboratory. The frequency of cleaning will depend on the amount of use and contamination. Follow the manufacturer's instructions regarding laundering of lab coats.

Table 1: Lab Coat Selection Chart

Material	Vendor and Model Info	Splash Resistance/Chemical Resistance	Flame Resistance	Comfort	Uses/Comment
Polyester/Cotton Blend Listed by percent polyester then percent cotton. 80/20 or 65/35 or 40/60 common. (Recommend at least 65%/35% for chemical research lab setting.)	Supplier: Cintas Manufacturer: Cintas Model: 59925 Supplier: North Star Manufacturer: Fashion Seal Model: 439	May be fluid resistant. Check information from manufacturer. Unknown chemical resistance. Anecdotally, better for work with acids than cotton.	No. Burns readily.	Lightweight breathable. The more cotton, the more breathable.	Most common for clinical settings (hospitals, clinical labs) and labs handling biological materials and small amounts of flammables. Limited testing indicates poly/cotton fabrics will burn readily upon contact with pyrophoric chemicals, so poly/cotton coats must not be worn for handling such chemicals.
100% Cotton	Supplier: Cintas Manufacturer: White Swan Model: 650 Supplier: North Star Manufacturer: Fashion Seal Model: 420	Not fluid resistant or fluid proof. Degraded by acids. Anecdotally, more resistant to solvents.	No. Burns less readily than poly/cotton blends, but still burns.	Lightweight breathable	Good for labs where acid handling is limited and splash resistance is not a concern, and there is some work with flammables, heat and flame. Supplement with an apron for acid handling.
FR treated materials (either 100 % Cotton or primarily cotton treated with flame retardant)	Supplier: Cintas Manufacturer: Red Kap Model: KP72WH Supplier: North Star Manufacturer: Bulwark Model: KEL2LB	Not necessarily fluid resistant. Degraded by acids. More resistant to solvents. Not generally tested for chemical resistance.	Somewhat.	No information.	Better for lab settings with significant fire hazard, with an understanding of the limitations of the testing criteria for flame resistance (see background). Supplement with an apron for acid handling. More costly. Will not lose flame resistance with laundering over typical use life of coat. No bleach should be used by the laundry service.
Dupont Nomex	Supplier: Cintas Manufacturer: White Knight Model: OM60 Supplier: North Star Manufacturer: Bulwark Model: KNL6RB	Unknown splash and chemical resistance. There is a claim for chemical resistance, including acids, alkalis, and most solvents, but specific testing information could not be found.	Yes.	Breathable.	Expensive. Flame resistance is maintained even with laundering, provided bleach is not used. Good for settings where there may be an arc flash or flash fire. Used in petrochemical industry. Limited testing demonstrates nomex does not burn readily on contact with pyrophoric materials so is a good material for such work.
Polypropylene lab coat.	Various models available from VWR through ECAT. Ex: VWR Cat. #414004-346	No.	No.	Breathable	Intended for protection from dirt, grime, dry particulates in relatively non-hazardous environment such as animal handling and clean rooms. Burns readily.
VWR Microbreathe Lab Coat	Available from VWR through ECAT VWR cat. #14001-814	Fluid resistant for blood and body fluids and chemicals	No	Breathable	Disposable. For clinical and biological lab settings, and some chemical labs. Snap front, so can be readily removed. Not good for settings with significant fire hazard.
Kimberley Clark A65 Lab Coat (Disposable FR Coat)	Available from VWR through ECAT.	No Information.	Yes.	Breathable	Product literature mentions lab use.
Reusable Fluid Resistant Coats	Supplier: Cintas Manufacturer: White Knight Model: BAR 01 Supplier: North Star Manufacturer: Fashion Seal Model: 6403	Front material reportedly fluid resistant; "breathable" back material is not.	No	Permeable material in back of coat to increase comfort.	Generally the front and sleeves are "fluid resistant" material, while the back is a more permeable material for user comfort.

Table 1: Lab Coat Selection Chart

Material	Vendor and Model Info	Splash Resistance/Chemical Resistance	Flame Resistance	Comfort	Uses/Comment
Proban FR-7A coveralls	Available from LabSource; cat no: 1807300EA Manufacturer: Chicago Protective Apparel	Unknown splash and chemical resistance	Yes	Breathable	Proban®/FR-7A® 100% cotton fabrics are guaranteed to retain their flame resistance for 25 industrial or 50 home launderings.

A-2 Glove Selection Chart

RESISTANCE OF MATERIALS

CHEMICAL	Neoprene	Vinyl Plastic	Rubber Latex	Nitrile	Synthetic Latex	Natural Latex
Alcohols	E	E	G	E	E	G
Caustics	E	E	E	E	E	E
Chlorinated solvents	G	F	NR	E	G	NR
Ketones	G	NR	G	G	G	G
Petroleum solvents	E	G	F	S	E	F
Organic acids	E	E	E	E	E	E
Inorganic acids	E	E	E	E	E	E
Non-chlorinated solvents	G	F	NR	G	G	NR
Insecticides	E	E	F	S	E	F
Inks	E	E	F	S	E	F
Formaldehyde	E	E	E	S	S	E
Acrylonitrile	E	G	E	S	E	E
Hydraulic fluid	E	E	F	S	E	F
Carbon disulfide	NR	F	G	F	NR	G
Paint remover	F	F	NR	E	F	NR

SOURCE: WSU Chemical Hygiene Plan

S=Superior

E=Excellent

G=Good

F=Fair

NR = Not Recommended

WSU policies: The WSU Chemical Hygiene Plan requires individuals to wear appropriate gloves when there is a potential for skin contact with chemicals. Gloves should be inspected before each use. Disposable gloves should never be washed and reused. Rubber and utility gloves should be washed before removal and replaced whenever there are cracks or tears in the material.

A-3

Eye and Face Protection Selection Chart

Hazard	Protectors	Limitations	Marking ¹
IMPACT			
Flying fragments, objects, large chips, particles, sand, dirt, etc.	<ul style="list-style-type: none"> • Safety glasses with side protection • Goggles with direct or indirect ventilation • Face shield worn over safety glasses or goggles • Loose fitting respirator worn over safety glasses or goggles • Full facepiece respirators 	<p>To provide adequate protection, ensure that goggles fit tightly to the face.</p> <p>Atmospheric conditions and the restricted ventilation of a protector can cause lenses to fog. Frequent cleaning may be required.</p>	Impact rated + (spectacle lens) Z87+ (all other lens) Z87+ (plano frame) Z87-2+ (RX frame))
CHEMICAL			
Splash, droplets and sprays	<ul style="list-style-type: none"> • Goggles with indirect ventilation (eyecup or cover type) • Face shield worn over goggles • Loose-fitting respirator worn over safety glasses or goggles • Full-facepiece respirator 	<p>Atmospheric conditions and the restricted ventilation of a protector can cause lenses to fog. Frequent cleaning may be required.</p> <p>To provide adequate protection, ensure goggles fit tightly to the face.</p>	Splash/droplet: D3
Irritating Mist	<ul style="list-style-type: none"> • Goggles with no ventilation (cover type) • Face shield worn over goggles • Loose-fitting respirator worn over safety glasses or goggles • Full-facepiece respirator 	<p>Atmospheric conditions and the restricted ventilation of a protector can cause lenses to fog. Frequent cleaning may be required.</p> <p>To provide adequate protection, ensure goggles fit tightly to the face.</p>	NOTE: There are currently no marking designations for eye protection to irritating mists exposure in the ANSI/ISEA Z87.1-2015 standard
DUST			
Nuisance dust	<ul style="list-style-type: none"> • Goggles with direct or indirect ventilation (eyecup or cover type) • Full-facepiece respirator 	<p>Atmospheric conditions and the restricted ventilation of a protector can cause lenses to fog. Frequent cleaning may be required.</p> <p>To provide adequate protection, ensure goggles fit tightly to the face.</p>	Dust: D4
Fine dust	<ul style="list-style-type: none"> • Goggles with indirect ventilation or no ventilation • Full facepiece respirator 	To provide adequate protection, ensure goggles fit tightly to the face.	Fine dust: D5

WSU policies: The WSU Chemical Hygiene Plan requires appropriate eye protection to be worn by all persons, including visitors, where chemicals are stored or handled. Contact lenses must not be worn in the lab unless eye protection is being worn at all times.

A-3

Eye and Face Protection Selection Chart

Hazard	Protectors	Limitations	Marking ¹
OPTICAL RADIATION			
Infrared radiation (IR)	<ul style="list-style-type: none"> • Safety glasses with side protection • Goggles with direct or indirect ventilation • Face shield worn over safety glasses or goggles • Welding helmet worn over safety glasses or goggles • Loose-fitting respirator worn over safety glasses or goggles • Full-facepiece respirators 	<p>For proper fit of protector, there shall be no penetration of direct infrared of direct infrared spectra light in all non-lens areas.</p> <p>Side shields shall have filtering capability equal to or greater than the front lenses.</p>	IR: R and scale number
Visible Light (Glare)	<ul style="list-style-type: none"> • Safety glasses with side protection • Goggles with direct or indirect ventilation • Face shield worn over safety glasses or goggles • Welding helmet worn over safety glasses or goggles • Loose-fitting respirator worn over safety glasses or goggles • Full-facepiece respirators 	<p>For proper fit of protector, there shall be no penetration of direct infrared of direct infrared spectra light in all non-lens areas.</p> <p>Side shields shall have filtering capability equal to or greater than the front lenses.</p>	Visible: L and scale number
Ultraviolet Radiation (UV)	<ul style="list-style-type: none"> • Safety glasses with side protection • Goggles with direct or indirect ventilation • Face shield worn over safety glasses or goggles • Welding helmet worn over safety glasses or goggles • Loose-fitting respirator worn over safety glasses or goggles • Full-facepiece respirators 	<p>For proper fit of protector, there shall be no penetration of direct infrared of direct infrared spectra light in all non-lens areas.</p> <p>Side shields shall have filtering capability equal to or greater than the front lenses.</p>	UV: U and scale number
Lasers	Refer to ANSI Z136.1-2014 "Safe Use of Lasers", for guidance in choosing the correct protective eye wear when working with lasers		There are currently no marking designations for eye protection to Lasers in the ANSI/ISEA Z87.1-2015 standard.

¹ Refer to ANSI/ISEA Z87.1-2015 Table 3 for complete marking requirements.

Source: International Safety Equipment Association, Eye and Face Protection Selection Tool, ANSI/ISEA z87.1-2015

Appendix B: M&C Division OSHA “particularly hazardous substances” list¹

CHEMICAL NAME	CAS #	Select Carcin	Repro Toxin	Acute Toxic	Skin Haz.
2,4,5-T	000093-76-5		X		
ACETALDEHYDE	000075-07-0	X			
ACETAMIDE	000060-35-5	X			
ACETYLAMINOFLUORENE,2-	000053-96-3	X			
ACROLEIN	000107-02-8			X	
ACRYLAMIDE	000079-06-1	X			X
ACRYLONITRILE	000107-13-1	X		X	X
ADIPONITRILE	000111-69-3			X	
ADRIAMYCIN	023214-92-8	X			
AFLATOXIN M1	006795-23-9	X			
AFLATOXINS	001402-68-2	X			
AF-2[2-(2-FURYL)-3-(5-NITRO-2-FURYL)ACRYLAMIDE]	003688-53-7	X			
AMINOANTHRAQUINONE, 2-	000117-79-3	X			
AMINOAZOBENZENE,para-	000060-09-3	X			
AMINOAZOTOULENE,ortho-	000097-56-3	X			
AMINODIPHENYL,4-, “s”	000092-67-1	X			X
AMINOPTERIDINE	000054-62-6		X		
AMINO-2-METHYLANTHRAQUINONE, 1-	000082-28-0	X			
AMINO-3,4-DIMETHYL-3h-IMIDAZO(4,5f)QUINOLINE,2-	077094-11-2	X			
AMINO-3,8-DIMETHYL-3H-IMIDAZO(4,5-f) QUINOXALINE, 2-	077500-04-0	X			
AMINO-5-(5-NITRO-2-FURYL)-1,3,4-THIADIAZOLE, 2-	000712-68-5	X			
AMITROLE	000061-82-5	X			
AMMONIA (GAS)	007664-41-7			X	
AMMONIUM DICHROMATE (VI)	007789-09-5	X			
ANDROGENIC (ANABOLIC) STEROIDS	000000-00-0	X	X		
ANILINE AND COMPOUNDS	000062-53-3			X	X
ANISIDINE, ORTHO-	000090-04-0	X			X
ANISIDINE HYDROCHLORIDE, o-	000134-29-2	X			
ANTHRACENEDIONE,9,10-, 1,4,5,8-TETRAAMINO	002475-45-8	X			
ANTHRAQUINONE, 1,8-DIHYDROXY	000117-10-2	X			
ANTIMONY OXIDE	001309-64-4	X			
ANTINEOPLASTIC AGENTS	000000-00-0		X		
ANTITHYROID DRUGS	000000-00-0		X		
ARAMITE	000140-57-8	X			
ARSENEOUS ACID, CALCIUM SALT (2:1)	015194-98-6	X			
ARSENEOUS ACID, POTASSIUM SALT	013464-35-2	X			
ARSENIC ACID	007778-39-4	X	X	X	
ARSENIC ACID, CALCIUM SALT	010103-62-5	X			
ARSENIC ACID, CALCIUM SALT (2:3)	007778-44-1	X			
ARSENIC ACID, DISODIUM SALT, HEPTAHYDRATE	010048-95-0	X			
ARSENIC ACID, LEAD(2+) SALT (1:1)	007784-40-9	X			
ARSENIC ACID, MONOPOTASSIUM SALT	007784-41-0	X			
ARSENIC ACID, SODIUM SALT	007631-89-2	X			
ARSENIC AND COMPOUNDS	007440-38-2	X	X		
ARSENIC COMPOUNDS	000000-00-0	X	X		
ARSENIC PENTAFLUORIDE	007784-36-3	X	X	X	
ARSENIC PENTOXIDE	001303-28-2	X			
ARSENIC TRIOXIDE	001327-53-3	X	X	X	
ARSENIUOS ACID, CALCIUM SALT	027152-57-4	X			

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Appendix B: M&C Division OSHA “particularly hazardous substances” list¹

CHEMICAL NAME	CAS #	Select Carcin	Repro Toxin	Acute Toxic	Skin Haz.
ARSENIUOS ACID, MONOSODIUM SALT	007784-46-5	X			
ARSINE	007784-42-1			X	
ARSONIC ACID, CALCIUM SALT (1:1)	052740-16-6	X			
ASBESTOS	001332-21-4	X			
ASBESTOS, ACTINOLITE	077536-66-4	X			
ASBESTOS, AMOSITE	012172-73-5	X			
ASBESTOS, ANTHOPHYLLITE	077536-67-5	X			
ASBESTOS, CHRYSOTILE	012001-29-5	X			
ASBESTOS, CROCIDOLITE	012001-28-4	X			
ASBESTOS, TREMOLITE	077536-68-6	X			
ATRAZINE	001912-24-9	X			
AURAMINE, TECHNICAL-GRADE	000492-80-8	X			
AZACITIDINE	000320-67-2	X			
AZASERINE	000115-02-6	X			
AZATHIOPRINE	000446-86-6	X			
AZBLLEN ASBESTOS	017068-78-9	X			
A-a-C(2-AMINO-9H-PYRIDO[2,3-b]INDOLE)	000000-00-0	X			
BARIUM CHROMATE(VI)	010294-40-3	X			
BENZENE	000071-43-2	X	X		
BENZIDINE	000092-87-5	X			
BENZIDINE, 2,3'-DIMETHOXY-,DIHYDROCHLORIDE	020325-40-0	X			
BENZIDINE, 3,3'-DICHLORO-, DIHYDROCHLORIDE	000612-83-9	X			
BENZIDINE-BASED DYES	000000-00-0	X			
BENZOFURAN	000271-89-6	X			
BENZOTRICHLORIDE	000098-07-7	X			
BENZO[a]PYRENE	000050-32-8	X			
BENZO[b]FLUORANTHENE	000205-99-2	X			
BENZO[f]FLUORANTHENE	000205-82-3	X			
BENZO[k]FLUORANTHENE	000207-08-9	X			
BENZYL VIOLET 4B	001694-09-3	X			
BENZ[a]ANTHRACENE	000056-55-3	X			
BERYLLIUM ALUMINUM ALLOY	012770-50-2	X			
BERYLLIUM ALUMINUM SILICATE	001302-52-9	X			
BERYLLIUM AMD COMPOUNDS	007440-41-7	X			
BERYLLIUM CHLORIDE	007787-47-5	X			
BERYLLIUM COMPOUNDS	000000-00-0	X			
BERYLLIUM FLUORIDE	007787-49-7	X			
BERYLLIUM HYDROGEN PHOSPHATE (1:1)	013598-15-7	X			
BERYLLIUM HYDROXIDE	013327-32-7	X			
BERYLLIUM OXIDE	001304-56-9	X			
BERYLLIUM OXIDE CARBONATE	066104-24-3	X			
BERYLLIUM SULFATE, TETRAHYDRATE (1:1:4)	007787-56-6	X			
BERYLLIUM SULFATE (1:1)	013510-49-1	X			
BERYLLIUM ZINC SILICATE	039413-47-1	X			
BETEL QUID WITH TOBACCO	000000-00-0	X			
BISCHLOROETHYL NITROSOUREA (BCNU)	000154-93-8	X			
BITUMENS,EXTRACTS OF STEAM-&AIR- REFINED	008052-42-4	X			
BLEOMYCIN, HYDROCHLORIDE	067763-87-5	X			
BLEOMYCIN SULFATE	009041-93-4	X			

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CHEMICAL NAME	CAS #	Select Carcin	Repro Toxin	Acute Toxic	Skin Haz.
BLEOMYCINS	000000-00-0	X			
BLEOMYCINS	011056-06-7	X			
BORON TRIBROMIDE	010294-33-4			X	
BORON TRIFLUORIDE	007637-07-2			X	
BRACKEN FERN	000000-00-0	X			
BROMINE	007726-95-6			X	
BROMINE PENTAFLUORIDE	007789-30-2			X	
BROMOACETONE	000598-31-2			X	
BROMODICHLOROMETHANE	000075-27-4	X		X	
BUSULFAN	000055-98-1		X		
BUTADIENE,1,3-	000106-99-0	X			
BUTANE, (+-)-1,2:3,4-DIEPOXY-	000298-18-0	X			
BUTANEDIOL DIMETHANESULPHONATE,1,4- (MYLERAN)	000055-98-1	X			
BUTYLATED HYDROXYANISOLE (BHA)	025013-16-5	X			
BUTYLATED HYDROXYANISOLE (BHA)	030031-64-2	X			
BUTYRIC ACID, 4-(N-BUTYL-N-NITROSAMINO)-	038252-74-3	X			
BUTYROLACTONE,BETA-	003068-88-0	X			
CADMIUM AND COMPOUNDS	007440-43-9	X	X		
CADMIUM CARBONATE	000513-78-0	X			
CADMIUM CHLORIDE	010108-64-2	X			
CADMIUM COMPOUNDS	000000-00-0	X			
CADMIUM FLUOBORATE	014486-19-2	X			
CADMIUM NITRATE	010325-94-7	X			
CADMIUM OXIDE	001306-19-0	X			
CADMIUM SULFATE (1:1)	010124-36-4	X			
CADMIUM SULFIDE	001306-23-6	X			
CAFFEIC ACID	000331-39-5	X			
CALCIUM CHROMATE (VI)	013765-19-0	X			
CAPTAFOL	002425-06-1	X			
CARBAMIC ACID, N-METHYL-N-NITROSO,ETHYL_ ESTER	000615-53-2	X			
CARBON DISULFIDE	000075-15-0		X		X
CARBON MONOXIDE	000630-08-0		X		
CARBON TETRACHLORIDE	000056-23-5	X			X
CARBON-BLACK EXTRACTS	000000-00-0	X			
CARRAGEENAN, DEGRADED	009000-07-1	X			
CERAMIC FIBERS (RESPIRABLE SIZE)	000000-00-0	X			
CHLORAMBUCIL	000305-03-3	X	X		
CHLORAMPHENICOL	000056-75-7	X			
CHLORDANE	000057-74-9	X			
CHLORDANE	012789-03-6	X			
CHLORDANE, ALPHA	005103-71-9	X			
CHLORDANE, BETA	005103-74-2	X			
CHLORDANE, GAMMA	005566-34-7	X			
CHLORENDIC ACID	000115-28-6	X			
CHLORINATED PARAFFINS (CARBON-12, 60% CHLORINE)	108171-26-2	X			
CHLORINATED PARAFFINS (CARBON-23, 43%CHLORINE)	108171-27-3	X			
CHLORINATED TOULENES, ALPHA-	000000-00-0	X			
CHLORINE TRIFLUORIDE	007790-91-2			X	
CHLOROETHYL(2)-3-CYCLOHEXYL-1-NITROSOUREA,1-	013010-47-4	X			

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Appendix B: M&C Division OSHA “particularly hazardous substances” list¹

CHEMICAL NAME	CAS #	Select Carcin	Repro Toxin	Acute Toxic	Skin Haz.
CHLOROETHYL(2)-3-(4-METHYLCYCLOHEXYL)-1-NITROUREA,1-	013909-09-6	X			
CHLOROFORM	000067-66-3	X			
CHLOROMETHYL ETHER,BIS-	000542-88-1	X			
CHLOROMETHYL METHYL ETHER	000107-30-2	X			
CHLOROPHENOL, meta-	000108-43-0	X			
CHLOROPHENOLS	000000-00-0	X			
CHLOROPHENOXY HERBICIDES	000000-00-0	X			
CHLOROPICRIN	000076-06-2			X	
CHLOROPRENE	000126-99-8		X		X
CHLOROZOTOCIN	054749-90-5	X			
CHLORO-2-METHYLPROPENE, 3-	000563-47-3	X			
CHLORO-ortho-PHENYLENEDIAMINE,4-	000095-83-0	X			
CHLORO-ortho-TOLUIDINE, para-	000095-69-2	X			
CHLORO-O-TOLUIDINE HYDROCHLORIDE, 4-	003165-93-3	X			
CHROMATE(1-),HYDROXYOCTAOXODIZINCATEDI-	011103-86-9	X			
CHROMIC ACID, DISODIUM SALT	007775-11-3	X			
CHROMIC ACID, LEAD(2+) SALT (1:1)	007758-97-6	X			
CHROMITE (MINERAL)	001308-31-2	X			
CHROMIUM, DICHLORODIOXO-	014977-61-8	X			
CHROMIUM, HEXAVALENT AND COMPOUNDS	007440-47-3	X			
CHROMIUM CARBONATE	029689-14-3	X			
CHROMIUM COUMPOUNDS,HEXAVALENT	000000-00-0	X			
CHROMIUM PHOSPHATE	007789-04-0	X			
CHROMIUM TRIACETATE	001066-30-4	X			
CHROMIUM (III) OXIDE (2:3)	001308-38-9	X			
CHROMIUM (VI) OXIDE (1:3)	001333-82-0	X			
CHROMIUM (VI)CHLORIDE,	014986-48-2	X			
CI ACID RED 114	006485-34-3	X			
CI DIRECT BLUE 15	002429-74-5	X			
CISPLATIN	015663-27-1	X			
CITRUS RED NO. 2	006358-53-8	X			
COAL TAR	065996-89-6	X			
COAL TAR DISTILLATE	065996-92-1	X			
COAL TAR DYE	000000-00-0	X			
COAL-TAR	008007-45-2	X			
COAL-TAR PITCHES	065996-93-2	X			
COBALT	007440-48-4	X			
COBALT, BIS(CARBONATA(2-))HEXAHYDROXYPENTA-	051839-24-8	X			
COBALT, TRI-MU-CARBONYLNONACARBONYLTETRA-	010210-68-1	X			
COBALT, (MU(CARBONATO(2-)-O'O'))DIHYDROXYDI	012069-68-0	X			
COBALT ACETATE	000071-48-7	X			
COBALT ALLOY, CO, CR	011114-92-4	X			
COBALT CARBONATE	000513-79-1	X			
COBALT CARBONATE, COBALT DIHYDROXIDE (2:3)	012602-23-2	X			
COBALT CARBONYL	017786-31-1	X			
COBALT DINITRATE HEXAHYDRATE	010026-22-9	X			

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CHEMICAL NAME	CAS #	Select Carcin	Repro Toxin	Acute Toxic	Skin Haz.
COBALT HYDROXIDE	001307-64-4	X			
COBALT HYDROXIDE OXIDE	012016-80-7	X			
COBALT NAPHTHATE	061789-51-3	X			
COBALT OXIDE	001308-05-1	X			
COBALT TRIACETATE	000917-69-1	X			
COBALT (2+) SULFIDE	001317-42-6	X			
COBALT (III) OXIDE	001308-04-9	X			
COBALT (II) ACETATE	006147-53-1	X			
COBALT(2+) OXIDE	001307-96-6	X			
COBALT(II) CHLORIDE	007646-79-9	X			
COBALT(II) CHLORIDE, HEXAHYDRATE	007791-13-1	X			
COBALT(II) HYDROXIDE	021041-93-0	X			
COBALT(II) NITRATE (1:2)	010141-05-6	X			
COBALT(II) SULFATE (1:1)	010124-43-3	X			
COBALT-CHROMIUM-MOLYBDENUM ALLOY	012629-02-6	X			
COBALT-CHROMIUM-NICKEL-TUNGSTEN ALLOY	012638-07-2	X			
COBLAT MOLYBDATE(VI)	013762-14-6	X			
CONESTORAL	000438-67-5	X			
COUMARIN ANTICOAGULANTS	000000-00-0		X		
CREOSOTES	008001-58-9	X			
CRESIDINE, para-	000120-71-8	X			
CRESOATE, WOOD	008021-39-4	X			
CUPFERRON	000135-20-6	X			
CYANAMIDE	000420-04-2			X	
CYANIDES	000057-12-5			X	X
CYANOGEN	000460-19-5			X	
CYCASIN	014901-08-7	X			
CYCLOPENTA(C)FURO(3',3':4,5)FOURO(2,3-H)(1)BENZOPYRAN	001162-65-8	X			
CYCLOPHOSPHAMIDE	000050-18-0	X	X		
CYCLOPHOSPHAMIDE	006055-19-2	X			
CYCLOSPORIN	079217-60-0	X			
CYCLOSPORIN A	059865-13-3	X			
C.I. BASIC RED 9 MONOHYDROCHLORIDE	000569-61-9	X			
DACARBAZINE	004342-03-4	X			
DAUNOMYCIN	020830-81-3	X			
DDT	000050-29-3	X	X		X
DECABORANE	017702-41-9			X	X
DIACETYLBENZIDINE,N,N'-	000613-35-4	X			
DIAMINOANISOLE, 2,4-	000615-05-4	X			
DIAMINOANISOLE SULPHATE, 2,4-	039156-41-7	X			
DIAMINODIPHENYL ETHER, 4,4'-	000101-80-4	X			
DIAMINOTOLUENE, 2,4-	000095-80-7	X			
DIAZEPAM	000439-14-5		X		
DIBENZO[a, e]PYRENE	000192-65-4	X			
DIBENZO[a, h]PYRENE	000189-64-0	X			
DIBENZO[a, i]PYRENE	000189-55-9	X			
DIBENZO[a, l]PYRENE	000191-30-0	X			
DIBENZO[c, g]CARBAZOLE, 7H-	000194-59-2	X			

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Appendix B: M&C Division OSHA “particularly hazardous substances” list¹

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DIBENZ[a, h]ACRIDINE	000226-36-8	X			
DIBENZ[a, h]ANTHRACENE	000053-70-3	X			
DIBENZ[a, j]ACRIDINE	000224-42-0	X			
DIBORANE	019287-45-7			X	
DIBROMOPROPYL(2,3)PHOSPHATE, TRIS	000126-72-7	X			
DIBROMO-3-CHLOROPROPANE,1,2-	000096-12-8	X	X		
DICHLOROACETYLENE	007572-29-4			X	
DICHLOROBENZENE, para-	000106-46-7	X			
DICHLOROBENZIDINE,3,3'-	000091-94-1	X			X
DICHLOROETHANE, 1,2-	000107-06-2	X			
DICHLOROETHANE,1,1-,2-(O-CHLOROPHENYL)-2(P-CHLOROPHENYL)	000053-19-0	X			
DICHLOROMETHANE	000075-09-2	X			
DICHLOROPROPENE, 1,3- (TECHNICAL-GRADE)	000542-75-6	X			X
DICHLORO-2,2-BIS(P-CHLOROPHENYL)ETHANE, 1,1- (DDD)	000072-54-8	X			
DICHLORO-2,2-BIS(P-CHLOROPHENYL)ETHYLENE, 1,1- (DDE)	000072-55-9	X			
DICHLORO-4,4'-DIAMINODIPHENYL ETHER, 3,3'-	028434-86-8	X			
DICHLORVOS	000062-73-7	X			
DIEPOXYBUTANE	001464-53-5	X			
DIESEL ENGINE EXHAUST	000000-00-0	X			
DIESEL FUEL MARINE	000000-00-0	X			
DIETHYL SULPHATE	000064-67-5	X			
DIETHYLHYDRAZINE, 1,2-	001615-80-1	X			
DIETHYLSTILBOESTROL	000056-53-1	X	X		
DIGLYCIDYL RESORCINOL ETHER	000101-90-6	X			
DIHYDROSAFROLE	000094-58-6	X			
DIISOPROPYL SULFATE	002973-10-6	X			
DIMETHOXYBENZIDINE, 3,3'- (o-DIANISIDINE)	000119-90-4	X			
DIMETHYL SULFATE	000077-78-1	X		X	X
DIMETHYL SULFOXIDE	000067-68-5		X		X
DIMETHYLAMINOAZOBENZENE, para-	000060-11-7	X			
DIMETHYLBENZIDINE, 3,3'- (o-TOLIDINE)	000119-93-7	X			
DIMETHYLCARBAMOYL CHLORIDE	000079-44-7	X			
DIMETHYLFORMAMIDE,N,N-	000068-12-2	X			
DIMETHYLHYDRAZINE, 1,1-	000057-14-7	X			X
DIMETHYLHYDRAZINE, 1,2-	000540-73-8	X			
DIMETHYLVINYL CHLORIDE	000513-37-1	X			
DINITROPYRENE, 1,6-	042397-64-8	X			
DINITROPYRENE, 1,8-	042397-65-9	X			
DIOXANE, 1,4-	000123-91-1	X			X
DIRECT BLACK 38	001937-37-7	X			
DIRECT BLUE 6	002602-46-2	X			
DISPERSE BLUE 1	002475-45-8	X			
DI(2-ETHYLHEXYL)PHTHALATE	000117-81-7	X			
ENDOSULFAN	000115-29-7			X	X
ENDRIN	000072-20-8			X	X

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EPICHLOROHYDRIN	000106-89-8	X			X
ERIONITE	012510-42-8	X			
ERIONITE	066733-21-9	X			
ESTRADIOL-17	000050-28-2	X			
ESTRA-1,2,5(10),7-TETRAEN-17-ONE,3-(SULFOOXY)-, SODIUM SALT	016680-47-0	X			
ESTRONE	000053-16-7	X			
ETHINYLESTRADIOL	000057-63-6	X			
ETHYL ACRYLATE	000140-88-5	X			X
ETHYL ALCOHOL CONSUMPTION	000064-17-5		X		
ETHYL METHANESULPHONATE	000062-45-7	X			
ETHYLENE CHLOROXYDRIN	000107-07-3			X	X
ETHYLENE DIBROMIDE	000106-93-4	X	X		X
ETHYLENE GLYCOL ETHERS	000000-00-0		X		
ETHYLENE OXIDE	000075-21-8	X	X		
ETHYLENE THIOUREA	000096-45-7	X			
ETHYLENEIMINE	000151-56-4	X			
ETHYL-N-NITROSOUREA,N-	000759-73-9	X			
FLUORINE	007782-41-4			X	
FORMALDEHYDE	000050-00-0	X			
FOWLER'S SOLUTION	001332-10-1	X			
FUEL OIL, RESIDUAL	068476-33-5	X			
FURAN	000110-00-9	X			
GASOLINE	008006-61-9	X			
GASOLINE, ENGINE EXHAUST FUMES	000000-00-0	X			
GERMANE	007782-65-2			X	
GLASSWOOL (RESPIRABLE SIZE)	000000-00-0	X			
GLU-P-1 (2-AMINO-6-METHYLDIPYRIDO[1,2-a:3',2'-d] IMIDAZOLE)	067730-11-4	X			
GLU-P-2(2-AMINODIPYRIDO[1,2-A:3',2' D]IMIDAZOLE)	067730-10-3	X			
GLYCIDALDEHYDE	000765-34-4	X			
GLYCIDOL	000556-52-5	X			
GOSSYPOL	000303-45-7		X		
GRISEOFULVIN	000126-07-8	X			
HALOTHANE	000151-67-7		X		
HC BLUE 1	002784-94-3	X			
HEPTACHLOR	000076-44-8	X			
HEPTACHLOR EPOXIDE	001024-57-3	X			
HEXACHLOROBENZENE	000118-74-1	X	X		
HEXACHLOROETHANE	000067-72-1	X			
HEXACHLOROHEXANES	000608-73-1	X			
HEXAMETHYLPHOSPHORAMIDE	000680-31-9	X			
HYDRAZINE	000302-01-2	X			X
HYDRAZINE, SULFATE (1:1)	010034-93-2	X			
HYDRAZOBENZENE	000122-66-7	X			
HYDROGEN CYANIDE	000074-90-8			X	X

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HYDROGEN FLUORIDE	007664-39-3			X	X
HYDROGEN SELENIDE	007783-07-5			X	
HYDROGEN SULFIDE	007783-06-4			X	
INDENO[1,2,3-cd]PYRENE	000193-39-5	X			
IQ(2-AMINO-3-METHYLIMIDAZO[4,5-f]QUINOLINE)	076180-96-6	X			
IRON-DEXTRAN COMPLEX	009004-66-4	X			
ISOPRENE	000078-79-5	X			
KEPONE (CHLORDECONE)	000143-50-0	X			
LASIOCARPINE	000303-34-4	X			
LEAD ACETATE	000301-04-2	X			
LEAD ACETATE (II) TRIHYDRATE	006085-56-4	X			
LEAD AND COMPOUNDS	007439-92-1	X	X		
LEAD CHROMATE (VI) OXIDE	018454-12-1		X		
LEAD COMPOUNDS, INORGANIC	000000-00-0	X	X		
LEAD (II) PHOSPHATE (3:2)	007446-27-7	X			
LINDANE, ALPHA	000319-84-6	X			
LINDANE, BETA	000319-85-7	X			
LINDANE AND OTHER HEXACHLOROCYCLOHEXANE ISOMERS	000058-89-9	X			X
LITHIUM	007439-93-2		X		
LITHIUM CARBONATE	000554-13-2		X		
LITHIUM CITRATE	000846-59-1		X		
MAGENTA (CONTAINING CI BASIC RED 9)	000632-99-5	X			
MeA-ALPHA-C(2-AMINO-3-METHYL-9H-PYRIDO[2,3- b] INDOLE)	068006-83-7	X			
MECOPROP	000093-65-2	X			
MEDROXYPROGESTERONE	000071-58-9	X			
MELPHALAN	000148-82-3	X			
MERCHALAN	000531-76-0	X			
MERCURY	007439-97-6		X		X
MERCURY, INORGANIC COMPOUNDS	000000-00-0		X		X
MESTRANOL	000072-33-3	X			
METHANE,TERANITRO-	000509-14-8	X			
METHIMAZOLE	000060-56-0		X		
METHOXSALEN AND UV RADIATION	000298-81-7	X			
METHOXYSORALEN,5-	000484-20-8	X			
METHYL BROMIDE	000074-83-9			X	X
METHYL CYCLOPENTADIENYL MANGANESE TRICARBONYL	012108-13-3			X	X
METHYL HYDRAZINE	000060-34-4			X	
METHYL ISOCYANATE	000624-83-9			X	X
METHYL MERCURY	022967-92-6		X		
METHYL METHANESULPHONATE	000066-27-3	X			
METHYLAMINOPTERIN	000059-05-2		X		
METHYLANILINE, 2,6-	000087-62-7	X			
METHYLAZIRIDINE, 2- (PROPYLENEIMINE)	000075-55-8	X			

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CHEMICAL NAME	CAS #	Select Carcin	Repro Toxin	Acute Toxic	Skin Haz.
METHYL AZOXYMETHANOL	000590-96-5	X			
METHYL AZOXYMETHANOL ACETATE	000592-62-1	X			
METHYLCHRYSENE, 5-	003697-24-3	X			
METHYLDICHLOROARSINE	000593-89-5			X	
METHYLENE BIS(2-CHLOROANILINE), 4,4- (MBOAC)	000101-14-4	X			X
METHYLENE BIS(2-METHYLANILINE), 4,4'-	000838-88-0	X			
METHYLENEBIS(N,N-DIMETHYL)BENZENAMINE, 4,4'	000101-61-1	X			
METHYLENEDIANILINE, 4,4'- AND ITS DIHYDROCHLORIDE	000101-77-9	X			
METHYLENEDIANILINE,4,4'-DIHYDROCHLORIDE	013552-44-8	X			
METHYLTHIOURACIL	000056-04-2	X			
METHYL-1-NITROANTHRAQUINONE, 2- (UNCERTAIN PURITY)	000129-15-7	X			
METHYL-N-NITROSOURETHANE, N-	000000-00-0	X			
METHYL-N-NITRO-N'-NITROSOGUANIDINE,N-(MNNG)	000070-25-7	X			
METRONIDAZOLE	000443-48-1	X			
MICHLER'S KETONE	000090-94-8	X			
MINERAL OILS, UNTREATED AND MILDLY TREATED	000000-00-0	X			
MIREX	002385-85-5	X	X		
MITOMYCIN C	000050-07-7	X			
MOLYBDATE ORANGE	012656-85-8	X			
MONOCROTALINE	000315-22-0	X			
MORPHOLINOMETHYL-3-[(5- NITROFURFURYLIDENE) AMINO], 5-	003031-51-4	X			
MUSTARD GAS (SULPHUR MUSTARD)	000505-60-2	X			
NAFENOPIN	003771-19-5	X			
NAPHTHYL METHYL CARBAMATE	000063-25-2		X		
NAPHTHYLAMINE, 2-	000091-59-8	X			X
NAPHTHYLAMINE, ALPHA-	000134-32-7	X			X
NAPHTHYLAMINE,N,N-BIS(2CHLOROETHYL)-2-	000494-03-1	X			
NICKEL, METALLIC	007440-02-0	X			
NICKEL ALLOY AISI 687	011068-91-0	X			
NICKEL BISCYCLOPENDADIENE	001271-28-9	X			
NICKEL CARBONYL	013463-39-3	X		X	
NICKEL CARBONYL	013464-39-3	X			
NICKEL COMPOUNDS	000000-00-0	X			
NICKEL SULFIDE (3:20)	012035-72-2	X			
NICKEL (III) HYDROXIDE	012125-56-3	X			
NICKEL (II) ACETATE (1:2)	000373-02-4	X			
NICKEL (II) CARBONATE (1:1)	003333-67-3	X			
NICKEL (II) HYDROXIDE	012054-48-7	X			
NICKEL (II) OXIDE (1:1)	001313-99-1	X			
NICOTINE	000054-11-5		X	X	X
NIRIDAZOLE	000061-57-4	X			
NITRIC ACID (FUMING)	007697-37-2			X	X
NITRIC OXIDE	010102-43-9			X	

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NITRILOTRIACETIC ACID	005064-31-3	X			
NITRILOTRIACETIC ACID, DISODIUM SALT	015467-20-6	X			
NITRILOTRIACETIC ACID, DISODIUM SALT, MONOHYDRATE	023255-03-0	X			
NITRILOTRIACETIC ACID, MONOSODIUM SALT	018994-66-6	X			
NITRILOTRIACETIC ACID, SODIUM SALT	010042-84-9	X			
NITRILOTRIACETIC ACID, TRISODIUM SALT, MONOHYDRATE	018662-53-8	X			
NITRILOTRIACETIC ACID AND SALTS	000139-13-9	X			
NITROACENAPHTHENE, 5-	000602-87-9	X			
NITROBIPHENYL, 4-	000092-93-3	X			
NITROCHRYSENE, 6-	007496-02-8	X			
NITROFEN (TECHNICAL-GRADE)	001836-75-5	X			
NITROFLUORENE	000607-57-8	X			
NITROFURFURYLIDIENE(5)-AMINO-2-IMIDAZOLIDINONE, 1-	000555-84-0	X			
NITROGEN DIOXIDE	010102-44-0			X	
NITROGEN MUSTARD	000051-75-2	X			
NITROGEN MUSTARD HYDROCHLORIDE	000055-86-7	X			
NITROGEN MUSTARD N-OXIDE	000126-85-2	X			
NITROGEN MUSTARD N-OXIDE HYDROCHLORIDE	000302-70-5	X			
NITROGEN TETROXIDE	010544-72-6			X	
NITROPROPANE, 2-	000079-46-9	X			
NITROPYRENE, 1-	005522-43-0	X			
NITROPYRENE, 4-	055738-54-0	X			
NITROPYRENE, 4-	057835-92-4	X			
NITROSOBUTYLBUTANOLAMINE, N-	003817-11-6	X			
NITROSODIETHANOLAMINE, N-	001116-54-7	X			
NITROSODIETHYLAMINE, N-	000055-18-5	X			
NITROSODIMETHYLAMINE, N-	000062-75-9	X			
NITROSODI-n-BUTYLAMINE, N-	000924-16-3	X			
NITROSODI-n-PROPYLAMINE, N-	000621-64-7	X			
NITROSOMETHYLETHYLAMINE, N-	010595-95-6	X			
NITROSOMETHYL VINYLAMINE, N-	004549-40-0	X			
NITROSOMORPHOLINE, N-	000059-89-2	X			
NITROSONORNICOTINE, N'-	016543-55-8	X			
NITROSONORNICOTINE, N-	084237-38-7	X			
NITROSOPIPERIDINE, N-	000100-75-4	X			
NITROSOPYRROLIDINE, N-	000930-55-2	X			
NITROSOSACOSINE, N-	013256-22-9	X			
NITROSO-N-METHYLUREA, N-	000684-93-5	X			
NORETHISTERONE	000068-22-4	X			
N-NITROSOMETHYLAMINO-1-(3-PYRIDYL)-1-BUTANONE, 4-(NNK)	064091-91-4	X			
N-NITROSOMETHYLAMINO-PROPIONITRILE, 3-	060153-49-3	X			
N-[4-(5-NITR-2-FURYL)-2-THIAZOYL]ACETAMIDE	000531-82-8	x			
OCHRATOXIN A	000303-47-9	X			

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OIL ORANGE SS	002646-17-5	X			
OXAZOLIDININE,2,5-(MORPHOLINOMETHYL)-3-[(5-NITROFURYLIDENE)	003795-88-8	X			
OXYMETHOLONE	000434-07-1	X			
PANFURAN S (CONTAININGDIHYDROXMETHYLFURATRIZINE)	000794-93-4	X			
PARAMETHADIONE	000115-76-3		X		
PARATHION	000056-38-2			X	X
PCB (AROCLOR 1254)	011097-69-1	X			
PCB (AROCLOR 1260)	011096-82-5	X			
PENICILLAMINE	002219-30-9		X		
PENTABORANE	019624-22-7			X	
PENTACHLOROBIPHENYL	025429-29-2	X			
PENTACHLOROPHENOL	000087-86-5	X			
PENTACHLOROPHENOL	000087-86-5			X	X
PHENACETIN	000062-44-2	X			
PHENAZOPYRIDINE HYDROCHLORIDE	000136-40-3	X			
PHENOBARBITAL	000050-06-6	X			
PHENOXYBENZAMINE HYDROCHLORIDE	000062-92-3	X			
PHENYL GLYCIDYL ETHER	000122-60-1	X			
PHENYTOIN	000057-41-0	X	X		
PHLP(2-AMINO-1-METHYL-6-PHENYLIMIDAZO[4,5-B]PYRIDINE)	105650-23-5	X			
PHOSGENE	000075-44-5			X	
PHOSPHINE	007803-51-2			X	
PHOSPHORUS (YELLOW)	007723-14-0			X	
POLYBROMINATED BIPHENYL (FF-1)	067774-32-7	X			
POLYBROMINATED BIPHENYLS	000000-00-0	X	X		
POLYCHLORINATED BIPHENYLS	000000-00-0	X	X		
POLYCHLORINATED BIPHENYLS	001336-36-3	X			
PONCEAU 3R	003564-09-8	X			
PONCEAU MX	003761-53-3	X			
POTASSIUM BROMATE	007758-01-2	X			
POTASSIUM CHROMATE (VI)	007789-00-6	X			
POTASSIUM DICHROMATE (VI)	007778-50-9	X			
PROCARBAZINE HYDROCHLORIDE	000366-70-1	X			
PROGESTERONE	000057-83-0	X			
PROGESTINS	000057-83-0	X			
PROPANE SULTONE, 1,3-	001120-71-4	X			
PROPARGYL BROMIDE	000106-96-7			X	
PROPIOLACATONE, BETA	000057-57-8	X			
PROPIONIC NITRILE	000107-12-0			X	
PROPRIONIC ACID,2-(2,4-DICHLOROPHENOXY)	000120-36-5	X			
PROPYLENE OXIDE	000075-56-9	X		X	
PROPYLTHIOURACIL	000051-52-5	X			
RADON AND ITS DECAY PRODUCTS	010043-92-9	X			

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Appendix B: M&C Division OSHA “particularly hazardous substances” list¹

CHEMICAL NAME	CAS #	Select Carcin	Repro Toxin	Acute Toxic	Skin Haz.
RESERPINE	000050-55-5	X			
RETINOIC ACID, 1,3-CIS-	004759-48-2		X		
SACCHARIN	000081-07-2	X			
SACCHARIN, CALCIUM SALT	006485-34-3	X			
SACCHARIN, SODIUM SALT	000128-44-9	X			
SAFROLE	000094-59-7	X			
SELENIUM HEXAFLUORIDE	007783-79-1			X	
SELENIUM SULFIDE	007446-34-6	X			
SENARMONITE	012412-52-1	x			
SHALE-OILS	068308-34-9	X			
SILICA, CRYSTALLINE CRISTOBALITE	014464-46-1	X			
SILICA, CRYSTALLINE TRIDYMITE	015468-32-3	X			
SILICA, CRYSTALLINE TRIPOLI	001317-95-9	X			
SILICIC ACID BERYLLIUM SALT	015191-85-2	X			
SODIUM DICHROMATE (VI)	010588-01-9	X			
SODIUM FLUOROACETATE	000062-74-8			X	X
SODIUM ortho-PHENYLPHENATE	000132-27-4	X			
SOOTS	000000-00-0	X			
STERIGMATOCYSTIN	010048-13-2	X			
STIBINE	007803-52-3			X	
STREPTOZOTOCIN	018883-66-4	X			
STRONTIUM CHROMATE (VI)	007789-06-2	X			
STRYCHNINE	000057-24-9			X	
STYRENE	000100-42-5	X			
STYRENE-7,8-OXIDE	000096-09-3	X			
SULFALLATE	000095-06-7	X			
SULFUR TRIOXIDE	007446-11-9	X			
SULFURIC ACID	007664-93-9	X			
SULFURIC ACID, FUMING	008014-95-7	X			
TALC CONTAINING ASBESTIFORM FIBRES	014807-96-6	X			
TETRACHLORODIBENZO-para-DIOXIN, 2,3,7,8- (TCDD)	001746-01-6	X	X		
TETRACHLOROETHYLENE	000127-18-4	X	X		X
TETRACYCLINES	000060-54-8		X		
TETRAETHYL LEAD	000078-00-2		X	X	X
TETRAETHYL PYROPHOSPHATE	000107-49-3			X	
TETRAMETHYL SUCCINONITRILE	003333-52-6			X	X
THALIDOMIDE	000050-35-1		X		
THIAZOLE,2(2-FORMYLHYDROZINE)-4-(5-NITRO-2- FURYL)	003570-75-0	X			
THIOACETAMIDE	000062-55-5	X			
THIODIANILINE, 4,4'-	000139-65-1	X			
THIOPHENOL	000108-98-5			X	

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Appendix B: M&C Division OSHA “particularly hazardous substances” list¹

CHEMICAL NAME	CAS #	Select Carcin	Repro Toxin	Acute Toxic	Skin Haz.
THIOTEPA	000052-24-4	X			
THIOUREA	000062-56-6	X			
THORIUM DIOXIDE	001314-20-1	X			
TOBACCO PRODUCTS, SMOKELESS	000000-00-0	X			
TOBACCO SMOKE	000000-00-0	X	X		
TOLUENE	000108-88-3		X		X
TOLUENE DIISOCYANATE, 2,6-	000091-08-7	X			
TOLUENE DIISOCYANATES	000584-84-9	X			
TOLUENE DIISOCYANTE	026471-62-5	X			
TOLUENESULFONAMIDE, O-	000088-19-7	X			
TOLUIDINE, ORTHO-	000095-53-4	X		X	X
TOLUIDINE, ORTHO-	000108-49-0			X	X
TOLUIDINE HYDROCHLORIDE, O-	000630-21-5	X			
TOXAPHENE (POLYCHLORINATED CAMPHENES)	008001-35-2	X			
TREOSULPHAN	000299-75-2	X			
TRICHLOROETHANE,1,1,1-,2-(O-CHLOROPHENYL)- 2-(P-CHLOROPHENYL)	000789-02-6	X			
TRICHLOROETHYLENE	000079-01-6	X			
TRICHLOROMETHINE	000817-09-4	X			
TRICHLOROPHENOL, 2,4,6-	000088-06-2	X			
TRICHLOROPROPANE, 1,2,3-	000096-18-4	X			
TRIMETHADIONE	000127-48-0		X		
TRP-P-1(3-AMINO-1,4-DIMETHYL-5H-PYRIDO[4,3-b] INDOLE)	062450-07-1	X			
TRP-P-2(3-AMINO-1-METHYL-5H-PYRIDO[4,3- b]INDOLE)	062450-06-0	X			
TRYPAN BLUE	000072-57-1	X			
URACIL MUSTARD	000066-75-1	X			
URETHANE	000051-79-6	X			
VALENTINITE	001317-98-2	X			
VALPROIC ACID	000099-66-1		X		
VANADIUM PENTOXIDE	001314-62-1			X	
VENOM, SNAKE- CROTALUS ADAMANTEUS	000000-00-0			X	
VENOM, SNAKE- CROTALUS ATROX	000000-00-0			X	
VINYL ACETATE	000108-05-4	X			
VINYL BROMIDE	000593-60-2	X			
VINYL CHLORIDE	000075-01-4	X	X		
VINYL FLUORIDE	000075-02-5	X			
VINYLCYCLOHEXENE, 4-	000100-40-3	X			
VINYLCYCLOHEXENE DIEPOXIDE	000107-87-6	X			
VINYL-1-CYCLOHEXENE DIEPOXIDE, 4-	000106-87-6	X			
VITAMIN A CONSUMPTION	000068-26-8		X		
WARAFIN	000081-81-2		X		
WELDING FUMES	000000-00-0	X			
XYLIDINE	001330-73-8			X	X
ZINC CHROMATE HYDROXIDE	013530-65-9	X			
ZINC CHROMATE (VI) HYDROXIDE HYDRATE	015930-94-6	X			

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Appendix B: M&C Division OSHA “particularly hazardous substances” list¹

Additional Comments:

Select Carcinogens Definition

A carcinogen is any substance or agent that is capable of causing cancer – the abnormal or uncontrolled growth of new cells in any part of the body in humans or animals. Carcinogens are chronic toxins with long latency periods that can cause damage after repeated or long duration exposures and often do not have immediate apparent harmful effects.

The OSHA Lab Standard defines a “Select Carcinogen” as any substance, which meets one of the following criteria:

- (i) It is regulated by OSHA as a carcinogen; or
- (ii) It is listed under the category, "known to be carcinogens," in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or
- (iii) It is listed under Group 1 ("carcinogenic to humans") by the International Agency for Research on Cancer Monographs (IARC) (latest editions); or
- (iv) It is listed in either Group 2A or 2B by IARC or under the category, "reasonably anticipated to be carcinogens" by NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
 - (A) After inhalation exposure of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m³;
 - (B) After repeated skin application of less than 300 (mg/kg of body weight) per week; or
 - (C) After oral dosages of less than 50 mg/kg of body weight per day.

With regard to mixtures, OSHA requires that a mixture, “shall be assumed to present a carcinogenic hazard if it contains a component in concentrations of 0.1% or greater, which is considered to be carcinogenic.”

Note that the potential for carcinogens to result in cancer can also be dependent on other “lifestyle” factors such as:

- Cigarette smoking
- Alcohol consumption
- Consumption of high fat diet
- Geographic location – industrial areas and UV light exposure
- Therapeutic drugs
- Inherited conditions

More information on carcinogens, including numerous useful web links such as a listing of OSHA regulated carcinogens, can be found on the [OSHA Safety and Health Topics for Carcinogens webpage](#).

The State of California has developed an extensive list of [“Carcinogens Known to the State of California through Prop 65.”](#)

Appendix C: Pyrophoric Chemicals

Category	Examples*
Aluminum alkyls: $R_3Al, R_2AlCl, RAlCl_2$	Et ₃ Al Et ₂ AlCl EtAlCl ₂ Me ₃ Al Diethylethoxyaluminium
Grignard Reagents: RMgX (R=alkyl, aryl, vinyl X=halogen)	Methyl magnesium bromide Butyl magnesium bromide
Lithium Reagents: RLi (R = alkyls, aryls, vinyls)	Butyllithium, Isobutyllithium sec-Butyllithium, tert-Butyllithium, Ethyllithium Hexyllithium Isopropyllithium Methylithium (Trimethylsilyl)methylithium, Phenyllithium 2-Thienyllithium Vinyllithium Lithium acetylide ethylenediamine complex Lithium (trimethylsilyl)acetylide Lithium phenylacetylide
Zinc Alkyl Reagents: RZnX, R ₂ Zn	Et ₂ Zn
Metal carbonyls :	Lithium carbonyl Nickel tetracarbonyl Dicobalt octacarbonyl
Metal powders (finely divided):	Bismuth Calcium Cobalt Hafnium Iron Magnesium Titanium Uranium Zinc Zirconium
Low Valent Metals:	Titanium dichloride
Metal hydrides	Potassium Hydride Sodium hydride Lithium Aluminum Hydride Diethylaluminium hydride Diisobutylaluminum hydride Dichloro(methyl)silane
Nonmetal hydrides	Arsine Boranes Diethylarsine diethylphosphine Germane Phosphine Phenylphosphine Silane Methanetetellurol (CH ₃ TeH)
Non-metal alkyls: R ₃ B, R ₃ P, R ₃ As	Tetramethylsilane Tributylphosphine
Used hydrogenation catalysts	Raney nickel Palladium Platinum
Activated Copper fuel cell catalysts	Cu/ZnO/Al ₂ O ₃
Finely Divided Iron Sulfides	FeS, FeS ₂ , Fe ₃ S ₄ Potassium Sulfide (K ₂ S),
Elements:	Phosphorus Cesium Lithium Potassium Sodium Sodium Potassium Alloy (NaK) Aluminum Phosphide (AlP)

* This list was taken from the UCLA LHAT tool.

Appendix D: Potentially Explosive Chemicals

Acetyl peroxide	Acetylene	Ammonium nitrate
Ammonium perchlorate	Ammonium picrate	Ba/Pb/Hg azide (heavy metal azides) Li/K/Na azide
Organic azides	Benzoyl peroxide	Bromopropyne
Butanone peroxide	Cumene peroxide	Diazodinitrophenol
Dinitrophenol	Dinitrophenylhydrazine	Dinitroresorcinol
Dipicryl amine	Dipicryl sulphide	Dodecanoyl peroxide
Ethylene oxide	Lauric peroxide	MEK peroxide
Mercury fulminate, Silver fulminate	Nitrocellulose	Nitrogen trifluoride
Nitrogen triiodide	Nitroglycerine	Nitroguanidine
Nitromethane	Nitrourea	Picramide
Picric acid (trinitrophenol)	Picryl chloride	Picryl sulphonic acid
Propargyl bromide (neat)	Sodium dinitrophenate	Succinic peroxide
Tetranitroaniline	Trinitroaniline	Trinitroanisole
Trinitrobenzene	Trinitrobenzenesulphonic acid	Trinitrobenzoic acid
Trinitrocresol	Trinitronaphthalene	Trinitrophenol (picric acid)
Trinitroresorcinol	Trinitrotoluene	Urea nitrate

This list was taken from the UCLA LHAT tool

Potentially Explosive Compound Classes

Functional Groups:

Acetylene (-C=C-)	
Acyl hypohalites (RCO-OX)	Azide Organic (R-N ₃)
Azide Metal (M-N ₃)	
Azo (-N=N-)	Diazo (=N=N)
Diazosulphide (-N=N-S-N=N-)	Diazonium salts (R-N ₂ ⁺)
Fulminate (-CNO)	Halogen Amine (=N-X)
Nitrate (-ONO ₂)	Nitro (-NO ₂)
	Aromatic or Aliphatic Nitramine (=N-NO ₂) (-NH-NO ₂) Nitrite (-ONO)
Nitroso (-NO)	Ozonides
Peracids (-CO-O-O-H)	Peroxide (-O-O-)
Hydroperoxide (-O-O-H)	Metal peroxide (M-O-O-M)

This list was taken from the UCLA LHAT tool.

Explosive Salts:

Bromate salts (BrO ₃ ⁻)	Chlorate salts (ClO ₃ ⁻)
Chlorite salts (ClO ₂ ⁻)	Perchlorate salts (ClO ₄ ⁻)
Picrate salts (2,4,6-trinitrophenoxide)	
Picramate salts (2-amino-4,6-dinitrophenoxide)	Iodate salts (IO ₃ ⁻)
Hypohalite salts (XO ⁻)	

This list was taken from the UCLA LHAT tool.

Appendix E: MIOSHA Regulated Carcinogens

Reference: MIOSHA-STD-1238 (10/15) which specifically regulates procedures to be followed in facilities where the listed carcinogens are manufactured, processed, repackaged, released, handled or stored.

CHEMICAL NAME	CAS #
4-nitrobiphenyl	92933
Alpha-naphthylamine	134327
3,3'-Dichlorobenzidine (and its salts)	91941
Methyl chloromethyl ether	107302
Bis-chloromethyl ether	542881
Beta -Naphthylamine	91598
Benzidine	92875
4-Aminodiphenyl	92671
Ethyleneimine	151564
Beta-propiolactone	57578
2-Acetylaminofluorene	53963
4-dimethylaminoazo-benzene	60117
N-nitrosodimethylamine	62759

Appendix F: Reproductive Toxins

OSHA Laboratory Standard Definition: Reproductive toxin means chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis). This list was taken from the UCLA LHAT tool and includes compounds not listed on the MC OSHA particularly hazardous substances list.

CHEMICAL NAME	CAS NUMBER
Acetohydroxamic acid	546-88-3
Actinomycin D	50-76-0
All-trans retinoic acid	302-79-4
Alprazolamm	8981-97-7
Amikacin sulfate	3983-55-5
Aminoglutethimide	125-84-8
Aminoglycosides	
Aminopterin	54-62-6
Angiotensin converting enzyme (ACE inhibitors)	
Anisindione	117-37-3
Aspirin	50-78-2
Barbiturates	
Benomyl	17804-35-2
Benzphetamine hydrochloride	5411-22-3
Benzodiazepines	
Bischloroethyl nitrosourea (BCNU) (carmustine)	154-93-8
Bromoxynil	1689-84-5
Butabarbital sodium	143-81-7
1,4-Butanediol dimethylsulfonate (busulfan)	55-98-1
Carbon disulfide	75-15-0
Carbon monoxide	630-08-0
Carboplatin	41575-94-4
Chenodiol	474-25-9
Chlorcyclizine hydrochloride	1620-21-9
Clorambucil	305-03-3
Chlordecone (kepone)	143-50-0
Chlordiazepoxide	58-25-3
Chlordiazepoxide hydrochloride	438-41-5
1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea (CCNU)	13010-47-4
Clomiphene citrate	50-41-9
Chlorazepate dipotassium	57109-90-7
Cocaine	50-36-2
Colchicine	64-86-8
Conjugated estrogens	
Cyanazine	21715-46-2
Cycloheximide	66-81-9
Cyclophosphamide (anhydrous)	50-18-0
Cyclophosphamide (hydrated)	6055-19-2
Cyhexatin	13121-70-5
Cytarabine	147-94-4
Danazol	17230-88-5
Daunorubicin hydrochloride	23541-50-6
Demeclocycline hydrochloride (internal use)	64-73-3
Diazepam	439-14-5

Appendix F: Reproductive Toxins (continued)

CHEMICAL NAME	CAS NUMBER
Dicumarol	66-76-2
Diethylstilbestrol (DES)	56-53-1
Dinocap	39300-45-3
Dinoseb	88-85-7
Diphenylhydantoin (phenytoin)	57-41-0
Doxycycline (internal use)	564-25-0
Doxycycline calcium (internal use)	94088-85-4
Doxycycline hyclate (internal use)	24390-14-5
Doxycycline monohydrate (internal use)	17086-28-1
Ergotamine tartrate	379-79-3
Ethylene glycol monoethyl ether	110-80-5
Ethylene glycol monomethyl ether	109-86-4
Ethylene glycol monoethyl ether acetate	111-15-9
Ethylene glycol monomethyl ether acetate	110-49-6
Ethylene thiourea	96-45-7
Etoposide	33419-42-0
Etrinate	54350-48-0
Fluorouracil	51-21-8
Fluoxymesterone	76-43-7
Flurazepam hydrochloride	1172-18-5
Flutamide	13311-84-7
Halazepam	23093-17-3
Hexachlorobenzene	118-74-1
Ifosfamide	3778-73-2
Iodine-131	24267-56-9
Isotretinoin	4759-48-2
Lead	
Lithium carbonate	554-13-2
Lithium citrate	919-16-4
Lorazepam	846-49-1
Lovastatin	75330-75-5
Medroxyprogesterone acetate	71-58-9
Megestrol acetate	595-33-5
Melphalan	148-82-3
Menotropins	9002-68-0
Meprobamate	57-53-4
Mercaptopurine	6112-76-1
Methacycline hydrochloride	6112-76-1
Methimazole	60-56-0
Methotrexate	59-05-2
Tethotrexate sodium	15475-56-6
Methyl bromide	74-83-9
Methyl mercury	22967-92-6
Methyltestosterone	58-18-4
Midazolam hydrochloride	59467-96-8
Minocycline hydrochloride (internal use)	13614-98-7
Misoprostol	62015-39-8
Mitoxantrone hydrochloride	70476-82-3
Nafgarelin acetate	86220-42-0
Neomycon sulfate (internal use)	1405-10-3
Netilmicin sulfate	56391-57-2
Nicotine	54-11-5

Appendix F: Reproductive Toxins (continued)

CHEMICAL NAME	CAS NUMBER
Nitrogen mustard (mechlorethamine)	51-75-2
Nitrogen mustard hydrochloride	55-86-7
Norethisterone (norethindrone)	68-22-4
Norethisterone acetate (norethindrone acetate)	51-98-9
Norethisterone (norethindrone)/ethinyl estradiol	68-22-4/57-63-6
Norethisterone (norethindrone)/mestranol	68-22-4/72-33-3
Norgestrel	6533-00-2
Oxazepam	604-75-1
Oxytetracycline (internal use)	79-57-2
Oxytetracycline hydrochloride (internal use)	2058-46-0
Paramethadione	115-67-1
Penicillamine	52-67-5
Phenacemide	63-98-9
Phenprocoumon	435-97-2
Pipobroman	54-91-1
Plicamycin	18378-89-7
Polychlorinated biphenyls	
Procarbazine hydrochloride	366-70-1
Propylthiouracil	51-52-5
Ribavirin	36791-04-5
Secobarbital sodium	309-43-3
Streptomycin sulfate	3810-74-0
Tamoxifen citrate	54965-24-1
Temazepam	846-50-4
Testosterone cyoionate	846-50-4
Testosterone enanthate	315-37-7
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746-01-6
Tetracycline (internal use)	
Thalidomide	50-35-1
Thioguanine	154-42-7
Tobacco smoke (primary)	
Tobramycin sulfate	49842-07-1
Toluene	108-88-3
Triazolam	28911-01-5
Trilostane	13647-35-3
Uracil mustard	66-75-1
Urofollitropin	26995-91-5
Valproate (valproic acid)	99-66-1