

APPENDIX A

Links to PEI Regulations

Occupational Noise Levels

Occupational Health and Safety Act: general regulations, part 8

<http://www.wcb.pe.ca/index.php3?number=62171>

First Aid

Occupational Health and Safety Act: general regulations, part 9

<http://www.wcb.pe.ca/index.php3?number=62171>

Radiation Protection

Occupational Health and Safety Act: general regulations, part 10 (non-ionizing radiation)

<http://www.wcb.pe.ca/index.php3?number=62171>

Public Health Act: Radiation Safety Regulations

<http://www.canlii.org/pe/laws/regu/1984r.547/20041117/whole.html>

Ventilation

Occupational Health and Safety Act: general regulations, part 11

<http://www.wcb.pe.ca/index.php3?number=62171>

Environmental Protection Act: Air Quality Regulations

<http://www.canlii.org/pe/laws/regu/1992r.377/20041117/whole.html>

Fire Control

Occupational Health and Safety Act: general regulations, part 25

<http://www.wcb.pe.ca/index.php3?number=62171>

Fire Protection Act

General regulations:

<http://www.canlii.org/pe/laws/regu/1985r.15/20050211/whole.html>

Codes & Standards Order Regulations

<http://www.canlii.org/pe/laws/regu/1985r.16/20050211/whole.html>

Electrical Safety

Occupational Health and Safety Act: General regulations, part 36

<http://www.wcb.pe.ca/index.php3?number=62171>

Electrical Inspection Act: Canadian Electrical Code Regulations

<http://www.canlii.org/pe/laws/regu/2004r.115/20050211/whole.html>

Eye, Skin and Face Protection

Occupational Health and Safety Act: General regulations, S.43.31 and Part45

<http://www.wcb.pe.ca/index.php3?number=62171>

Chemical Storage

Occupational Health and Safety Act: General Regulations, S.43.9 - 43.31

<http://www.wcb.pe.ca/index.php3?number=62171>

Chemical Handling

Occupational Health and Safety Act: General Regulations, S.43.9 - 43.31

<http://www.wcb.pe.ca/index.php3?number=62171>

Chemical Disposal

Environmental Protection Act: Waste Resource Management Regulations

<http://www.canlii.org/pe/laws/regu/2000r.691/20050211/whole.html>

UPEI Health and Safety Policies/Information

<http://www.upei.ca/humanres/safety>

APPENDIX B

UNATTENDED OPERATIONS NOTICE

An example of a notice that can be cut to fit a 5" X 7" plastic frame follows.

PLEASE LEAVE ON		
Name:	phone #	
Permission from supervisor	Yes	No
Supervisor's name:	phone #	
Alternate contact:	phone #	
Start time:	am/pm	– End time: am/pm
Date:	Date:	
Contents of reaction vessel include:		
Procedure requires:		
Stirring	Heating	Water cooling Vacuum Nitrogen
Instrument to be left ON :		

APPENDIX C

Reference: www.upei.ca/humanres/safety under “Inspections”

UPEI Laboratory/Barn/S&R Inspection Report

June 14/2005

Inspection Date		Area(s) Inspected		Local H&S Committee	
Inspectors				Area Guide	

Hazard Rating (hazards to personal injury, property or the environment): A - Serious hazard B - High hazard C - Moderate hazard. D - Low hazard.

* Item previously noted.

* #	Y	N	A	Item (Y = Satisfactory, N = Needs Improvement NA = Not Applicable)	Description	Hazard Rating	Corrective Action	Person Responsible	Target Date	Completion Date
1				workplace clean and orderly						
2				exits clear of obstructions and accessible						
3				stored materials secured and limited in height to prevent collapse						
4				suitable warning signs & labels (radiation, laser, UV, PPE, biohazards, no food/drink)						
5				no food or drink in labs						
6				appropriate body cover and no open shoes						
7				floor free of tripping hazards: loose mats/rugs, obstacles						
8				materials on cabinets/shelves stored safely						
9				books/items reachable from the ground or approved step stool available						
10				free standing shelves are stable/safe loads						
11				file cabinet drawers shut when not in use						
12				no frayed electrical cords						

13				no overloaded sockets						
14				equipment maintenance & guards in place						
* #	Y	N	NA	Item (Y = Satisfactory, N = Needs Improvement NA = Not Applicable)	Description	Hazard Rating	Corrective Action	Person Responsible	Target Date	Completion Date
15				emergency exit signs available, visible & working and exits unobstructed						
16				fire alarm pull stations, fire hose stations, and portable fire extinguishers visible and unobstructed						
17				stairway doors/self closing doors closed (unless close automatically during alarms)						
18				all sprinkler heads free of obstruction						
19				emergency telephone #'s posted/accessible						
20				extinguishers fully charged & current refill						
21				emergency evacuation plan & drills in place; exit routes, pull stations & extinguisher locations known						
22				MSDS available for hazardous materials						
23				Hazardous waste procedure followed						
24				Adequate spill containment, clean-up & procedures available						
25				All chemicals properly stored with separate acids and flammables storage						
26				Hazardous materials inventoried within the last year						

27				Eyewash & safety shower stations: clearly marked, training and monthly maintenance done & documented						
* #	Y	N	NA	Item (Y = Satisfactory, N = Needs Improvement NA = Not Applicable)	Description	Hazard Rating	Corrective Action	Person Responsible	Target Date	Completion Date
28				Gas cylinders properly labeled; secured when stored or moved; caps in place						
29				Fume and biocontainment hoods maintained and regularly inspected						
30				Lab ventilation adequate						
31				Staff inoculated against appropriate infectious materials						
32				Animal restraint devices available & used						
33				Personal hygiene & decontamination procedures in place & followed						
34				Procedure for safe transport of hazardous materials between work areas						
35				SOP's and appropriate manuals available (eg. UPEI Safety Manual, Laboratory Biosafety Guidelines - Health Canada, Containment Standard for Veterinary Facilities, etc.)						
36				WHMIS training for required employees						
37				First Aid/CPR trained individuals						
38				PPE available and personnel trained in the selection, care & use of PPE						
39				site specific training & immediate area orientation done & documented						

APPENDIX D

VACATING A LAB FORM FOR LABORATORY EMPLOYEES

This form is to be filled out and signed when faculty, staff, graduate and/or research students who have made use of laboratory facilities at UPEI, are planning to vacate their lab at UPEI for any reason.

PLEASE PRINT

VACATEE: _____

POSITION: _____

DEPARTMENT: _____

BUILDING/LABORATORY(S) _____

1. Have you made an inventory list of the Chemicals, Radioactive Materials, Infectious Agents, Gas Cylinders and Equipment that you have been responsible for?
☐ YES ☐ NO
2. Have you consulted with your supervisor/chairman to decide which of the above is to be disposed of, removed from the University or taken over by another party?
☐ YES ☐ NO
3. Have you made arrangements to ensure the proper handling of the above items on your inventory list?
☐ YES ☐ NO

If NO who will be responsible for these items after you leave. _____

4. Have the work areas that you have used been cleaned and left in a tidy state and disinfected if necessary?
☐ YES ☐ NO

Vacatee

Name: _____ (please print)

Signature : _____ Date: _____

Supervisor/Chairman

Name: _____ (please print)

Signature : _____ Date: _____

APPENDIX E

SOME KNOWN, PROBABLE AND POTENTIAL CARCINOGENIC CHEMICALS EVALUATED BY IARC (Note that this list is not complete.)

Group 1 Chemicals which are Carcinogenic to Humans:

4-Aminobiphenyl	Arsenic and some arsenic compounds
Benzene	Benzidine
Beryllium and some beryllium compounds	Bis(chloromethyl)ether
Chloromethyl methyl ether	Cadmium and some cadmium compounds
Chromium VI compounds	Ethylene oxide
2-Naphthylamine	Formaldehyde
Nickel compounds	
Vinyl chloride	

Group 2a Chemicals which are Probably Carcinogenic to Humans:

Acrylamide	Acrylonitrile
Benzidine-based dyes	Benzo(alpha)pyrene
1,3-Butadiene	Diethyl sulfate
Dimethyl sulfate	Ethylene dibromide
Formaldehyde	
Tetrachloroethylene	
Trichloroethylene	

Group 2b Chemicals which are Possibly Carcinogenic to Humans:

Acetaldehyde	Acetamide
o-Anisidine	Antimony trioxide
beta-Butyrolactone	Carbon tetrachloride
Chloroform	Cobalt and some cobalt compounds
1,2-Dichloroethane	Dichloromethane
2,6-Dimethylaniline	1,1-Dimethylhydrazine
1,2-Dimethylhydrazine	2,4-Dinitrotoluene
2,6-Dinitrotoluene	1,4-Dioxane
Ethyl acrylate	Furan
Hydrazine	Methyl methanesulfonate
Nickel	2-Nitroanisole
Nitrobenzene	Phenyl glycidyl ether
Potassium bromate	beta-Propiolactone
Propylene oxide	Styrene
Thiourea	Toluene diisocyanates
o-Toluidine	Vinyl acetate

For further information from the International Agency for Research on Cancer (IARC)
go to: <http://monographs.iarc.fr/ENG/Classification/index.php>

APPENDIX F

FIRE PROPERTIES OF SOME COMMON LABORATORY LIQUIDS AND VOLATILE SOLIDS

	Boiling	Flash	Flammable Limits		Autoignition
	Point (C)	Point (C)	lower (%)	upper (%)	Temp (C)
Acetic Acid	118	39	4.0	19.9	463
Acetone	56	-20	2.5	12.8	465
Acetonitrile	82	6	3.0	16.0	524
Acrylonitrile	77	0	3.0	17.0	481
Benzene	80	-11	1.2	7.8	498
1-Butanol	117	37	1.4	11.2	343
tert-Butanol	83	11	2.4	8.0	478
Chlorobenzene	132	28	1.3	9.6	593
Cyclohexane	82	-20	1.3	8.0	245
Cyclohexene	83	-7	0.8	2.8	244
Dibutyl Ether	141	25	1.5	7.6	194
1,2-Dichloroethane	84	13	6.2	16.0	413
Diethyl Ether	35	-45	1.9	36	180
p-Dioxane	101	12	2.0	22.0	180
Ethanol	78	13	3.3	19.0	363
Ethylamine	17	-18	3.5	14.0	385
Ethyl Mercaptan	35	-18	2.8	18.0	300
Furfural	161	60	2.1	19.3	316
Gasoline	40-200	-43	1.4	7.6	280
Hexane	69	-22	1.1	7.6	225
Isoamyl Alcohol	132	43	1.2	9.0	350
Isopropyl Alcohol	83	12	2.0	12.7	399
Isopropyl Ether	69	-28	1.4	7.9	443
Methanol	64	11	6.0	36.0	464
Methylene Chloride	40	none	13.0	23.0	556
Methylethyl Ketone	80	-9	1.4	11.4	404
Nitromethane	101	35	7.3		418
Phenol	181	79	1.8	8.6	715
1-Propanol	97	23	2.2	13.7	412
Tetrahydrofuran	66	-14	2.0	11.8	321
Toluene	111	4	1.1	7.1	480
Trichloroethane	74	none	7.5	12.5	
p-Xylene	138	27	1.1	7.0	528

APPENDIX G

FIRE PROPERTIES OF SOME COMMON LABORATORY GASES

	Boiling Point (C)	Flammable Limits		Autoignition Temp (C)
		lower (%)	upper (%)	
Acetylene	-83	2.5	100	305
Ammonia	-33	15.0	28.0	651
1,3-Butadiene	-4	2.0	12.0	420
Carbon Monoxide	-192	12.5	74.0	609
Dimethylamine	7	2.8	14.4	400
Ethane	-89	3.0	12.5	472
Ethylene	-104	2.5	36.0	450
Hydrogen	-252	4.0	75.0	500
Hydrogen Sulphide	-60	4.0	44.0	260
Methylamine	-6	4.9	20.7	430
Propane	-42	2.1	9.5	450

APPENDIX H

PEROXIDE-FORMING CHEMICALS

Tetrahydrofuran and diethyl ether are two of a number of laboratory ethers that readily auto-oxidize forming peroxides. The resulting peroxides are quite unstable and can be detonated by even a relatively minor shock. Chemical suppliers often stabilize the parent ethers with inhibitors which retard the formation of peroxides. But because the inhibitors interfere with some applications, many suppliers also sell peroxide-forming chemicals without the inhibitors. Some laboratories distill ethers to produce high purity solvents. These redistilled solvents also lack the inhibitor.

Exposing an uninhibited peroxide-former to air allows the peroxide to form. The rate of peroxide formation depends upon a number of factors, but with some ethers, dangerous amounts of peroxide can form within days. When the peroxide is insoluble in the parent ether, the risk of a shock-initiated explosion can be extreme. When the peroxide is more soluble in the parent ether, the explosion risk increases as the parent solvent evaporates. Again, the result can be a disastrous explosion.

Many common peroxide-forming materials are highly volatile. So, in addition to the peroxide problem, they often present a serious fire hazard.

To Reduce the Chances of Peroxide Accidents:

- ✗ Avoid using peroxide-forming chemicals when possible.
- ✓ Buy only inhibited ethers when possible.
- ✓ Buy peroxide-forming chemicals in the smallest quantities possible to limit the volumes exposed to air.
- ✓ Store in a cool location and protect from exposure to light or air.
- ✓ Record the date that containers are opened.
- ✓ Use peroxide-forming chemicals with regard for their reactivity, toxicity and flammability.
- ✓ Work in a fume hood with the sash lowered as far as is practical.
- ✓ Use laboratory techniques that prevent exposing inhibitor free peroxide-formers to air.
- ✓ Consider using an explosion shield.
- ✓ Wear eye protection at all times while in the laboratory.
- ✓ Test* containers for peroxides at least monthly and record date and result of test. If test shows the presence of significant amounts of peroxide remove the peroxide and dispose of properly.
- ✓ Treat any peroxide-forming chemical as an extreme shock sensitive explosion hazard unless you are sure it is free of peroxides.

- ✗ Do not move the container if crystalline deposits or viscous liquids form in peroxide-forming chemicals. Do not handle, alert supervisor.

***TEST FOR PEROXIDES IN ETHERS:**

- ✓ Use commercial peroxide test strips, or
- ✓ Add 9 mL of ether to 1 mL of a saturated solution of KI. Mix carefully. A yellow colour indicates the presence of peroxides.

Some Common Peroxide-Forming Chemicals:

acetal	cyclohexene
dibutyl ether	diethyl ether
1,4-dioxane	ethylene glycol dimethyl ether
isopropyl ether	tetrahydrofuran

Some Less Common Peroxide-Forming Chemicals:

decahydronaphthalene	diacetylene
dicyclopentadiene	divinyl acetylene
methyl acetylene	sodium amide
tetrahydronaphthalene	vinyl acetate
vinyl ether	vinylidene chloride

APPENDIX I

SOME INCOMPATIBLE CHEMICAL COMBINATIONS

Uncontrolled reactions between chemicals listed on the left and chemicals or chemical families on the right can result in fires, explosions or in the release of otherwise dangerous substances. If you are unsure of the chemistry, refer to the MSDS and seek help from your supervisor.

Acetic acid	-	Strong oxidizing agents, strong bases
Acetic anhydride and acid halides	-	Alcohols, amines, strong bases, strong oxidizing agents, water
Acetone	-	Acids, bases, strong oxidizing agents
Alkali metals (Li, Na, K)	-	Acids, alcohols, carbon dioxide, oxidizing agents, water
Alkali metal hydroxides	-	Halogen and nitro-substituted organics, strong acids
Ammonia or ammonium hydroxide	-	Acids, certain heavy metals such as silver and mercury, halogens, strong oxidizing agents
Ammonium nitrate	-	Metal powders, strong reducing agents
Azide salts	-	Acids, carbon disulfide, heavy metal salts
Charcoal (finely divided)	-	Strong oxidizing agents
Chlorates	-	Acids, reducing agents
Chromic acid (chromium trioxide, chromates and dichromates)	-	Strong reducing agents
Hydrazine	-	Strong oxidizing agents
Hydrogen peroxide	-	Reducing agents
Metals (powdered) (in air, some are spontaneously combustible)	-	Oxidizing agents
Nitric acid	-	Chromic acid, strong bases, strong reducing agents
Oxalic acid	-	Mercury and silver and their salts
Perchloric acid perchlorate salts	-	Certain heavy metal salts, reducing agents, strong acids salts and bases
Peroxides (some peroxides are shock sensitive)	-	Reducing agents
Phosphorus pentoxide	-	Alcohols, bases, water
Sulfuric acid	-	Alcohols, bases, chlorates, perchlorates, permanganates, water

There are many other hazardous chemical combinations.

More information regarding compatibility can be found on the EPA Chemical Compatibility Chart on web site:

<http://www.brown.edu/Administration/EHS/lab/PDFs/EPACChemicalCompatibilityChart.pdf>

APPENDIX J

HAZARDS OF COMMON LABORATORY GASES OBTAINED IN HIGH PRESSURE CYLINDERS (* Liquified gas)

GAS	Decompression	Flammability	Asphyxiation	Toxicity	Cryohazard
Acetylene	Yes	Yes	Yes	No	No
Air	Yes	No	Yes	No	No
Argon	Yes	No	Yes	No	Yes*
Carbon Dioxide	Yes	No	Yes	Yes	Yes*
Helium	Yes	No	Yes	No	Yes*
Hydrogen	Yes	Yes	Yes	No	Yes*
Nitrogen	Yes	No	Yes	No	Yes*
Oxygen	Yes	Yes	No	No	Yes*
Propane	Yes	Yes	Yes	No	No

APPENDIX K

COMPRESSED GAS ASSOCIATION FITTING DESIGNATIONS:

GAS	CGA DESIGNATION
Acetylene	CGA-510
Air	CGA-590
Argon	CGA-580
Carbon Dioxide	CGA-320
Helium	CGA-580
Hydrogen	CGA-350
Nitrogen	CGA-580
Oxygen	CGA-540*
Propane	CGA-510

* Ensure that the regulator does not contain aluminum

APPENDIX L

CLASSIFICATION OF HAZARDS AND RECOMMENDED GLOVE PROTECTION

NATURE OF HAZARD	DEGREE OF HAZARD	PROTECTIVE MATERIAL
Chemicals and Fluids	Refer to Appendix M, product MSDS, or glove manufacturer data	Dependant upon specific chemical hazards: natural rubber, neoprene, butyl rubber, polyvinyl chloride, etc.
Cold	-	Leather, insulated plastic or rubber, wool, cotton, cold resistant specialty fabrics. Loose fitting gloves for liquid nitrogen or carbon dioxide.
Heat	High temperatures (>350°C)	Heat resistant specialty fabrics
	Medium temperatures (100-350°C)	Heat resistance leather with linings, Nomex, Kevlar, Zetex
	Less warm temperatures (up to 100°C)	Chrome-tanned leather, terry cloth
Abrasion	Moderate	Rubber, plastic, leather, polyester, nylon, cotton
Sharp Edges	-	Leather, terry cloth, polyester, cotton, nylon, Kevlar®
General Duty	Low risk duties	Cotton, terry cloth, leather, rubber, plastic

* (Adapted from Safety Infogram produced by the Canadian Centre for Occupational Health and Safety.)

APPENDIX M

GUIDE TO SELECTION OF A CHEMICAL RESISTANT GLOVE

The following table is intended to be used as a general guideline during glove selection. Adapted from the ACGIH Guidelines for the Selection of Chemical Protective Clothing.

GLOVE MATERIAL	CHEMICAL RESISTANCE PROPERTIES		PHYSICAL PROPERTIES E: EXCELLENT G: GOOD F: FAIR P: POOR				
	RECOMMENDED FOR USE WITH	NOT RECOMMENDED FOR USE WITH	Cut Res.	Flexi-bility	Heat Res.	Punc-ture Res.	Tear Res.
Natural rubber latex	Acids, bases, alcohols, aqueous solutions.	Oils, greases, organics.	E	E	F	E	E
Butyl rubber	Aldehydes, ketones, esters, glycol ethers, polar organic solvents.	Hydrocarbons, chlorinated solvents.	G	G	E	G	G
Neoprene	Oxidizing acids, caustics, alcohols, oils, fats, aniline, phenol, glycol ethers.	Chlorinated hydrocarbons.	E	G	G	G	G
Nitrile	oils, greases, acids, caustics, aliphatic chemicals.	Aromatics, many ketones, esters, many chlorinated solvents.	E	E	G	E	G
Polyvinyl alcohol (PVA)	Aliphatics, aromatics, chlorinated solvents, ketones (except acetone), esters, ethers.	Acids, alcohols, bases.	F	P	G	F	G
Polyvinyl chloride (PVC)	Strong acids & bases, salts, other aqueous solutions, alcohols, glycol ethers.	Aromatics, hydrocarbons, chlorinated solvents, aldehydes, ketones, nitrocompounds.	P	F	P	G	G

Res. = Resistance

APPENDIX N

QUICK GUIDE TO RISK ASSESSMENT FOR HAZARDOUS CHEMICALS

1. **Identify chemicals to be used and circumstances of use.** Identify the chemicals involved in the proposed experiment and determine the amounts that will be used. Is the experiment to be done once, or will the chemicals be handled repeatedly? Will the experiment be conducted in an open laboratory, in an enclosed apparatus, or in a fume hood? Is it possible that new or unknown substances will be generated? Are any of the workers involved in the experiment pregnant or likely to become pregnant? Do they have any known sensitivities to specific chemicals?
2. **Consult sources of information.** Consult an up-to-date MSDS for each chemical involved in the planned experiment. In cases where substances with significant or unusual potential hazards are involved, it may also be advisable to consult more detailed references. Depending on the worker's level of experience and the degree of potential hazard associated with the proposed experiment, it may also be necessary to obtain the assistance of experts in the field, supervisors and safety professionals before proceeding with risk assessment.
3. **Evaluate the types of toxicity and other dangers.** Are any of the chemicals to be used toxic, corrosive, irritants or sensitizers? Will any carcinogens be encountered? How about flammability and environmental toxicity? Are any chemicals involved in the proposed experiment suspected to be reproductive or developmental toxins or neurotoxins? Examine all possible types of toxicity and other danger.
4. **Consider possible routes of exposure.** Determine the potential routes of exposure for each chemical. Are the chemicals gases, or are they volatile enough to present a significant risk of exposure through inhalation? If liquid, can the substances be absorbed through the skin? Is it possible that dusts or aerosols will be formed in the experiment? Does the experiment involve a significant risk of inadvertent ingestion or injection of chemicals? Will there be environmental impacts?
5. **Evaluate quantitative information on toxicity.** Consult the information sources to determine the LD50 for each chemical via the relevant routes of exposure. Determine the acute toxicity hazard level for each substance, classifying each chemical as highly toxic, moderately toxic, slightly toxic and so forth. For substances that pose inhalation hazards, take note of the threshold limit value time-weighted average (TLV-TWA), short-term exposure limit (STEL) and odour threshold.
6. **Select appropriate procedures to minimize exposure.** Use Good Laboratory Practices for all work with chemicals in the laboratory. In addition, determine whether any of the chemicals to be handled in the planned experiment are extremely hazardous, i.e. deserve a

'3' or '4' rating under any of the NFPA categories. If so, pay special attention to the control of these compounds. Consider the total amount of the substance that will be used, the expected frequency of use, the chemical's routes of entry, and the circumstances of its use in the proposed experiment.

7. **Prepare for contingencies.** Note the signs and symptoms of exposure to the chemicals to be used in the proposed experiment. Note appropriate measures to be taken in the event of exposure, accidental release or other unplanned situations involving any of the chemicals. Be sure to get the appropriate spill clean-up supplies for the chemicals in use and keep them on hand.

Reference: *University of Saskatchewan Lab Safety Manual*, June 2003.

as adapted from:

Committee on Prudent Practices for Handling, Storage and Disposal of Chemicals in Laboratories. *Prudent Practices in the Laboratory Handling and Disposal of Chemicals*, Washington: National Academy Press, 1995. Page 47

APPENDIX O

UPEI Sample Departmental Safety Training Checklist/Acknowledgment

I, _____, have completed WHMIS training and site safety orientation for the _____ Department and know:

Check off those which apply.

- ☐ the location of and how to use the MSDSs for the lab
- ☐ the chemical inventory and MSDS update procedure for the lab
- ☐ the proper labeling and storage procedure for any products developed and kept in the lab

the safe handling, storage and disposal procedures for:

- ☐ chemicals
- ☐ biohazards
- ☐ sharps and broken glassware
- ☐ gases
- ☐ cryogenics
- ☐ that individuals who transport, offer for transport, pack or unpack chemicals may be required to be trained in Transportation of Dangerous Goods if and when the chemicals are classed as dangerous goods under TDG regulations

the safe use of radiation including:

- ☐ultraviolet ☐laser ☐x-ray

the personal protective equipment requirements for the lab including:

- ☐ the compulsory use of lab coats, closed toe footwear, and safety glasses
- ☐ the availability and proper use of various protective gloves

the location of and how to properly use:

- ☐ face shields
- ☐ respirators
- ☐ fumehoods
- ☐ biological safety cabinets
- ☐ eyewashes, emergency showers and deluge hoses
- ☐ first aid kits
- ☐ spill kits (concentrated acids and bases as well as mercury)
- ☐ nearest fire alarm
- ☐ fire extinguishers (also the procedure to get them re-charged once used)

the precautions to follow when leaving reactions unattended including:

- ☐ informing my supervisor and getting approval
- ☐ properly labeling the reaction with the approved department form
- ☐ properly securing the apparatus, including the heat source

- ☐ using tygon tubing for water cooling and securely clamping it to the equipment
- ☐ where to locate the electrical panels for labs and instrument rooms
- ☐ where to locate the UPEI Emergency Procedures Guide
- ☐ the emergency evacuation procedure for this building
- ☐ the procedure for reporting an incident to the immediate supervisor, to UPEI security and, in an emergency, to 9-911
- ☐ that only people who are authorized by the supervisor are allowed to be in the lab

I also acknowledge that general safe laboratory practice also includes:

Safety glasses and lab coats must be worn in all areas where hazardous chemicals are stored and used.

Food or drinks are not allowed in the lab.

Working alone in the laboratory is not permitted when working with hazardous chemicals or equipment and doing other activities as noted in the specific lab working alone policy.

After hours work is permitted only with proper authorization.

Fumehoods, benchtops and sinks must be kept clear of clutter.

Volume of radios/music must be kept low to enable hearing sounds of trouble and avoid disturbing others.

Lab coats and gloves must not be worn outside of lab area.

Door handles, phones, computers and other common surfaces must not be touched with gloves.

Hands should be washed when leaving the lab.

Loose clothing should not be worn in the lab and long hair should be tied back

Safe handling procedures for all glassware and equipment must be known and practised at all times.

Caution must be used when working around equipment emitting high voltages.

Equipment having frayed electrical cords must never be used. They must be marked as damaged and replaced or repaired immediately.

_____ Employee (print)	_____ Signature	_____ Date
_____ Site Safety Trainer	_____ Signature	_____ Date
_____ Supervisor	_____ Signature	_____ Date

APPENDIX P

DEFINITIONS OF TERMS/ACRONYMS

ACGIH: American Conference of Government Industrial Hygienists. ACGIH is an organization open to all practitioners in industrial hygiene, occupational health, environmental health, or safety. Their web site is <http://www.acgih.org/>. ACGIH establishes the TLVs.

ANSI: American National Standards Institute

AIR PURIFYING RESPIRATOR (APR): A half or full face respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element. *OSHA Definition.*

ATMOSPHERE SUPPLYING RESPIRATOR: A respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units. *OSHA Definition*

AUTOIGNITION TEMPERATURE: The autoignition temperature of a substance is the temperature at or above which a material will spontaneously ignite (catch fire) without an external spark or flame.

BIOHAZARD: A **biological hazard** or **biohazard** is an organism, or substance derived from an organism, that poses a threat to health. This can include medical waste, samples of a microorganism, virus or toxin (from a biological source) that can impact human health. It can also include substances harmful to animals. The term and its associated symbol is generally used as a warning, so that those potentially exposed to the substances will know to take precautions.

BIOSAFETY: Biosafety is safety from exposure to infectious agents.

BIOSAFETY CABINET: Biosafety cabinets are used to provide primary containment in the laboratory when using potentially infectious materials.

BOILING POINT: Boiling point is the temperature at which a liquid changes to a gas (vapor) at normal atmospheric pressure.

BREAKTHROUGH: The penetration of challenge material(s) through a gas or a vapor air-purifying element. The quantity or extent of breakthrough during service life testing is often referred to as the percentage of the input concentration. *NIOSH Definition*

CANISTER OR CARTRIDGE: A container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container. *OSHA Definition*

CARCINOGEN: A carcinogen is a substance that causes cancer (or is believed to cause cancer).

CGA: Compressed Gas Association

CSA: Canadian Standards Association

DISPOSABLE RESPIRATOR: A respirator that is discarded after the end of its recommended period of use, after excessive resistance or physical damage, or when odor breakthrough or other warning indicators render the respirator unsuitable for further use. *NIOSH Definition*

DUST: A solid, mechanically produced particle with a size ranging from submicroscopic to macroscopic. *NIOSH Definition*

EMERGENCY RESPIRATOR USE SITUATION: A situation that requires the use of respirators due to the unplanned generation of a hazardous atmosphere (often of unknown composition) caused by an accident, mechanical failure, or other means and that requires evacuation of personnel or immediate entry for rescue or corrective action. *NIOSH Definition*

EMERGENCY SITUATION: Any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant. *OSHA Definition*

EMPLOYEE EXPOSURE: Exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection. *OSHA Definition*

END-OF-SERVICE-LIFE INDICATOR (ESLI): A system that warns the respirator user of the approach of the end of adequate respiratory protection; for example, that the sorbent is approaching saturation or is no longer effective. *OSHA Definition*

FILTER OR AIR-PURIFYING ELEMENT: A component used in respirators to remove solid or liquid aerosols from the inspired air. *OSHA Definition*

FILTERING FACEPIECE: A particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

FILTERING FACEPIECE (Dust Mask): A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium. *OSHA Definition*

FIT FACTOR: A quantitative measure of the fit of a specific respirator facepiece to a particular individual. *NIOSH Definition*

FIT FACTOR: A quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn. *OSHA Definition*

FIT TEST: Means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test QLFT and Quantitative fit test QNFT.) *OSHA Definition*

FLAMMABLE LIMITS: Flammable limits apply generally to vapors and are defined as the concentration range in which a flammable substance can produce a fire or explosion when an ignition source (such as a spark or open flame) is present.

FLASHPOINT: Flash point is the lowest temperature at which a liquid can form an ignitable mixture in air near the surface of the liquid. The lower the flash point, the easier it is to ignite the material.

FUME: A solid condensation particle, usually of a vaporized metal. *NIOSH Definition.*

FUMEHOOD: A fume hood is a type of local exhaust ventilation system (engineering control). A typical fume hood is a cabinet with a moveable front sash (window) made out of safety glass. Air is drawn into the hood under and through the opened sash and is exhausted through openings in the rear and top of the cabinet to a remote point such as an exhaust stack on the roof of the building.

GAS: An aeriform fluid that is in a gaseous state at standard temperature and pressure. *NIOSH Definition*

HIGH-EFFICIENCY PARTICULATE AIR (HEPA) FILTER: A filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters. *OSHA Definition*

HOOD: Means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso. *OSHA Definition*

IARC: International Agency for Research on Cancer

IATA: International Air Transportation Association

IDLH: Immediately Dangerous to Life and Health. IDLH refers to the maximum concentration to which most persons can be exposed for up to 30 minutes without sustaining escape impairing or irreversible health effects. These are exposure levels that should never be exceeded.

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH (IDLH): An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or

LD₅₀: An LD₅₀ (50% lethal dose) value is the amount of a solid or liquid material that it takes to kill 50% of test animals (for example, mice or rats) in one dose.

LOOSE-FITTING FACEPIECE: A respiratory inlet covering that is designed to form a partial seal with the face. *OSHA Definition*

LOWER FLAMMABLE LIMIT: Below the lower flammable limit (LFL) the mixture of substance and air lacks sufficient fuel (substance) to burn.

MIST: A liquid condensation particulate. *NIOSH Definition*

MSDS: Material Safety Data Sheet. Material safety data sheets provide the necessary information for you to understand and deal with the potential hazards associated with a particular substance.

NEGATIVE PRESSURE RESPIRATOR (TIGHT FITTING): A respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator. *OSHA Definition*

NFPA: National Fire Protection Association (US). The National Fire Protection Association is a voluntary membership organization whose aims are to promote and improve fire protection and prevention. NFPA has published 16 volumes of codes known as the National Fire Codes.

OXYGEN DEFICIENT ATMOSPHERE: An atmosphere with an oxygen content below 19.5% by volume. *OSHA Definition*

PEL: Permissible Exposure Limit, is the maximum amount or concentration of a chemical that a worker may be exposed to.

POSITIVE PRESSURE RESPIRATOR: A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator. *OSHA Definition*

POWERED AIR-PURIFYING RESPIRATOR (PAPR): An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering. *OSHA Definition*

PPE: Personal Protective Equipment. PPE includes all clothing and other work accessories designed to create a barrier against workplace hazards. Examples include safety goggles, blast shields, hard hats, hearing protectors, gloves, respirators, aprons, and work boots.

ppm: parts per million

PROTECTION FACTORS: *NIOSH Definition*

Assigned Protection Factor (APF): The minimum anticipated protection provided by a properly functioning respirator or class of respirators to a given percentage of properly fitted and trained users.

Simulated Workplace Protection Factor (SWPF): A surrogate measure of the workplace protection provided by a respirator.

Workplace Protection Factor (WPF): A measure of the protection provided in the workplace by a properly functioning respirator when correctly worn and used.

QUALITATIVE FIT TEST (QLFT): A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent. *OSHA Definition*

QUANTITATIVE FIT TEST (QNFT): Means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator. *OSHA Definition*

RECOMMENDED EXPOSURE LIMIT (REL): An 8- or 10-hour time-weighted average (TWA) or ceiling (C) exposure concentration recommended by NIOSH that is based on an evaluation of the health effects data. *NIOSH Definition*

RESPIRATOR: A respirator (of the "approved" type) is a device which has been designed to protect the wearer from inhalation of harmful atmospheres.

RESPIRATORY INLET COVERING: The portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a facepiece, a helmet, a hood, a suit, or a mouthpiece respirator with nose clamp. *OSHA Definition*

SAR: Supplied Air Respirator - for use when an APR is not adequate providing contamination level is < IDLH.

SCBA: Self-Contained Breathing Apparatus- for emergency use, or when atmosphere is IDLH.

SELF-CONTAINED BREATHING APPARATUS (SCBA): An atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user. *OSHA Definition*

SERVICE LIFE: The period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer. *OSHA Definition*

SINGLE-USE DUST OR DUST AND MIST RESPIRATORS: Respirators approved for use against dusts or mists that may cause pneumoconiosis and fibrosis. *NIOSH Definition*

SOP: Standard Operating Procedure

STEL: Short Term Exposure Limit. STEL is defined by ACGIH as the concentration to which workers can be exposed continuously for a short period of time without suffering from negative health affects.

SUPPLIED -AIR RESPIRATOR (SAR) OR AIRLINE RESPIRATOR: An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user. *OSHA Definition*

TDG: Transportation of Dangerous Goods

TIGHT-FITTING FACEPIECE: A respiratory inlet covering that forms a complete seal with the face. *OSHA Definition*

TLV: Threshold Limit Value. TLV's are guidelines (**not** standards) prepared by the ACGIH to assist industrial hygienists in making decisions regarding safe levels of exposure to various hazards found in the workplace. TLV is the concentration of a material to which nearly all workers can be exposed day after day without adverse effects. This value is based upon an 8 hour exposure and a 40 hour work week.

TWA: Time Weighted Average. TWA is the average time, over a given work period (eg 8-hour workday) of a person's exposure to a chemical or an agent. The average is determined by sampling for the contaminant throughout the time period.

UPPER FLAMMABLE LIMIT: Above the upper flammable limit (UFL) the mixture of substance and air is too rich in fuel (deficient in oxygen) to burn.

USER SEAL CHECK: An action conducted by the respirator user to determine if the respirator is properly seated to the face. *OSHA Definition*

VAPOR: The gaseous state of a substance that is solid or liquid at temperatures and pressures normally encountered. *NIOSH*

VENTILATION: Ventilation is the process of supplying fresh air to an enclosed space in order to refresh/remove/replace the existing atmosphere. Ventilation is commonly used to remove contaminants such as fumes, dusts or vapors and provide a healthy and safe working environment.

WHMIS: Workplace Hazardous Materials Information System. WHMIS is Canadian legislation covering the use of hazardous materials in the workplace.

APPENDIX Q

ADDITIONAL SOURCES OF INFORMATION

1. Bretherick L., *Handbook of Reactive Chemical Hazards*, 4th ed., Butterworth - Heinemann, Oxford, Boston, 1990
2. Yasida T., *Safety of Reactive Chemicals (Industrial Safety Series)*, Elsevier Science Publications, Amsterdam, 1987.
3. *Fire Protection Guide to Hazardous Materials*, 10th ed., National Fire Protection Association, Quincy, MA, 1991
4. *Flammable and Combustible Liquid Code 30*, American National Standards Institute & National Fire Protection Association, Quincy, MA, 1993.
5. Sax N. I., *Dangerous Properties of Industrial Materials*, 8th ed., Van Nostrand Reinhold, Litton Publishing, New York, 1993.
6. Sittig M., *Handbook of Toxic and Hazardous Chemicals and Carcinogens*, 2nd ed., Noyes Publications, New Jersey, 1985.
7. Bretherick L., *Hazards In the Chemical Laboratory*, 4th ed. Royal Chemical Society, London, 1986
8. *Prudent Practices in the Laboratory*, National Research Council, National Academy Press, Washington, DC, 1995
9. *Laboratory Health and Safety Guidelines*, 4th ed., Chemical Institute of Canada, Ottawa, ON, 2003
10. *Safety in Academic Laboratories*, 7th ed., American Chemical Society, Washington, DC, 2003
11. Furr A.K., *Handbook of Laboratory Safety*, 3rd ed. CRC Press, Cleveland, OH, 1990

APPENDIX R

Record of Testing & Maintenance of Emergency Eye-Wash Station

Instructions: Place the date and the signature of inspector/tester beside the appropriate month or at the Annual Maintenance, indicating that the emergency eyewash was inspected and tested; one form per eyewash unit.

Location: _____

Year: _____

Month	Inspector	Date
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
Annual Maintenance		

Record of Testing & Maintenance of Emergency Shower Station

Instructions: Place the date and the signature of inspector/tester beside the appropriate month or at the Annual Maintenance, indicating that the emergency eyewash was inspected and tested; one form per shower unit.

Location: _____

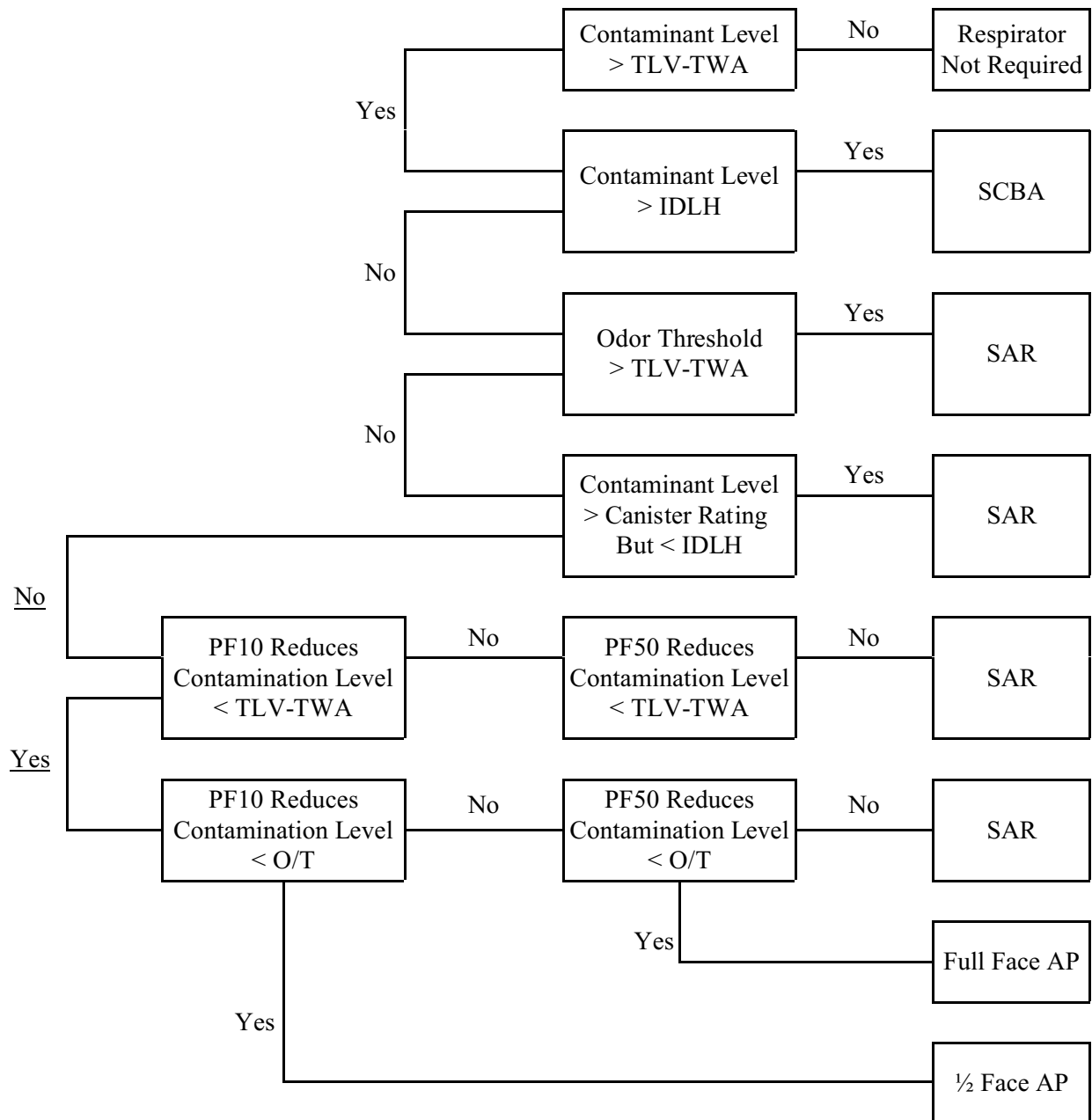
Year: _____

Month	Inspector	Date
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
Annual Maintenance		

APPENDIXS

GUIDE TO RESPIRATOR SELECTION

RESPIRATOR SELECTION LOGIC TREE



PF10 = TLV x 10
 PF50 = TLV x 50
 O/T = Odor Threshold



APPENDIX T: UPEI Respirator User Screening Form

(For initial and periodic screening of respirator users in conjunction with CSA Standard Z94.4, Clause 11.)

Part 1: Employer Information

University of Prince Edward Island
550 University Avenue, Charlottetown
PE C1A 4P3

Supervisor Name: _____
Telephone: _____
Fax: _____

Part 2: Respirator User Information

Name: _____
Employee #: _____
Title/Occupation: _____

Date: _____
Telephone: _____
Fax: _____

Part 3: Conditions of Use

Activities requiring respirator use:

Frequency of respirator use: ☐ daily ☐ weekly

Exertion level during use: ☐ light ☐ moderate

Duration of use per shift: ☐ <1/2 hr ☐ ~ 1 hr

Temperature during use: ☐ <0°C ☐ 0-25°C

Atmospheric pressure during use: ☐ reduced

☐ monthly ☐ yearly ☐ uncertain

☐ heavy ☐ other

☐ >2 hr ☐ variable ☐ unknown

☐ >25°C

☐ normal/ambient ☐ increased

Special Work Conditions

☐ Rescue operations ☐ Oxygen deficiency

☐ Riot/Police activity ☐ Fire fighting

☐ Other: _____

Uncontrolled/hostile Environment

☐ Emergency escape

☐ IDLH ☐ Confined spaces

☐ Hazardous materials (emergency)

Other Personal Protective Equipment (PPE):

Additional types of PPE required, specify: _____

Weight of tools/equipment carried during respirator use (estimate): Maximum: ____ Average: ____

Part 4: Types of Respirators Used (check all that apply):

☐ Tight-fitting (forms a seal)

☐ Non-tight-fitting (eg. hood)

☐ Air-purifying, powered

☐ Air-purifying, non-powered

☐ SCBA

☐ Other - specify: _____

Part 5: Respirator User's Health Conditions (check YES or NO box only. Do not Specify.)

a) Some conditions can seriously affect your ability to safely use a respirator.

Do you have or do you experience any of the following, or another condition that may affect respirator use? ☐ YES ☐ NO

Shortness of breath

Vision impairment

Back/neck problems

Breathing difficulties

Chest pain or exertion

Cardiovascular disease

Fainting spells

Heart problems

Thyroid problems

Prescription medicine to
control a condition

Lung disease

Hypertension

Neuromuscular disease

Temperature susceptibility

Panic attacks

Asthma

Reduced sense of taste

Emphysema

Allergies

Pacemaker

Color blindness

Reduced sense of smell

Claustrophobia/fear of heights

Facial features/skin conditions

Dizziness/nausea

Hearing impairment

Diabetes

Dentures

Chronic bronchitis

Seizures

b) Have you had previous difficulty while using a respirator? ☐ YES ☐ NO ☐ N.Ap

c) Do you have any concerns about your future ability to use a respirator safely? ☐ YES ☐ NO

A "YES" answer to "a", "b" or "c" indicates further assessment by a health care professional is required prior to respirator use. NOTE: **Medical information is NOT to be offered on this form.**

Signature of Respirator User: _____

Supervisor's Initials: _____

Date: _____

Part 6: Health Care Professional Primary Assessment (if required)

Assessment date: _____

Respirator use permitted? ☐ YES ☐ NO ☐ Uncertain

Referred to Medical Assessment: ☐ YES ☐ NO

Comments: _____

Name of Health Care Professional: _____ Signature of HCP: _____

Title: _____ Reassessment date: _____

Part 7: Medical Assessment (if required)

Assessment date: _____

☐ Class 1. NO restrictions

☐ Class 2. Some specific restrictions apply: _____

☐ Class 3. Respirator use is NOT permitted.

Name of Physician: _____ Signature of Physician: _____

☐ Return this form to: UPEI Health and Safety Advisor, Fax:894-2895
UPEI, 550 University Ave, Charlottetown, PE, C1A 4P3