

# ADMINISTRATIVE PROCEDURES

**SUBJECT:** Secondary Science Safety Procedures

These procedures were developed to assist school staff in maintaining a safe environment in secondary Science classrooms, laboratories and preparation rooms. The Science Teachers' Association of Ontario (STAO) document Safe ON Science is a key resource for staff. The Board through the Health and Safety Department will maintain a STAO membership for each secondary school.

## Access to Science Areas

### **The Principal shall ensure that:**

- A teacher qualified to teach Science and who has appropriate training in Science safety practices is present during any laboratory procedure.
- A sign is posted outside a Science chemical storage room indicating that hazardous materials are present.
- Science Chemical Storage Areas are keyed separately and only the principal, Science teachers, custodial staff and appropriate board personnel have access.
- Chemical Storage Areas and Science Laboratories will be equipped with auto closing doors which swing in a direction that will not cause injury to people passing by.
- Science classrooms equipped with gas, shall have a visible "Gas On Light" installed outside the classroom door.
- Gas, power, and water will be controlled through a key system so the switches are secured to prevent unauthorized access. At least one emergency shut-off switch must be present which will simultaneously turn off gas/water/power.
- Gas, power, and water is turned off during non-instructional hours.
- Science classrooms, laboratories, and storage areas are properly secured during extended periods of non-use (i.e. Summer Vacation, March Break, and Christmas holidays).
- Doors from the hallway to Chemical Storage/Prep Areas must always be kept locked; doors to Science Laboratories are to be kept locked whenever a staff member is not present. The adjoining door between the classroom and the Prep Room can be unlocked provided staff is present in one of the rooms.

## Chemical Storage

### **The Principal shall ensure that:**

- Staff (Science teachers and custodial staff) working with or in the vicinity of Science chemicals should be familiar with the STAO Safe ON Science document and "Safer Use of Chemicals in School Science Laboratories". A copy of both documents should be posted in each Science Chemical Prep and Storage Area.
- Chemical storage will be done in accordance with the STAO "Chemical Storage Group Chart" (Appendix A) and the STAO Safe ON Science document.
- All chemical storage facilities shall include the following:
  - One cabinet will be used to store organic flammables, including alcohols. This cabinet requires venting in accordance with the Ontario Fire Code.

- One cabinet will be used to store water-reactive metals and other flammables approved in accordance with the Ontario Fire Code. Water reactive metals and flammable solids shall be stored in a closed, sealed container that is inspected at the beginning of September and February and the end of June. A record of inspection shall be maintained and kept near the cabinet.
- Acids will be stored in an acid cabinet. The acid cabinet shall be vented separately from the flammables cabinet. All shelves should be equipped with an appropriate spill capture system. Nitric Acid shall be stored separately on an approved insert or away from other acids, especially acetic acid.
- Corrosives should be stored on a low shelf.
- Flammable liquids and biological preparations, which emit flammable vapours, should not be stored in refrigerators sold for domestic purposes. They should be stored either in a refrigerator designed for these materials or in an appropriate cabinet.
- Oxidizing agents should be stored on shelves away from organic materials. General chemicals should be divided into inorganic and organic groups on shelves in alphabetical order according to their anions. It is recommended that where possible shelves have either a lip or rod insert installed in order to prevent bottles from falling. Under no circumstances should chemicals ever be stored on the floor.
- All compressed gas cylinders, including lecture bottles, shall be stored in a cool place and chained or clamped firmly, in an upright position or stored in special stand for this purpose. All compressed gas storage areas should be identified with proper labels. The valve protection cap should be in place when the cylinder is not in use. Anything larger than a lecture or demo sized tank should not be used without the permission of the principal and the Board Health and Safety Officer.

**The Health and Safety Officer, through the Program Department, will ensure that:**

- The STAO document, Safe ON Science and the Administrative Procedure- Secondary Science Safety Procedures are reviewed annually, at District Subject Meetings, including the most recent STAO list of banned chemicals.

**The Science Curriculum Leaders will ensure that:**

- Science teachers review at the beginning of each semester, the Administrative Procedure – Secondary Science Safety Procedures and STAO Safe ON Science document including rules for the proper storage, use, and disposal of chemical and biological materials.
- Prior to the purchase of chemicals, the STAO “Safer Use of Chemicals in School Science Laboratories” document should be consulted for a list of approved and banned chemicals.
  - Chemicals listed as banned in this document are not allowed to be ordered unless approved by the principal and Health & Safety Officer.
  - Materials or products not listed in the LKDSB WHMIS inventory for the worksite may only be added with approval of the Health & Safety Officer as outlined in Administrative Procedure A-BU-516.
  - Chemicals are ordered in quantities suitable for use within a specific time period. Only a one year supply of designated or unstable chemicals should be purchased.
- Chemicals shall be marked using an appropriate labeling program; this system shall include the date of purchase.
- Chemical inventory shall be reviewed annually; chemicals deemed surplus should be disposed of in an appropriate manner.
- A list of all designated substances that are stored in Chemical Storage Areas will be maintained and reviewed annually as per the Occupational Health & Safety Act (i.e. lead, etc.). The proper assessment of the material as per the Act will be kept on file at the school and a copy will be shared with the Health and Safety Department where it will be stored in the school’s Health & Safety File and posted on the Health and Safety Folder on the school’s shared drive.

**The Board's Purchasing Department will:**

- Retain a copy of the current version of STAO Safer Use of Chemicals in School Science Laboratories document.

**Animal Materials and Microbes****The Science Curriculum Leaders will ensure that:**

- Animal materials and/or microbes will be purchased from an authorized supplier: educational supply company, butcher, or abattoir.
- Science staff are aware of the importance of rinsing chemically stored specimens with water prior to use. All surfaces which have come into contact with these materials must be cleaned with appropriate disinfectants. After handling any specimens, hands need to be washed thoroughly using soap and water.
- Bleach is not to be used as a disinfectant. Alternatives include hydrogen peroxide, or quaternary ammonia (QUAT) available from custodians.
- Waste specimens may be rinsed and disposed of in the regular garbage; double-bagging the specimen is suggested. They may also be collected in a plastic pail and marked as "Chemically Stored Specimens For Disposal" and disposed of in accordance with the Board's hazardous waste program.
- Specimens stored in formaldehyde shall be removed from the school or have the formaldehyde replaced with an alternate preservative by a certified company.
- Science teachers review prior to doing any microbial analysis the STAO resource Safe On Science, as well as "The Use of Microorganisms" (Appendix B).

**Plants and Live Animals**

- The Principal shall determine if live animals are permitted be kept in the school.
- The Science Curriculum Leaders shall ensure that, where live animals are kept at school, Science teachers review the section in the STAO resource Safe On Science which pertains to care and use of animals.
- The Science Curriculum Leaders shall ensure that Science teachers review the section in the STAO resource Safe On Science which pertains to plants
- Similarly, the Science Curriculum Leaders shall ensure that Science teachers review the section in the STAO resource Safe On Science which pertains to greenhouses.

**STAFF TRAINING**

- The Health and Safety Officer will organize appropriate Science lab safety training at the beginning of each semester for teachers new to the Board as well as teachers new to teaching Science.
- The principal shall ensure that all Science staff participate in appropriate Science lab safety training on an on-going basis. The Health and Safety Officer, in collaboration with the Science Consultant and the Secondary Facilities Joint Health and Safety Committee will determine a schedule for completion of this training.

## **Workplace Hazardous Material Information System (WHMIS)**

### **The Principal shall ensure that:**

- Science teachers have received WHMIS training prior to working with or in the vicinity of any controlled product and adhere to the Board's WHMIS Administrative Procedure.

Removed a several clauses as the WHMIS Admin Procedure covers most of this section.

## **Hazardous Waste Removal Program**

### **The Health & Safety Officer shall ensure that:**

- There are two hazardous waste pick-ups per year (one per semester), for each secondary school in order to prevent the long-term storage of hazardous waste.

### **The Principal shall ensure that:**

- The Ministry of Environment manifest is signed and sent to the Health & Safety Department.

### **The Science Curriculum Leaders shall ensure that:**

- The Administrative Procedure – Secondary Science Safety Procedures and the STAO Safe ON Science document including the most recent listing of banned chemicals are reviewed annually (at District Subject Meetings).
- A Hazardous Waste Inventory form is accurately completed and includes room numbers and the contact person.
- All hazardous materials are placed in tightly sealed, closed containers and clearly labeled “Hazardous Waste For Disposal” before they are cited for waste pick-up. If there is any uncertainty regarding whether a material has been cited for waste pick-up, it will be left at the school to prevent mistakes in removing non-waste materials.
- Waste specimens may be rinsed and disposed of in the regular garbage; double-bagging the specimen is suggested. They may also be collected in a plastic pail and marked as “Chemically Stored Specimens For Disposal” and disposed of in accordance with the Board's hazardous waste program.

## **Projects Outside Ontario Curriculum Guidelines or of an Unusual Nature**

### **The Science Curriculum Leaders will ensure that:**

- A written outline of the project is developed and submitted to the principal for approval prior to starting any project that is outside Ontario Curriculum guidelines or completed off-site (ie Science Fair Projects).
  - Prior to starting these projects the Science Curriculum Leader will meet with the Principal to discuss specific materials and procedures required. It is the Principal's responsibility to ensure that reasonable precautions as stated in the Occupational Health & Safety Act are followed.
  - Teachers should consult the guidelines in Youth Science Foundation, as referenced in Safe ON Science.
- Science teachers involved in the project have determined whether the school's facilities are suitable for the project. This includes giving consideration to ventilation, storage, equipment and chemicals required. Only approved chemicals may be used.

## **Science Safety Inspections**

The Health & Safety Officer shall ensure that:

- All chemical storage areas, fume hoods, chemical exhaust vents, emergency shut-off systems and waste neutralizers, including acid pits are inspected and maintained annually.
- The Secondary Joint Health & Safety Committee reviews the general inspection process of all Science areas in accordance with the Industrial Establishment Regulations made under the Occupational Health & Safety Act.

The Principal shall ensure that the eye-wash stations are inspected and maintained as prescribed in the Eye-wash Station Administrative Procedure.

## **Laboratory and Chemical Storage Room Attire**

**The Principal shall ensure that:**

- Science teachers and students wear proper attire when working in the Science labs and preparation rooms. This includes wearing lab coats or lab aprons, eye protection suitable for the activity, appropriate footwear (no open toes or backs, to protect against chemical spills), and having all long hair tied back when working with hazardous materials as required by the Board and/or the Occupational Health & Safety Act and Safety Regulations.

Note: Chemical splash goggles must be worn when there is a potential for splashing.

## **Student Safety**

**The Science Curriculum Leaders will ensure that:**

- Science teachers will develop and use a safe, positive working attitude and ensure that safety instructions are an integral part of the Science program. Science teachers will set a good example for students by modeling good safety rules.
- A Student Science Safety Practice Agreement is developed in consultation with the Health and Safety Officer.
- Science teachers will make sure that their students understand and sign this agreement at the beginning of each Science course. A signed record of these agreements should be kept on file at that school.
- A Science teacher is present whenever a student is performing a laboratory procedure.

## **Additional Safety Procedures**

**The Science Curriculum Leaders will ensure that:**

- Science teachers clearly post and discuss with students safety equipment signs within each lab (i.e. fire extinguishers, emergency stop buttons, first aid kits, eye wash stations, special shut off valves, emergency exits, etc.).
- Science teachers make sure that required guarding for power equipment/machinery is in place and operational. Machines missing the proper guarding must be locked-out of service until the proper repairs can be made. The Lock-out Administrative Procedure must be followed when locking out equipment.
- Science teachers do not engage in work that requires or results in alterations, repairs or modifications to the school's electrical (i.e. installing an outlet), gas lines, water lines or the fabric of the building. These types of changes require the approval of the Building Services Department.
- Science teachers shall use only CSA approved electrical equipment in Science laboratories.

- Prior to ordering new equipment, including donated items, the Science Curriculum Leader and the Principal are responsible for ensuring the proper forms/requisitions, including the attached Science Equipment Installation Checklist, are completed. Building Services will be available to assist with cost estimates related to installation. This is to ensure that all proper Board Departments have had a chance to review it to ensure the facility systems (i.e. electrical, ventilation, etc.) are capable of handling it and that it meets all safety requirements (i.e. CSA Standards, guarding, manuals etc.) Similarly, Science equipment must not be used for non-school (i.e. personal) projects.
- Under no circumstances will food products and or water be consumed in chemical preparation or laboratory areas.
- Refrigerators used for the storage of chemical agents and/or biological materials must never be used for the storage of food meant for human consumption.
- Items donated to the Board will meet Board policies and procedures. Prior to installing new equipment, including donated items contact Building Services Department to ensure proper installation requirements are followed (i.e., electrical, ventilation, CSA, etc.).
- Staff will not use portable propane torch type cylinders and or portable Bunsen burners.  
Note: The Board does not have the special variance required by the Ontario Propane Code, for staff to use this equipment.

Implementation Date: September 14, 2006

Revised: October 1, 2013

Reference: Board Policy Health & Safety PO-405-0d1  
WHMIS Administrative Procedure 516-05  
Occupational Health & Safety Act  
WHMIS Regulation  
Regulations for Industrial Establishments  
Designated Substance Regulations under the OH&S Act  
The Ontario Fire code 1997  
The Fire Prevention And Prevention Act, 1997 (The Ontario Fire Code 1997)  
Science Teachers Association of Ontario's Safe ON Science Document  
Science Teachers Association of Ontario's Safer Use of Chemicals in School Science Laboratories Document

## Appendix A – Chemical Storage Group

The following chart was adopted from the Science Teachers' Association of Ontario (STAO) "Safe ON Science"  
Publication October 2002 - ISBN 1-84592-22-0.

Group	Storage Provision	Store Away From
<b>SPECIAL CASES:</b>	These do not fit into other groups and are some of the most awkward to store.	
<b>Gas Cylinders</b>	Should be either clamped to a fixture or chained to a trolley, in an upright position, and properly capped.	Flammable liquids
<b>Radioactive Substances**</b>	In a metal container in a special cupboard or drawer (not necessarily in chemical storage area, located so that staff do not regularly sit or work near it.	Flammable liquids and corrosive liquids
<b>White Phosphorus *</b>	Should be stored in a separate cupboard or cabinet, under water in a tightly covered unbreakable container (or if container is glass put it in an outside plastic container). Possibly best kept with toxics.	Oxidizers and water-reactive solids
<b>FLAMMABLE LIQUIDS</b> e.g., alcohols, acetone, ethyl acetate	Should be stored in an approved, vented, fire-resistant "Flammables Cabinet." A few small bottles (up to 500 mL each) could be kept on shelves.	Oxidizers and toxics.
<b>FLAMMABLE AND WATER-REACTIVE SOLIDS</b> e.g. alkali metals, red phosphorous; calcium carbide	Should be stored in a separate cupboard or cabinet. Alkali metals should be always covered with kerosene, paraffin oil or petroleum oil in tightly covered unbreakable containers. If the container is made of glass, it should be put in an outside plastic container.	Oxidizers, corrosive liquids and flammable liquids
<b>HIGHLY TOXIC CHEMICALS*</b> e.g. arsenic compounds, cyanides, mercury and its compounds, lead compounds	Poisonous chemicals should be carefully inventoried. They should be kept in a special locked and secured "Poisons Cabinet". These substances can enter the body by absorption through the skin, by inhalation during breathing or by ingestion during eating.	Flammable liquids
<b>CORROSIVE LIQUIDS, acids</b> e.g. Conc. H <sub>2</sub> SO <sub>4</sub> ; conc. HCL, conc. HNO <sub>3</sub> , glacial acetic	These should be stored in a vented (blue) 'Acid Cabinet'. Nitric acid should be segregated from acetic acid. It is better to store nitric acid alone if possible.	Non-acid corrosive liquids, water-reactive solids and toxics
<b>CORROSIVE LIQUIDS, bases</b> e.g. NaOH and KOH solutions	These should be kept on a low shelf. Base solutions should not be store in glass containers.	Acids, water-reactive solids and toxics
<b>CORROSSIVE SOLIDS</b> e.g. NaOH and KOH	On shelves with general inorganic chemicals	
<b>OXIDIZING AGENTS</b> E.G., Nitrates; iodates; peroxides; dichoramtes, chlorates, permanganates	Can be stored on shelves with general inorganic chemicals.	Flammable liquids, flammable solids, water-reactive solids, organics and corrosive liquids.
<b>GENERAL CHEMICALS</b>	Divide remaining chemicals into inorganic and organic groups whether harmful, irritant, or neither. This should be done in order that oxidizing agents may be separated from the organic chemicals.	
Inorganic	Should be stored on shelves, alphabetically according to their anions (never alphabetically according to their cations except within an anion group.)	
Organic	Should be store on shelves, alphabetically.	

\*The use of these chemicals should be considered carefully. Because of their extremely hazardous properties, it is recommended by STAO not to have them in a school.

\*\*Radioactive material should not be present in quantities in excess of the scheduled quantity as defined in Schedule 1 of the Atomic Energy Control Regulations made under the Atomic Energy Control Act (Canada). Because of disposal problems with some radioactive sources, the use of mini-generators with short half-lives (approx. 0.5 h or less) is recommended by STAO.

### Appendix B – Safety Code for Using Microorganisms

The following chart was adopted from the Science Teachers' Association of Ontario (STAO) "Safe ON Science" publication.

1. When culturing, if possible, grow bacteria and fungi on solids (agar) rather than liquids (broth) to avoid spills and aerosol formation. Choose substance, such as nutrient agar, that do not favour the growth of pathogens. Disposable Petri dishes should be used.
2. Do not grow culture of spores collected from telephones, doorknobs, washrooms, or any potable source of water.
3. Grow cultures at room temperature or in the range of 25°C to 32°C. Incubation at 37°C. encourages growth of pathogens.
4. Use sterile equipment or procedures (e.g., by flaming loops and mouths of bottles).
5. Invert agar plates when incubating to avoid condensation dripping on to cultures.
6. Securely close (but do not seal) all containers in which microorganisms are grown. Do not uncover them for observation. See the note below on culture microorganisms.
7. Never allow fermentation by yeast in closed, air-tight containers as the pressure of the gas generated could cause an explosion.
8. Date all cultures.
9. Do not leave cultures for long periods before disposal and ensure immediate disposal of anything which begins to produce an odour. All cultures must be sterilized before disposal using an appropriate method (hydrogen peroxide, autoclave etc).
10. Never use material from waste containers or polluted water for investigations on microorganisms.
11. Anyone with cuts or abrasions should take appropriate protective measures to avoid contamination with microorganisms (e.g., use of protected gloves).
12. Wash hands thoroughly with soap, preferably liquid soap, after working with any cultures.
13. Never put anything into the mouth.
14. For the aseptic transfer of cultures, clean laboratory work surfaces using an appropriate disinfectant solution before and after an activity.
15. Clean up spills of microbial cultures immediately.

**Note:** *Culturing Microorganisms – Whenever cultures are grown in conditions of limited air supply, there is a risk of the growth of extremely dangerous anaerobic pathogens occurring. In school microorganism investigations this is most likely to happen in containers, such as Petri dishes, which have been completely sealed with tape and left for some time. To prevent this the lids of Petri dishes, for example, should be taped down to the bases with 2 or 4 pieces of tape rather than around the rim. This will leave sufficient space for gases from the air to diffuse in and out of the dish.*





**SCIENCE EQUIPMENT INSTALLATION CHECK LIST**

SUPPLIER \_\_\_\_\_ CONTACT \_\_\_\_\_  
 ADDRESS \_\_\_\_\_ TELEPHONE \_\_\_\_\_  
 CITY \_\_\_\_\_ POSTAL CODE \_\_\_\_\_ FAX \_\_\_\_\_

**EQUIPMENT SPECIFICATIONS** MANUFACTURER \_\_\_\_\_  
 MAKE \_\_\_\_\_ MODEL \_\_\_\_\_ TYPE \_\_\_\_\_

**WARRANTY ON EQUIPMENT**

PARTS \_\_\_\_\_ YRS LABOUR \_\_\_\_\_ YRS ON LOCATION  SHIPPING?   

	<b>Yes</b>	<b>No</b>	
EXTENDED WARRENTY	<input type="checkbox"/>	<input type="checkbox"/>	COST \$ _____
SERVICE AGREEMENT	<input type="checkbox"/>	<input type="checkbox"/>	COST \$ _____
CONSUMABLES REQUIRED	<input type="checkbox"/>	<input type="checkbox"/>	COST \$ _____

**REPAIR SERVICE**

WHO \_\_\_\_\_  
 WHERE \_\_\_\_\_  
 COSTS \_\_\_\_\_

**REGULAR MAINTENANCE**

WHAT \_\_\_\_\_  
 RECOMMENDED INTERVALS \_\_\_\_\_  
 OTHER \_\_\_\_\_

**ENVIRONMENTAL CONCERNS**

	Yes	No		Type
VENTILATION REQUIRED	<input type="checkbox"/>	<input type="checkbox"/>		_____
<b>POTENTIAL EMISSIONS:</b>				
NOISE	<input type="checkbox"/>	<input type="checkbox"/>	dB.s	_____
HEAT	<input type="checkbox"/>	<input type="checkbox"/>	B.T.U.s	_____
FINE PARTICLES	<input type="checkbox"/>	<input type="checkbox"/>	Microns	_____
RADIATION	<input type="checkbox"/>	<input type="checkbox"/>	Type	_____
LIGHT	<input type="checkbox"/>	<input type="checkbox"/>	Ft. Candles	_____
VIBRATION	<input type="checkbox"/>	<input type="checkbox"/>	Hz.	_____
OTHER (PLEASE SPECIFY)	<input type="checkbox"/>	<input type="checkbox"/>		_____

**OPERATOR SAFETY CONCERNS**

	Yes	No		Type
GUARDING INCLUDED	<input type="checkbox"/>	<input type="checkbox"/>	EXTRA	\$ _____
EMERGENCY SHUT OFF EQUIP.	<input type="checkbox"/>	<input type="checkbox"/>	EXTRA	\$ _____
ACCEPTS LOCKOUT DEVICE	<input type="checkbox"/>	<input type="checkbox"/>	EXTRA	\$ _____
PERSONAL PROTECTION EQUIP REQ.D	<input type="checkbox"/>	<input type="checkbox"/>	EXTRA	\$ _____

**OPERATIONAL REQUIREMENTS**

POWER REQUIRED VOLTS \_\_\_\_\_ PHASES \_\_\_\_\_ CONSUMPTION AMPS \_\_\_\_\_

	Yes	No		Type
C.S.A. APPROVED	<input type="checkbox"/>	<input type="checkbox"/>	CONNECTION TYPE	_____
COMPRESSED AIR REQUIRED	<input type="checkbox"/>	<input type="checkbox"/>	C.F.M. _____ P.S.I. _____	
GAS REQUIRED	<input type="checkbox"/>	<input type="checkbox"/>	TYPE _____ VOLUME _____	
CGA APPROVED	<input type="checkbox"/>	<input type="checkbox"/>		

**CHEMICAL REQUIREMENTS**

	Yes	No		Type
CUTTING FLUIDS	<input type="checkbox"/>	<input type="checkbox"/>	*PLEASE SPECIFY	_____
BY-PRODUCT DISPOSAL	<input type="checkbox"/>	<input type="checkbox"/>	*PLEASE SPECIFY	_____
MSDS SHEET AVAILABLE ON WEBSITE	<input type="checkbox"/>	<input type="checkbox"/>		
OTHER	<input type="checkbox"/>	<input type="checkbox"/>	*PLEASE SPECIFY	_____

**SPECIAL INSTALLATION CONCERNS**

INSTALLED PRICE \$ \_\_\_\_\_

	Yes	No		Type
SPECIAL REQUIREMENTS	<input type="checkbox"/>	<input type="checkbox"/>	*PLEASE SPECIFY	_____
COST TO DISPOSE OF EQUIPMENT	<input type="checkbox"/>	<input type="checkbox"/>	*PLEASE SPECIFY	_____
OTHER	<input type="checkbox"/>	<input type="checkbox"/>	*PLEASE SPECIFY	_____

Principal's Signature \_\_\_\_\_ School \_\_\_\_\_ Date \_\_\_\_\_