Ref. : CDI-O/SC/909/00

EDUCATION DEPARTMENT
HONG KONG

20 December 2000

SCHOOLS MISCELLANEOUS CIRCULAR NO.7 / 2000

Safety in School Laboratories

(Note: This circular should be read by -
(a) Heads of all Secondary Schools - for necessary action
(b) Heads of Sections/Government Primary Schools - for information)

Summary

The purpose of this circular is to remind heads, science teachers and laboratory technicians of all secondary schools of the importance of safety in science laboratories and the appropriate safety measures that should be taken.

Details

2. This circular supersedes Schools Miscellaneous Circular No.6/98.

3. Heads of schools are requested to note the content of this circular, and bring it to the attention of all science teachers and laboratory technicians. Paragraph 3 of the Annex of this circular should also be read by teachers who may use a science laboratory for non-science lessons, and paragraphs 8, 9, 10, 23, 24, 29 and 30 by teachers of Art and Design, Home Economics and technological subjects.

4. Further guidelines and references on laboratory facilities and safety are available for browsing or downloading on the Internet web pages of the Science Section at *http:// www.cdccdi.hk.linkage.net/cdi/sci.htm* before 31 March 2001 or *http://cd.ed.gov.hk/sci* after 1 April 2001.

Enquiry

5. Enquiries concerning laboratory safety should be directed to schools' respective Regional Education Offices or the Science Section (Tel: 2712 8476 or 2762 0305), Education Department.

Dr K K CHAN
for Director of Education

Annex

Appendix

Introduction

The attention of supervisors/heads of secondary schools is drawn to regulations 21, 24, 26, 27, 31, 32 and 33 in the Hong Kong Education Regulations in connection with safety in school laboratories. For ease of reference, these regulations are reproduced in Appendix A of this circular.

2. According to the above-mentioned regulations, supervisors/heads of secondary schools should ensure that all necessary safety precautions are taken in science laboratories. Teachers in charge of science laboratories should assist school heads to ensure that the essential safety requirements are complied with, and supervise the work of the laboratory technicians under their charge.

Using a Science Laboratory for Non-science Lessons

3. If a science laboratory is used as a classroom for non-science lessons due to floating class arrangements, the teacher involved should see that the pupils:-

(a) do not enter the laboratory unless the teacher is present;

(b) do not disturb or remove any of the materials in the science laboratory.

However, schools should, as far as possible, avoid arranging non-science lessons in science laboratories, especially in the Chemistry laboratory.

Standing Laboratory Safety Committee and Emergency Plan

4. In order to ensure that safety measures adopted in secondary schools are properly implemented and any emergencies occurring in science laboratories can be dealt with in an effective and efficient manner, the Education Department has requested schools to set up a standing laboratory safety committee, draw up and implement an emergency plan which should include emergency measures, evacuation procedures and escape routes, and conduct evacuation drills regularly. Guidelines on setting up a standing laboratory safety committee and drawing up an emergency plan can be found in Appendix B of this circular.

5. As explained in Appendix B, the standing laboratory safety committee should convene regular meetings to discuss various issues related to laboratory safety. It is important that notes on such meetings and the record of work of the committee (including the emergency plan, evacuation drills, etc.) should be properly kept, and made available for inspection when required.

6. It should be noted that the guidelines given in Appendix B are by no means prescriptive and exhaustive. It is the responsibility of each school to formulate and to prioritise its own emergency measures and evacuation procedures for implementation. Besides, school heads should ensure that all staff and pupils are familiar with the emergency measures, evacuation procedures as well as the escape routes.

7. In general, when there is an emergency (such as fire, explosion, spillage of dangerous chemicals and gas leakage) occurring in a science laboratory, the staff and pupils should be evacuated immediately from the laboratory in accordance with the emergency plan drawn up by the school. If the situation becomes serious, all staff and pupils should be

evacuated from the school building. It is essential that such evacuation should be carried out in an orderly, controlled manner, and that every effort should be made to avoid panic amongst pupils. At the same time, the Fire Services Department should be immediately notified by dialling 999. Schools' respective Regional Education Offices should also be notified of the incident.

Control of Chemical Wastes in Secondary Schools

8. The Waste Disposal (Chemical Waste) (General) Regulation under the Waste Disposal Ordinance (Cap. 354) was enacted in May 1992 and has been fully implemented with effect from 3 May 1993. The Environmental Protection Department (EPD) has advised that according to the regulation, all educational establishments (including secondary schools) with science laboratories and/or technological subjects workshops are required to register with EPD as chemical waste producers and to store up, prior to collection for disposal by licensed collectors, the following three main types of chemical wastes which arise as a result of practical work in science laboratories and technological subjects workshops:

(a) strong acids and alkalis with concentrations as defined in Schedule 1 to the regulation;

(b) spent organic solvents; and

(c) surplus or expired chemicals.

With effect from 3 May 1993, secondary schools are required to comply with the regulation with respect to the registration as chemical waste producers and the storage and disposal of these chemical wastes.

9. The general requirements for segregation, packaging, labelling, storage and collection of chemical wastes generated in schools are detailed in Schools Miscellaneous Circular No. 1/98 issued on 11 March 1998.

10. Enviropace Limited, the contractor of the Chemical Waste Treatment Centre, has been carrying out regular collections of the first two types of chemical wastes (i.e. strong acids, strong alkalis and spent organic solvents) from schools since March 1994. Starting from May 1995, the Centre has also provided services to collect the third type of chemical wastes (i.e. surplus or expired chemicals) from schools. For enquiries concerning the collection services, schools should contact the Enviropace Limited direct (Tel: 2434 6452).

Information of Hazardous Chemicals

11. Good housekeeping, regular inspection as well as clear and exact labelling are essential for minimising accidents resulting from the storage of hazardous chemicals. In particular, schools should ensure that all containers of hazardous chemicals, including bench reagent bottles, bear appropriate hazard warning symbols which depict the nature of the chemicals and hence serve to alert the laboratory users. In this connection, the Education Department has produced self-adhesive labels bearing hazard warning symbols for use in school laboratories. Schools wishing to obtain these self-adhesive labels may contact the respective Regional Education Offices or the Science Section, Education Department (Tel: 2712 8476 or 2762 0305).

12. It is recommended that Material Safety Data Sheets for all the hazardous chemicals used are readily available in each science laboratory. They provide important hazardous information about the chemicals, including their hazard natures, safe handling procedures, first aid measures and emergency procedures, for reference of laboratory users at any instance.

Posters on Laboratory Safety and Laboratory Rules

13. Sets of seven posters on laboratory safety and laboratory rules had been distributed to secondary schools in 1996. These posters aim at promoting laboratory safety and should be displayed prominently in science laboratories and demonstration rooms. Schools wishing to obtain additional sets of these posters may contact the respective Regional Education Offices or the Science Section, Education Department (Tel: 2712 8476 or 2762 0305).

Personal Protective Equipment

14. Teachers, pupils and laboratory staff, when working in the laboratory, should wear suitable personal protective equipment (PPE) such as safety spectacles, protective gloves and respirator, etc. in all circumstances wherever there is any potential risk of bodily injury. Suitable PPE, especially safety spectacles, should always be put on when heating chemicals, handling acids, alkalis and other corrosive chemicals, working with glass apparatus under pressure, or carrying out potentially violent or exothermic reactions. All PPE should be kept clean and should be properly maintained in a serviceable condition. Defective PPE should be replaced immediately.

Fire Precautions in School Laboratories

15. Every laboratory must be equipped with at least one appropriate fire-extinguisher, which should normally be installed near an exit and be easily accessible, i.e. not more than 900 mm above the floor. The following two types of fire-extinguishers are suitable for laboratory use:

(a) Carbon dioxide type

(b) "Dry powder" type

16. Fire-extinguishers should be inspected at least once every twelve months. Discharged or expired fire-extinguishers must be promptly recharged by a registered fire service installations contractor.

17. In addition, there should be an approved type of fire-blanket and two buckets of sand in every laboratory. These facilities should be solely used for fire-fighting purposes and be easily accessible. All laboratory staff should be familiar with the operation and handling of all fire-fighting equipment, which must be kept in a state of instant readiness at all times.

18. Schools should conduct fire drills regularly. All pupils, teachers and laboratory staff should be familiar with the escape routes from the laboratories.

19. Schools are reminded that for safety reasons, all exit doors in the laboratories should never be locked during lessons. Furthermore, the passage for the laboratory exits should always be kept clear of obstacles.

20. The main gas supply valve of the laboratory should only be turned on when gas supply is required, and all downstream gas taps inside the laboratory must be in the OFF position before the main valve is turned on.

21. Staff should ensure that fire-resisting doors are closed, but not locked. The gas supply and electricity should be turned off at the mains if practicable when it is necessary to evacuate the laboratory. It is essential that all science teachers and laboratory technicians know the positions of mains controls.

22. If liquefied petroleum gas (LPG) is used in the laboratory, formal approval must be obtained from the Director of Fire Services and all fire services requirements formulated for such purpose must be observed at all times.

23. The Gas Authority strongly recommends on safety grounds that LPG cylinders should not be stored inside school science laboratories and other special rooms (e.g. technological subjects workshops and Home Economics rooms). For schools in locations where piped gas supply is not available, LPG cylinders should be housed in an approved chamber external to school premises (i.e. within the entire school boundary but outside the school building) and the gas supply piped into the special rooms as required. All gas installation work must only be undertaken by registered gas contractors employing installers properly trained and qualified for such work. If schools have any enquiries or difficulties in complying with these recommendations, please contact the Gas Standards Office, Electrical and Mechanical Services Department on 2808 3683 or 2882 8011.

24. As advised by the Fire Services Department, schools are reminded to ensure that ethanol (ethyl alcohol) is not stored together with kerosene and thinner in the laboratory, workshop, art room or in any other rooms within the school premises, including the dangerous goods store. Moreover, storage of dangerous goods in the laboratory shall not exceed the exempted quantity as well as the aggregated quantity specified in the Dangerous Goods (General) Regulations. If schools have any enquiries or difficulties in complying with the regulations, please contact the Licensing and Control Command, Fire Services Department on 2723 2197.

Storage and Handling of Potassium, Sodium, Phosphorus and Water-reactive Chemicals

25. Potassium and sodium should be covered with *paraffin oil* in well-sealed glass bottles in metal containers and stored dry. Old samples of potassium and sodium (especially the former), which appear yellow due to the formation of superoxides, are liable to explode upon friction or shock; it is therefore strictly forbidden to use these old samples for practical work or to cut them into small pieces with a knife as it would entail an explosion. As a general guide, it is advisable:

(a) to purchase these metals only in small quantities (i.e. to keep not more than 100 g of each metal in the laboratories);

(b) to date-stamp the samples upon arrival;

(c) to check the stock of sodium/potassium in the laboratory *regularly*, making sure that there is enough immersion liquid. An additional label showing the name of the immersion liquid should be stuck on each container. Bottles of sodium/potassium should not be stored together with those containing phosphorus (to avoid confusing the immersion liquids); and

(d) that sodium and potassium should never be stored in refrigerators.

26. Both red and yellow (white) phosphorus are poisonous. Yellow phosphorus is more hazardous to handle and should always be stored under *water* because of the spontaneity with which it ignites in air. The vapour from ignited phosphorus irritates the nose, throat, lungs and eyes. Phosphorus burns the skin and causes severe internal damage if taken by mouth. Phosphorus burns should be flooded with running water as a first-aid measure.

27. Water-reactive chemicals like calcium carbide, silicon tetrachloride, disulphur dichloride, phosphorus(III) chloride and phosphorus(V) chloride may be stored in schools for use in experiments. These chemicals, when in contact with water or moist air, can give out flammable gases (as in the case of calcium carbide) or harmful gases. This may also result in building-up of pressure inside the container and cause cracking of the bottle if the stopper has jammed. These chemicals should be kept dry by storing them in tightly sealed containers or desiccators, away from heat and moisture, and subject to regular inspection. It is always advisable to keep minimum amount of the substances sufficient for current use.

28. Surplus, expired or old samples of sodium, potassium, phosphorus and other dangerous chemicals should be regarded as chemical wastes and disposed of through Enviropace Limited as described in paragraph 10.

Using Air-conditioners in Science Laboratories / Laboratory Preparation Rooms / School Workshops / Art and Design Room / Home Economics Room

29. If schools have installed air-conditioners in their science laboratories / laboratory preparation rooms / school workshops / Art and Design Room / Home Economics Room, they should observe the following safety measures to ensure that there is adequate ventilation in these special rooms during practical lessons/ activities.

(a) When Bunsen burners, gas appliances or chemicals are to be used, all air-conditioners should be switched off and exhaust fans switched on. The windows of these special rooms should be left open.

(b) Notices to this effect should be prominently displayed in these special rooms.

30. All users of these special rooms, including teachers, pupils, laboratory technicians and attendants, should be notified of the above measures.

31. In addition to the safety measures mentioned in paragraph 29, school should observed the following safety measures in air-conditioned preparation room:

(a) To maintain adequate fresh air supply in laboratory preparation room, the exhaust fan must be switched on whenever the room is in use. To this effect, the air-conditioning system and exhaust fan in the preparation rooms must

be electrically interlocked so that switching on of the former will automatically turn on the ventilation fan so as to avoid accumulation of gases within the preparation room, but not vice versa.

(b) Chemicals which generate hazardous vapours should not be handled or stored inside preparation rooms, whether or not air-conditioned. Preparation work which involves unpleasant or hazardous fumes/gases should not be conducted in preparation rooms but in fume cupboards of the laboratories.

(c) Attention should be paid to regular cleansing of the air filter in the maintenance of air-conditioning facilities.

Experiments Involving Animal Blood, Cells and Human Saliva

32. Teachers are reminded that taking human blood and cell samples (such as cheek cells) for practical work ***should not be performed***, as this may carry a risk of transmitting blood borne diseases such as AIDS (Acquired Immune Deficiency Syndrome) and Viral Hepatitis B.

33. For hygienic purpose, it is highly recommended for schools to use chemicals (e.g. diastase) to replace human saliva during experiments, wherever possible. For experiments that involve the use of human saliva, teachers should instruct pupils to work only with their own saliva.

34. For experiments that involve animal blood and cells, such as the preparation of a blood smear and examination of animals cells, chicken blood, ox corneal cells or frog skin cells can be used.

35. When performing the experiments related to animal blood, cells and human saliva, teachers should instruct pupils to wear disposable plastic/vinyl gloves for protection and hygienic reasons. Under no circumstances should these samples be in contact with the wounds or cuts or mucosal membrane. Care should also be taken not to let the samples spilled onto the eyes, nose or mouth.

Experiments Involving Micro-organisms

36. Cultures of micro-organisms may be contaminated by pathogens which may arise from mutation or from wild sources. All micro-organisms should therefore be treated as potentially hazardous and be handled with care. Any person doing microbiological experiments should be familiar with the safety precautions. Precautions in handling microorganisms can be found in the pamphlet "*Safety in Science Laboratories*" published by the Education Department. In particular, the following points should be observed:

(a) All hand-to-mouth operations should be strictly forbidden during microbiological experiment. Pipette fillers should be used to transfer liquid cultures. Teachers, technicians and students should wash hands thoroughly with soap and warm water after practical microbiological work.

(b) All cuts on body surface should be covered with waterproof dressings before starting microbiological experiments.

(c) Do not incubate culture of micro-organisms at 37°C because this practice tends to select organisms adapted to human body temperature. Most of the saprophytic micro-organisms used in school microbiological experiments grow well at normal room temperature.

(d) Cultures of microorganisms for class inspection should be kept in sealed containers to prevent contamination and infection.

(e) Unwanted cultures should be destroyed by autoclaving or immersing in disinfectant solutions (e.g. hypochlorite/'Chloros', or formalin) for several hours before disposal.

(f) The bench surface and floor should be wiped with disinfectant solutions immediately after each practical microbiology class.

Handling and Killing of Rats for Dissection

37. Living rats may bite or scratch people handling them. Leather gloves for handling of animals should therefore be worn when working with them. All living rats for dissection must be obtained from a licensed dealer and wild rats should not be used. Under no circumstances should pupils be allowed to handle living rats. Killing of rats should only be carried out by teachers or laboratory technicians. It should be done in a swift and humane way with carbon dioxide or chloroform (trichloromethane) in the absence of pupils. As chloroform is harmful, the killing chamber should be exposed after use either in a fume cupboard or in the open air. After killing, check that the animals are dead and immerse them in dilute disinfectant before handling them over to pupils for dissection. It should be noted that rats should not be reared in schools for use in dissections.

38. If a pupil is bitten by a rat, the case should be reported to the teacher-in-charge at once. Basic first-aid treatment should be given to the wounded pupil, who should then be sent immediately to hospital/clinic for medical treatment. The animal in question should be isolated for subsequent diagnosis purpose.

Use of Naphthalene in Science Experiments

39. Naphthalene (moth ball) was formerly used in science experiments in melting point determination and in the study of cooling curve. However, it is known that some 4.5 per cent of local born male babies suffer from G6PD (glucose-6-phosphate dehydrogenase) deficiency which would last for life and that people with such deficiency when exposed to naphthalene may suffer from haemolysis (destruction of blood cells). In addition, naphthalene is harmful by inhalation, ingestion or skin contact. The use of naphthalene in the above experiments should be replaced by wax or octadecan-l-ol, which are safer alternatives.

40. Science teachers are advised to note the hazardous nature of naphthalene and NOT to use naphthalene in any science experiments.

Use of Radioactive Sources for Teaching Purposes in Schools

41. The use of sealed radioactive sources is governed by the "Code of Practice on the Use of Sealed Radioactive Sources for Teaching Purposes in Schools". (Please refer to the

pamphlet "*Safety in Science Laboratories*" for details.) *Schools are reminded that compliance with the instructions stipulated in this code of practice is obligatory.* In particular, schools should :

(a) apply for exemption from requiring Radioactive Substances Licence for *each and every* radioactive source to be purchased;

(b) make a fresh application for exemption should there be a change in source custodian;

(c) arrange for routine checks, at intervals not exceeding 6 months, of the integrity of encapsulation of all sealed sources by "Wipe Test" and the efficiency and condition of all monitoring instruments; and

(d) keep all radioactive substances (including sealed radioactive sources, natural radioactive substances and acidified uranyl nitrate solution) in a locked metal container with an appropriate warning label outside.

42. The experiment "Decay and Recovery of Protactinium" has been deleted in the revised Advanced Level Physics Syllabus (1992) which is currently implemented in schools. Hence the chemical, uranyl nitrate (100 g of solid, 12 MBq/kg of elemental uranium), for the experiment is no longer required. Procedures suggested by the Radiation Board for the disposal of the uranyl nitrate are as follows:

(a) Dissolve the uranyl nitrate in 1 litre of water.

(b) Dispense the solution carefully into approximately 4 equal portions.

(c) Discharge one portion each of the solution carefully into a closed sewerage such as flush toilet in four consecutive weeks.

(d) Rinse the drain with 10 litres of water after each discharge.

(e) Rinse all the containers and receptacles carefully with large quantities of water, and discharge the water into the same sewerage.

(f) Used containers and receptacles may be reused after thorough rinsing, or may be disposed of as normal refuse if they are no longer needed.

43. However, should schools wish to retain the uranyl nitrate for the experiment "Decay and Recovery of Protactinium", the radioactive source custodians or AL Physics teachers are reminded that annual disposal of the acidified uranyl nitrate solution prepared for the experiment is NOT necessary. The acidified solution should be poured into a glass bottle instead of leaving it in the polythene bottle each time after the experiment. The polythene bottle can be re-used after cleansing, rinsing it carefully with distilled water (disposable gloves worn) over the flush toilet and draining away the water in the toilet for 3-5 minutes. The emptied polythene bottle and the acidified solution contained in the glass bottle should be locked inside the metal storage container together with other radioactive sources when not in use. In this way, the acidified solution can be re-used again and again.

Use of Lasers

44. Schools in possession of lasers for teaching purposes (typically with maximum output power not exceeding 1 mW) are reminded that lasers have to be used with proper precautions. They should appoint a graduate science teacher to be responsible for the procurement, storage, issue and return of lasers and associated safety equipment. The teacher should draw up a list of safety rules and operating procedures and ensure that these are observed when experiments involving the use of lasers are carried out. Any person using the laser should be familiar with its operation procedures and the safety precautions. Safety precautions and rules related to the use of lasers can be found in the pamphlet "*Safety in Science Laboratories*".

45. Recently, Class III A laser pointers are easily available in the marketplace (with maximum output power not exceeding 5 mW). Schools should remind teachers and pupils that the laser beam from such pointers may lead to damage of the eyes if viewed directly. Should schools wish to use a laser pointer in presentation, it would be safer to use a Class II laser pointer (with maximum output power not exceeding 1 mW).

Use of Electrical Equipment

46. The use of electricity in science laboratories is very common and the potential danger for electric shock is always present. Schools are reminded that basic safety measures, which are given in the pamphlet "*Safety in Science Laboratories*", should be taken when electricity is used in science laboratories.

47. According to the Electricity (Wiring) Regulations of the Electricity Ordinance (Cap. 406), low voltage fixed electrical installations located in schools should be inspected, tested and certified at least once every five years. Schools are advised to pay attention to the fulfillment of this requirement in science laboratories. If schools have any enquiries or difficulties in complying with the regulations, please contact the Customer Services Office, Electrical and Mechanical Services Department on 2808 3391.

The First-aid Box

48. Every science laboratory should be provided with a first-aid box marked clearly with 'FIRST AID' and '**急救**', which should be installed in a prominent and easily accessible position. In addition, eye wash bottles should also be provided beside these first aid boxes.

49. The recommended items to be included in the first-aid box for science laboratories are listed in Appendix C. With regard to the prevention of the transmission of blood-borne diseases in schools, the items include antiseptics, sterile cotton wool, disposable plastic/vinyl gloves and sterile dressings/gauze.

50. In each school, a team of 2 or more members should be designated to be responsible for the first aid boxes. Schools should also ensure that at least one member of the team is available during normal school hours. A notice specifying the names of the members of the team has to be affixed to the first aid boxes. The contents of the first-aid box should be regularly checked to ensure that all the recommended items are kept in sufficient quantity and maintained in good condition at all times.

51. All laboratory staff should be familiar with the contents of the first-aid box and their use.

Awareness of Laboratory Safety

52. Comprehensive guidelines on laboratory safety can be found in the pamphlet "*Safety in Science Laboratories*". To enhance the standard of safety in school laboratories, these guidelines should be carefully studied and strictly followed by *all* science teachers and laboratory technicians.

53. It is recommended that all science teachers should conduct at least one lesson on the general aspects of laboratory safety with each class *at the beginning of the school year* and that they should emphasize specific aspects of laboratory safety in detail whenever opportunities come up during the normal science lessons.

54. It is further recommended that science panel chairpersons should arrange *at least one of the panel meetings during each school year* to discuss matters regarding laboratory safety with their panel members. The subject panel meetings on laboratory safety should be conducted in parallel to the meetings of the standing laboratory safety committee mentioned in paragraphs 4 and 5 to follow up decisions made in the latter and to provide feedback to the standing laboratory safety committee when necessary.

Laboratory Accidents and Insurance

55. When an accident involving injuries occurs in a laboratory, first aid should be administered to the injured as appropriate, and the school head should be notified as soon as possible. In the event of any serious injury, or whenever in doubt, medical aid should be sought without delay. The most effective way of securing medical aid urgently is to make a 999 telephone call for an ambulance. All injuries to the eyes should be regarded as serious.

56. A careful record of ***all*** accidents (including ***minor*** accidents) in each science laboratory should be kept by the teacher-in-charge of the laboratory. Each entry should contain: names of persons involved (teachers/laboratory staff/pupils), place, date, time of day, nature of accident, cause of accident, experiment being performed, extent of injury and treatment given. *Following each **serious** laboratory accident (e.g. an accident in which medical advice has been sought), a detailed accident report, using the standard report form at Appendix D, should also be sent to schools' respective Regional Education Offices.*

57. In order to monitor the standard of safety in school science laboratories, the Education Department started to conduct annual surveys of laboratory accidents occurring in science laboratories in the 1995-96 school year. Schools are requested to submit statistics of ***all*** laboratory accidents (including ***minor*** accidents) occurred in each school year using a standard survey form. A separate school circular will be issued to all secondary schools to request schools to return the completed survey form. If schools have kept a careful record of ***all*** accidents (including ***minor*** accidents) in each science laboratory as mentioned in paragraph 56, they should not have difficulties in completing the survey form.

58. The statistics obtained in the annual survey of laboratory accidents will be analysed and the findings on common accidents will be disseminated to all secondary schools for reference. The report of the survey conducted in 1999 is available on the Internet web pages of the Science Section at *http://www.cdccdi.hk.linkage.net/cdi/sci.htm* before

31 March 2001 or *http://cd.ed.gov.hk/sci* after 1 April 2001. Schools should request their science teachers and laboratory technicians to study the report carefully and observe the recommendations given in the report as far as possible. By so doing, it is hoped that schools will be able to take preventive measures against the occurrence of accidents in their laboratories. Enquiries concerning the annual survey of laboratory accidents and the survey form may be made at the Science Section, Education Department (Tel: 2712 8476 or 2762 0305).

59. Schools should ensure that there is adequate insurance coverage against laboratory accidents.

Science Experiments Performed Outside School Laboratories

60. It has been noticed that some science publications advocate science experiments for school children to be performed at home. Some of these experiments are potentially hazardous (e.g. they either involve the use of dangerous chemicals or generate reactions which are violently explosive). It is essential to remind school children repeatedly that such hazardous experiments should by no means be done by them at home.

61. Science curricula for secondary schools have been undergoing changes. Much greater emphasis is placed on developing in pupils a spirit of enquiry. The learning of science is no longer confined exclusively to the classroom and the laboratory. Pupils are encouraged to study the real world around them and to acquire information through experiments/project work for themselves. However, it is important to ensure that if pupils are to carry out experiments/project work on their own outside the school, they should first seek advice from their teachers on the nature of these experiments/project work, as well as the safety precautions required.

62. In the past, a number of accidents occurred when pupils tampered with dangerous chemicals outside school. Science teachers should therefore advise their pupils against performing potentially dangerous experiments (e.g. those involving the use of concentrated sulphuric acid, micro-organisms and radioactive substances) outside school, especially when they are not sure about the possible hazards of the experiments. The only proper place for potentially dangerous experiments is the school laboratory with qualified supervisory staff in attendance.

APPENDIX A

Hong Kong Education Regulations in Connection with Safety in School Laboratories

(21) (1) The supervisor shall ensure that all necessary safety precautions are adopted in school workshops and science laboratories and shall modify or extend those precautions as the Director may require.

(2) The supervisor and principal shall ensure that no instruction is given in the use of tools or the operation of machines or in science experiments except by a responsible teacher.

(24) The Director may limit the number of pupils who may at any one time receive instruction in any school workshop or science laboratory.

(26) All machinery, machine tools, hand tools and other equipment in a school workshop or science laboratory shall be suitable for the courses and shall be maintained in proper working order.

(27) No pupil shall be permitted to enter any school workshop or science laboratory unless a teacher is present.

(31) No poisonous or dangerous substance shall be kept without the permission of the Director in any place in school premises except in a science laboratory or a store room that has been approved in writing for such purpose by the Director.

(32) The principal of every school shall appoint a teacher to be in charge of every science laboratory and store room which has been approved by the Director under regulation 31.

(33) A teacher who is appointed under regulation 32 to be in charge of a science laboratory or a store room shall :

(a) cause every poisonous substance and dangerous substance in such laboratory or store room :

(i) to be kept in a proper container clearly marked with the name of the substance, and with the word "Dangerous" or the words "危險" or any word or words of similar meanings; and

(ii) to be stored in a locked room or cupboard, except when the substance is being used for the purpose of a lawful experiment in practical science which is carried out under the control of a teacher; and

(b) keep the key to such locked room or cupboard in his control.

APPENDIX B

Guidelines on Setting up a Standing Laboratory Safety Committee and Drawing up an Emergency Plan

Standing Laboratory Safety Committee

1. The standing laboratory safety committee should be headed by a laboratory safety coordinator chosen from among the science teachers. The membership should comprise all science teachers and laboratory technicians.

2. The committee should

- convene regular meetings to discuss various issues related to laboratory safety such as the formulation or revision of laboratory safety policies and laboratory rules;
- plan and conduct safety programmes regularly for school staff and pupils;
- carry out safety inspections regularly on the storage of chemicals, maintenance of fire-fighting equipment, protective equipment, first-aid boxes, fume cupboards, laboratory ventilation *etc*, and to rectify any irregularities spotted;
- formulate, implement and revise the emergency plan for dealing with emergency cases; and
- conduct evacuation drills regularly.

3. A deputy laboratory safety coordinator should also be appointed and take charge of the duties of the laboratory safety coordinator in the absence of the latter.

4. It is important that notes on meetings held by the standing laboratory safety committee should be properly kept and made available for inspection when required.

Emergency Plan

1. The emergency plan should include a set of emergency measures and evacuation procedures, and describes in details the escape routes. In drawing up the emergency measures and evacuation procedures, schools should ensure that such measures and procedures can as far as possible cover a wide range of emergencies such as fire, explosion, spillage of dangerous chemicals, gas leakage and other serious laboratory accidents.

2. When drawing up the emergency measures, schools should consider

- ways to minimise injuries;
- ways to help the injured; and
- ways to cut down loss.

It is important that schools should assign specifically one or more members of their staff to report the accident to relevant government bodies (*eg* Fire Services Department, Education Department *etc*), to alert all school staff and pupils when an accident occurs, and to coordinate evacuation of school staff and pupils when necessary.

3. In formulating evacuation procedures, schools should

- set out criteria for applying the different evacuation procedures;
- devise steps involved in the evacuation; and
- look into follow-up actions necessary.

Schools should bear in mind that, in accordance with the nature of the accident, evacuation may be carried out in different degrees and with different procedures (evacuating school staff and pupils at the scene only, on the same floor or floors above the scene, or evacuating the whole school). Under all circumstances, it is important that evacuation should be accomplished safely and in an orderly manner. Steps devised should ensure that no congestion of the staircases and corridors will occur.

4. Schools should draw up maps describing in detail the escape routes for the various science laboratories. Such maps should be prominently displayed in the science laboratories, and schools should ensure that all school staff and pupils are familiar with the escape routes.

5. Schools should also conduct regular evacuation drills in accordance with the evacuation procedures and escape routes.

APPENDIX C

List of Items Recommended to be Included in the First-aid Box for Science Laboratories

1. Antiseptics e.g. Savlon, alcohol
2. Sterile cotton wool
3. Disposable plastic/vinyl gloves
4. Sterile dressings/gauze
5. Adhesive plaster
6. Bandages (of different sizes)
7. Forceps
8. Safety pins
9. Scissors
10. Sterile adhesive dressings (of different sizes)
11. Sterile eye pad
12. Triangular bandages

APPENDIX D

To: Regional Education Office (HK / Kln / NTE / NTW)*

Fax no.: HK – 2865 0658; Kln – 2770 2012; NTE – 2672 0357; NTW – 2416 2750

** Please delete whichever is inappropriate*

Report on Accident Concerning Science Experiments/Facilities in School

1. Name of School/College : _____

   Address : _____

   Tel. No. : _____ Fax No. : _____

   Name of Principal : _____

2 Occurrence of accident

   Date : _____ Time : _____

   Place : _____

   Class : _____ No. of pupils in class : _____

3. Nature of accident (*eg* fire, explosion, heat burns, chemical burns *etc*)

   _____

   _____

4. Name(s) of pupil(s) involved (with age in bracket), and injury, if any, caused by accident

   _____

   _____

   _____

   _____

5. Name(s) of teacher(s) / laboratory technician(s) involved, and injury, if any, caused by the accident

   _____

   _____

   _____

   _____

6. Cause of the accident (*eg* wrong procedure, or carelessness or malicious action of pupils or others, faulty equipment *etc*)

   _____

   _____

7. Title of the experiment performed when the accident occurred (if applicable)

_____

8. Distribution of pupils at time of accident

   (a) Group experiment :
   Number of pupils in each group _____

   (b) Demonstration experiment :
   Location of pupils _____

9. Location and activity of the teacher in charge of the class at time of accident

_____

10. First aid given, if any

_____

_____

11. Was any of the following telephoned for help? Yes / No *

	Tick as appropriate	Time notified	Time arrived
Police	☐	_____	_____
Fire Services	☐	_____	_____
Ambulance	☐	_____	_____

Action taken by the above after arrival:

_____

_____

12. Was the Regional Education Office (HK / Kln / NTE / NTW)* notified of the accident by telephone? Yes / No *

Date and time notified: _____

13. Was the parent(s) or guardian(s) of the injured pupil(s) notified of the accident?

Yes / No*

14. Name(s) and designation(s) of witness(es) to the accident, if any

_____

_____

15. General remarks on the accident, if any

_____

_____

_____

16. Particulars of the teacher in charge of the class at time of accident (if applicable)

Name (Print) : _____

Qualifications : _____

Teaching experience (number of years) : _____

17. Particulars of the laboratory technician in charge of the laboratory where the accident occurred (if applicable)

Name (Print) : _____

Qualifications (including professional qualifications) : _____

Working experience (number of years) : _____

18. Reporting person(s) (tick as appropriate) :

☐ Teacher _____ _____

(Name) (Signature)

☐ Laboratory technician _____ _____

(Name) (Signature)

19. Signature of principal: _____

Date : _____