Working Safely with Cyanide Guideline

Section 1 - Purpose and Scope

(1) This Guideline provides advice to University of Queensland (UQ) workers who handle cyanide and cyanide-containing compounds as part of their workplace activities at UQ and other associated locations. It applies to all UQ workers and students who work with cyanide and cyanide-containing compounds.

(2) This Guideline outlines the hazards and safety considerations for the use of cyanide compounds.

Section 2 - Process and Key Controls

(3) All UQ workers have a duty under the Work Health and Safety Act 2011 to ensure the risk of exposure to cyanide compounds is eliminated or minimised as far as practicably possible. This includes avoiding potential exposure that could result in chronic health effects, as well as ensuring the workplace has suitable first aid procedures to preserve life if an acute cyanide exposure occurs.

(4) Cyanide is a rapidly acting, highly toxic chemical that exerts its toxic effect through chemical asphyxiation (depriving the body of oxygen). Cyanide can be found in compounds that may exist as a:

a. gas, e.g. hydrogen cyanide and cyanogen chloride;
b. dusts, e.g. dispersed sodium cyanide and potassium cyanide salts (solid form); and
c. aqueous solutions, e.g. sodium or potassium cyanide salts dissolved in water.

(5) Be aware that cyanide compounds are labile and both solid and liquid forms may readily off-gas cyanide vapour.

(6) It is important to consider the following when planning to work with cyanide and cyanide-containing compounds:

a. conducting a risk assessment;
b. training and competency;
c. spills and contamination; and
d. emergency procedures.

(7) This document should be read in conjunction with the Safe Work Australia Guide for Preventing and Responding to Cyanide Poisoning in the Workplace and UQ's applicable policies, procedures and guidelines related to Occupational Hygiene and Chemical Safety.

Section 3 - Key Requirements

Part A - Risk Management

Permissioning

(8) Some cyanide compounds fall into the category of Regulated Poisons - Schedule 7 of the Poisons Standard and

require specific permits and methods of storage. Refer to the Substance Management Plan for Medicines and Poisons Procedure and Health (Drugs and Poisons) Regulation 1996 Queensland.

(9) Before purchasing or commencing work with cyanide, a 'Prior to Working with Cyanide Compounds' written risk assessment must be undertaken and recorded. The research group Supervisor must check and approve the risk assessment.

(10) Management Plan and Permit Applications are be submitted and requirements stipulated by the permit must be in place as soon as is practicable on receipt of cyanide (Drugs and Poisons: Cyanide Management Plan and Permit Application Forms – Queensland Health).

(11) Cyanide compounds must be stored in a locked poisons cupboard as stipulated by Health (Drugs and Poisons) Regulation 1996, section 240 'Permit conditions'.

Risk Assessment and Procedures

(12) A risk assessment must be undertaken as part of the planning process for conducting work with cyanide and cyanide-containing compounds. Information in this Guideline should be considered when developing a risk assessment.

(13) In the first instance, consideration must be given to whether cyanide can be substituted for another less toxic substance. If cyanide cannot be substituted for another less toxic substance, high order controls such as isolation of work areas using glove box enclosures, or control of airborne cyanide compounds with local exhaust ventilation (fume cupboards), along with appropriate PPE as determined by risk assessment should be used.

(14) Workplaces that have assessed their risk as significant should stock a cyanide antidote kit. This will depend on:

a. the level of risk of exposure in the workplace; and
b. the location of the nearest medical facility where exposed persons could be treated and whether they stock supplies of antidote.

(15) UQ Workers must:

a. be provided with Personal Protective Equipment (PPE) appropriate to the procedures;
b. be provided with risk assessments, Safety Data Sheets (SDSs) and Standard Operating Procedure (SOP);
c. be provided with training in safe work procedures; and
d. not work alone or outside normal working hours when using cyanide.

(16) All engineering controls must be operational when working with cyanide, if they are not, work cannot continue until the engineering controls are in place and functioning to the required standard.

(17) Working procedures must be monitored and reviewed regularly to ensure their effectiveness and changed if required.

Part B - Training and Competency

(18) All personnel working at UQ are required to complete mandatory online general health and safety induction training and fire safety training. UQ workers working in laboratories with hazardous chemicals are required to complete additional online training modules for laboratory and chemical safety. These modules are on the Staff and Health and Safety Training and Induction webpage.

(19) In addition to these online modules, UQ workers dealing with hazardous compounds must be given appropriate

training in the safe handling of cyanide by their Supervisors, the safe use of any plant involved in the process, safe storage procedures, and in the safe disposal and clean-up of spills or releases of the materials.

(20) UQ workers using cyanide must have received specific training in its safe use and emergency procedures, and have successfully completed training in the correct use of positive pressure self-contained breathing apparatus (HLTAID007 – Provide Advanced Resuscitation, sourced external to UQ) prior to work commencing.

Part C - Spills and Contamination

(21) The category (minor or major) of spill likely to occur should be assessed as part of the risk assessment. Factors determining the category of spill include the quantity and physical form (solid, gas, solution) of the spill, the location and potential for exposure to workers and others, and other factors such as damage to the environment. A spill kit must be available in the immediate work area where the cyanide is being used.

(22) The risk assessment, based on information in the SDS, provides information on laboratory spills and appropriate waste disposal. Cyanide and its compounds have serious environmental impacts and must be prevented from escaping into drains. If possible, contain the spill using absorbent, clean up material, which should be disposed of in suitable containers labelled “Cyanide Contaminated Waste”. Contact the UQ Science Store for specific chemical waste disposal.

Major Spill

(23) In the event of an unexpected spill of these materials, evacuate the area of all personnel, call UQ Security on 3365 3333 or other emergency contact as designated on the campus emergency contact card for your location. Do not attempt to clean up any large spills of cyanide beyond the capacity of your available spill kit. If workers have been contaminated, the contaminant must be removed immediately. Wearing PPE including gloves, remove any contaminated clothing from the person, move them to a safety shower/eyewash, and wash off the contaminants thoroughly (at least 20 minutes under shower or eyewash as appropriate). Contact your local First Aid Officer and UQ Health Care for advice.

Minor Spill

(24) Minor spills must be cleaned up immediately. Use appropriate PPE including respirator where dust/vapour is present. Collect waste into appropriate waste containers and label accordingly - dispose through the UQ Chemical Store.

Part D - Health Effects and Symptoms

Routes of Exposure

(25) Routes of exposure include:

a. Inhalation.
b. Skin contact.
c. Ingestion.

Symptoms - Local Health Effects

(26) The vapour or liquid will cause irritation of the mucous membranes in the eye, nose and throat and may cause skin irritation.

Symptoms - General Health Effects

(27) Symptoms of mild or early cyanide poisoning in addition to local health effects are general weakness, heaviness of the arms and legs, difficulty breathing, headaches, giddiness and rashes.

(28) The odour of bitter almonds may be detected on the casualty's breath, but this characteristic cannot be relied upon as an indicator of cyanide exposure.

Signs and Symptoms of Severe Cyanide Poisoning

(29) Signs and symptoms of severe cyanide poisoning include:

a. Nausea and vomiting.
b. Shortness of/ gasping for breath.
c. Loss of consciousness.
d. Convulsions.
e. Cardiac Arrest.

Part E - Emergency Procedures

First Aid/Medical Emergency

(30) Rescue action by fellow workers:

a. Call UQ Security on 336 53333 (St Lucia, Gatton) or ring 000. Note: internal emergency contact numbers may vary with each campus, refer to the campus emergency contact card for your location. Inform Security that the incident may involve exposure to cyanide. Security carry a Cyanokit for emergency procedures such as an exposure or poisoning.
b. Request immediate paramedic assistance and supply details such as building number, room number and where the casualty is located.
c. Using a positive pressure self-contained breathing apparatus*, wearing appropriate PPE (PVC apron and gloves, safety glasses with a face shield, and enclosed rubber or leather shoes) and working in pairs, remove the casualty from the contaminated area and into fresh air.
d. Prevent further access to the contaminated area.
e. Remove contaminated clothing and wash/wipe any parts of the body that have been splashed with cyanide or cyanide dust. Production of aerosols containing cyanide during the washing off process must be avoided.
f. Waste cloths must be collected into sealed plastic bags and labelled as cyanide waste.

> * Specialist training is required to use positive pressure self-contained breathing apparatus (BA) - contact your local safety coordinator to enquire about the availability of suitable BA training courses.

Managing Suspected Cyanide Poisoning - Designated First Aid

(31) First Aid Officers (trained to advanced level) and key workers in cyanide handling and storage areas must be trained to:

a. carry out rescue in a hazardous environment;
b. recognise the signs and symptoms of cyanide poisoning; and
c. implement first aid management of cyanide poisoning.

UQ Workers who have Advanced First Aid Training

(32) If breathing has stopped, begin cardiopulmonary resuscitation using oxygen (at 15L/min) and bag and mask resuscitation equipment. Expired air resuscitation using an approved resuscitation facemask should only be used in the absence of oxygen equipment.

(33) Continue resuscitation until medical assistance arrives.

(34) Look for firm evidence that cyanide poisoning has actually occurred (i.e. cyanide splash or spill, breath smell of bitter almonds, several people affected, etc.).

(35) Maintain resuscitation if necessary and if an emergency cyanide kit is available, send the kit to hospital with the patient (see 'Cyanide Antidote Kit' provisions below).

(36) Identify the specific compound containing cyanide and arrange for a hard copy of the appropriate SDS and a copy of this Guideline to be transferred with the patient to be passed on to medical staff.

(37) Provide details to paramedics when they arrive.

First Aid Equipment Checklist

(38) At workplaces where a risk assessment has revealed a significant risk of cyanide poisoning, the following items should be kept in an accessible and convenient position.

a. Rescuer PPE.
b. A positive pressure resuscitation bag, valve and mask.*
c. A source (cylinder) of oxygen, and oxygen flow delivery system.
d. Cyanide antidote kit.

> * Operating a CPR bag/valve mask and oxygen for resuscitation is a skill which needs to be taught by a qualified instructor, usually as part of an Advanced First Aid Course.

Cyanide Antidote Kit

(39) The antidote used for cyanide exposure is called a Cyanokit. Security carry a Cyanokit for emergency procedures.

(40) The kit should be contained in a clearly labelled box. If there is a cyanide incident, the kit must be sent with the casualty along with a copy of the SDS.

(41) Expiry dates should be regularly checked and stocks updated accordingly.

(42) Cyanide antidote should ONLY be administered by a medical practitioner who is certain cyanide poisoning has occurred.

Section 4 - Roles, Responsibilities and Accountabilities

Supervisors

(43) Ensure that risks are identified and eliminated or minimised as far as reasonably practicable through the risk assessment process.

(44) Provide supervision and training in the safe use of cyanide and its compounds.

(45) Provide assistance with the risk assessment process and to ensure the assessment is comprehensive and accurate, including any emergency equipment or first aid equipment that may be required. The risk assessment is to be completed in UQSafe.

(46) Review and approve the risk assessment, and to ensure all controls outlined in the assessment are followed by UQ workers.

(47) Ensure that all appropriate safety systems and equipment are in place, fully operational and used correctly.

(48) Ensure that all incidents involving these materials are investigated as soon as possible and corrective actions (including review and modification of risk assessment and SOPs) are implemented to prevent recurrences. All incidents, near misses or hazards are to be recorded in UQSafe.

UQ Workers

(49) Complying with this Guideline, any PPE requirements identified by a risk assessment and any local safe operating procedure regarding the correct use of cyanide in the Organisational Unit.

(50) Provide assistance with the risk assessment process, help ensure the assessment is comprehensive and accurate.

(51) Follow all safe operating procedures and use the controls outlined in the risk assessment.

(52) Immediately stop work and notify Supervisor if there are any changes to procedures or deficiencies in equipment or work process.

(53) Report any incident, near misses or hazards to the Supervisor and record these in UQSafe.

Section 5 - Monitoring, Review and Assurance

(54) Organisational Heads and Supervisors should regularly review the effectiveness of local procedures, and guidance material, particularly following incidents and near misses.

(55) Health, Safety and Wellness Division will review this Guideline as required to ensure its accuracy and relevance, and will amend as appropriate in regards to feedback on its effectiveness. As part of normal assurance monitoring, the Health, Safety and Wellness Managers and Health, Safety and Wellness Division may periodically assess the:

a. Existence and adequacy of workplace risk assessments;
b. UQ workers' compliance with local procedures in the workplace; and
c. UQ workers' awareness of compliance obligations associated with this Guideline.

(56) Local Health, Safety and Wellness Managers and Coordinators will conduct regular audits and inspections (as a minimum annually) to review appropriate risk controls.

Section 6 - Recording and Reporting

(57) Supervisors and/or Health, Safety and Wellness Managers and Coordinators will report in UQSafe any incidents, hazards or near misses.

Section 7 - Appendix

Definitions

Terms	Definitions
CNCl	Cyanogen chloride
HCN	Hydrogen cyanide
KCN	Potassium cyanide
NaCN	Sodium cyanide
SDS	Safety Data Sheets
UQ Workers	For the purposes of this Guideline, includes: • staff - continuing, fixed-term, research (contingent funded) and casual staff; • contractors, subcontractors and consultants; • visiting academics and researchers; • affiliates - academic title holders, visiting academics, Emeritus Professors, adjunct and honorary title-holders, Industry Fellows and conjoint appointments; • Higher Degree by Research students; and • volunteers and students undertaking work experience.

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