



health

Department:
Health
REPUBLIC OF SOUTH AFRICA



GUIDELINES FOR INVESTIGATION AND ENVIRONMENTAL CONTROL OF HUMAN CHEMICAL EXPOSURE AND POISONING CASES

A GUIDE FOR ENVIRONMENTAL HEALTH PRACTITIONERS

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Acronyms

BLL	Blood lead level
DALRRD	Department of Agriculture, Land Reform and Rural Development
DEL	Department of Employment and Labour
DFFE	Department of Forestry, Fisheries and the Environment
EHP	Environmental Health Practitioner
GHS	Globally Harmonised System of Classification and Labelling of Chemicals
HCF	Healthcare Facility
HEPA	High-Efficiency Particulate Absorbing
IEC	Information, Education and Communication
NDOH	National Department of Health
NICD	National Institute for Communicable Diseases
NMC	Notifiable Medical Condition
NRCS	National Regulator for Compulsory Specifications
OEL	Occupational exposure limit
OHS	Occupational Health and Safety
PPE	Personal protective equipment
SANS	South African National Standard
SDS	Safety Data Sheet
WHO	World Health Organization
UNEP	United Nations Environment Programme

Definition of key terms

Agricultural Remedy - in terms of Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No.36 of 1947) as amended, are defined as any chemical substance or biological remedy, or any mixture or combination of any substance or remedy intended or offered to be used-

(a) for the destruction, control, repelling, attraction or prevention of any undesired microbe, alga, nematode, fungus, insect, plant, vertebrate, invertebrate, or any product thereof, but excluding any chemical substance, biological remedy or other remedy in so far as it is controlled under the Medicines and Related Substances Control Act, 1965 (Act 101 of 1965), or the Hazardous Substances Act, 1973 (Act 15 of 1973); or

(b) as plant growth regulator, defoliant, desiccant or legume inoculant.

Poisons Information Helpline - 24/7 service provided by poisons centers on 0861 555 777

Stock remedy - means a substance intended or offered to be used in connection with domestic animals, livestock, poultry, fish or wild animals (including wild birds), for the diagnosis, prevention, treatment or cure of any disease, infection or other unhealthy condition, or for the maintenance or improvement of health, growth, production or working capacity, but excluding any substance in so far as it is controlled under the Medicines and Related Substances Control Act, 1965 (Act 101 of 1965); as defined in the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No.36 of 1947) as amended.

NB. In simple terms, agricultural and stock remedies refers to pesticides. Pesticides include herbicides, insecticides, fungicides, rodenticides, repellents, etc.

Foreword by the Director-General: Health


Chemicals are part of our daily lives, however, some chemicals can be hazardous and negatively affect the environment and cause human poisoning if not managed in a safe manner. Chemical poisoning is a public health concern globally. The new data estimates on the public health impact of chemicals released by the World Health Organization (WHO) Director-General, at the Ministerial Dialogue held on 7 July 2021 at the Berlin Forum on Chemicals and Sustainability: Ambition and Action towards 2030, show a continuing increase compared to earlier years, with 2 million lives and 53 million disability-adjusted-life-years lost in 2019. People are exposed to chemicals intentionally or accidentally due to poor handling or inappropriate use.

Some of the chemical poisoning cases in the country are related to homicide and suicide cases. Exposure to chemicals can occur through contamination of food, air, soil and water. All population groups are at risk of exposure, however, children, pregnant women, industrial and pesticide chemical workers, and agricultural workers are most vulnerable. There are various routes of human exposure to chemicals, which include ingestion, inhalation and skin contact.

Chemicals poisoning cases are still prevalent in the country, however the reporting and investigation of such cases remains a major challenge, and this further contributes to the lack of effective intervention strategies.

In South Africa, poisoning due to lead, mercury and agricultural or stock remedies are declared as notifiable medical conditions in terms of Regulations relating to Surveillance and Control of Notifiable Medical Conditions, R1434 of 15 December 2017, as amended. These conditions are, by law, expected to be reported and investigated to ensure intervention measures are implemented to curb the occurrence of future cases. A good practice in the country is that chemical poisoning cases that are not even notifiable by law are reported to Poisons Information Centres and can be investigated, for example paraffin, pharmaceuticals, and disinfectants poisoning. This is a practice that should continue because it enables municipalities, districts, provinces and the country in general to identify other hazardous chemicals that are responsible for poisoning outbreaks because of poor chemical management. Therefore, this will enable such chemicals to be identified as chemicals of public health concern, and which can be proposed to the Minister to be officially notified.

The National Department of Health (NDOH) has developed these guidelines primarily to improve, promote and protect public health. The guidelines provide a systematic framework for the investigation and surveillance of chemical exposure incidents or chemical poisoning cases by Environmental Health Practitioners. In addition, they provide a recommended framework for chemical risk assessment, management and communication.



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1. Background

1.1 Introduction

Chemicals are part of our daily lives. They are used in household products, cosmetics, agriculture, water treatment, mining, the food industry, jewellery manufacture, the automobile industry, pharmaceutical production, machinery manufacture, the metal industry, and other chemical industries.

Although useful in human life, some chemicals can be hazardous and negatively affect the environment and human health if not managed in a safe manner. Children are most vulnerable and are at risk of high exposures.

When dealing with complaints or notifications of chemical poisoning cases, it is important that the investigation occurs without delay, while remaining impartial and showing consideration to all parties. The issue of chemical exposure and its possible effects can be very contentious, and it is important to ensure that all those involved have equal opportunity to be heard and to have their concerns documented and considered. It is important that the cause of the poisoning, the source of a chemical, as well as its composition, is identified to ensure that appropriate intervention measures are undertaken.

1.2 Legislative context

There are various international conventions and national legislative measures that provide for the notification, surveillance and investigation of chemical poisoning cases.

1.2.1 International conventions

- a. Rotterdam Convention on Prior Informed Consent for certain Hazardous Chemicals and Pesticides in International Trade.

Article 6 of the Convention makes provision for parties to identify severely hazardous pesticide formulations used in a country, through surveillance and investigation of cases, and for parties to propose to the Secretariat that such chemicals be listed in Annex III.

The Convention has adopted a chemical/pesticide incident form to be used for investigation purposes and for reporting to the Secretariat of the Convention.

- b. International Code of Conduct in Pesticides Management

Article 5 of the International Code of Conduct in Pesticides Management, requires health surveillance and the collection of data on pesticide poisoning cases from occupational exposure, and supports Article 6 of the Rotterdam Convention.

- c. International Health Regulations (IHR), 2005, 3rd Edition

The purpose and scope of these Regulations are to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are equivalent with and restricted to public health risks, and which avoid unnecessary interference with international traffic and trade. In terms of public health response, as required and outlined in Article 13 of IHR, each State Party shall develop, strengthen and maintain, the capacity to respond promptly and effectively to public health risks and public health emergencies of international concern. The public health response required from State Parties include amongst others, detection of events involving disease or death above expected levels for the particular time and place in all areas within the territory of the State Party and determination and implementation of control measures to prevent domestic and international spread. An “event” in terms of IHR means a manifestation of disease or an occurrence that creates a potential for disease; and this includes exposure to or contamination by a chemical agent. A “disease” in terms of IHR means an illness or medical condition, irrespective of origin or source, which presents or could present significant harm to humans; and therefore this includes any human chemical poisoning.

1.2.2 National legislation

a. **National Health Act, 2003 (Act No. 61 of 2003)**

This is the primary Act of the NDOH, of which its section 90(1)(j) makes provision for the Minister to make Regulations relating to Notifiable Medical Conditions.

b. **Hazardous Substances Act, 1973 (Act No. 15 of 1973)**

Section 29 (1)(m) provides for the notification of cases or suspected cases of poisoning, intoxication, illness or death of persons who have been exposed to specified hazardous substances listed in groups according to toxicity. Lead, mercury and pesticides are included in these hazardous substance lists.

c. **Regulations relating to Surveillance and Control of Notifiable Medical Conditions, R 1434 of 15 December 2017**

In this Regulation, lead, mercury and poisoning due to agricultural and stock remedies (pesticides) are listed as Category 2 notifiable medical conditions. It is legally required that these conditions be reported in writing or electronically to the NDOH within seven (7) days of clinical or laboratory diagnosis by healthcare providers, and/or private or public health laboratories.

Regulation 16 relates to notifiable medical conditions and refers to the role of an Environmental Health Practitioner (EHP) who receives notifications as prescribed in the Regulation in order to conduct investigations and ensure that control measures are exercised. In terms of Regulation 16, the district health manager must ensure that healthcare providers implement the specified disease prevention, management and control measures, as stipulated. Where environmental control is required, the district health manager must ensure that the necessary stakeholders, including an EHP, are informed and involved in the prevention and control of a notifiable medical condition.

This Regulation further requires heads of institutions, including but not limited to a training or education institution, a care or residential institution, or a correctional services institution, who are aware or reasonably suspect that their institution has a case of lead, mercury or pesticide poisoning, to immediately report this to the healthcare provider within the institution or to the nearest health establishment.

Furthermore, any member of the community, including community health workers, local leaders, traditional or religious leaders, who is aware or reasonably suspects that a person in the community is a case of lead, mercury or pesticide poisoning to immediately report this to the nearest health establishment.

Healthcare providers and health establishments are to report cases to the NICD Notifiable Medical Conditions (NMC) Reporting App or manually to sub-districts for management and control.

The following case definitions for lead, mercury and poisoning due to agricultural and stock remedies (pesticides), have been adopted by NDOH:

Lead poisoning

Suspected case	A potentially lead-exposed case being evaluated by healthcare workers or public health officials for lead poisoning, but where no specific credible exposure has been identified
	OR
Probable case	A case with a single capillary blood specimen with lead level > 5 µg/dL
	OR

	A case with a single capillary or unknown blood specimen with lead level > 5 µg/dL or two capillary blood specimens, drawn greater than 12 weeks apart, both with lead level > 5 µg/dL
Confirmed case	Children and adults, with either of the following: <ul style="list-style-type: none"> • Blood lead level > 5 µg/dL of whole blood measured from a venous specimen; or • Blood lead level of > 5 µg/dL measured from two capillary specimens taken within a period of 12 weeks.

Mercury poisoning

Suspected case	A potentially mercury-exposed case being evaluated by healthcare workers or public health officials for mercury poisoning.
Probable case	A clinically compatible case with a high index of suspicion for mercury exposure due to case's history regarding location, source and time of exposure. OR A clinically compatible case with an epidemiologic link to a case with laboratory evidence.
Confirmed case	A clinically compatible illness in a person with history of exposure and laboratory evidence*, i.e. <ul style="list-style-type: none"> • Organic mercury <ul style="list-style-type: none"> - ≥10 µg/L in whole blood • Inorganic mercury <ul style="list-style-type: none"> - ≥10 µg/L in 24-hour urine - ≥10 µg/L in whole blood • Elemental mercury <ul style="list-style-type: none"> - ≥10 µg/L in 24-hour urine - ≥10 µg/L in whole blood (first few days after exposure only)

Poisoning due to agricultural and stock remedies (pesticides)

Suspected case	Must satisfy ONE criterion in EACH category listed below: <ol style="list-style-type: none"> 1. Pesticide exposure <ol style="list-style-type: none"> a. Report of acute pesticide exposure, from a patient or witness 2. Health effects <ol style="list-style-type: none"> a. Healthcare provider documenting ≥ 2 new post-exposure symptoms 3. Cause-effect relationship The health effects must: <ol style="list-style-type: none"> a. not be associated with any other likely explanation AND <ol style="list-style-type: none"> b. occur within a reasonable time period after exposure
Probable case	Must satisfy ONE criterion in EACH category listed below: <ol style="list-style-type: none"> 1. Pesticide exposure <ol style="list-style-type: none"> a. If criterion as for a Suspected case, must have Health effects criterion as for Confirmed case

	<p>OR</p> <p>b. If criterion as for a Confirmed case, may have Health effects criterion as for Suspected case</p> <p>2. Health effects</p> <p>a. If criterion as for a Suspected case, must have Pesticide exposure criterion as for Confirmed case</p> <p>OR</p> <p>b. If criterion as for a Confirmed case, may have Pesticide exposure criterion as for Suspected case</p> <p>3. Cause-effect relationship</p> <p>The health effects must:</p> <p>a. be characteristic of the pesticide</p> <p>AND</p> <p>b. occur within a reasonable time period after exposure</p>
Confirmed case	<p>Must satisfy ONE criterion in EACH category listed below:</p> <p>1. Pesticide exposure</p> <p>a. Observation of residue/odour by healthcare provider</p> <p>OR</p> <p>b. Clinical response to treatment or antidote (e.g. atropine) OR clinical description by a healthcare provider of ≥ 2 post-exposure health effects (at least 1 of which is a sign) characteristic for the pesticide</p> <p>OR</p> <p>c. Laboratory test demonstrating physiologic response to pesticide (e.g. prolonged clotting or pseudocholinesterase level below normal laboratory range)</p> <p>2. Health effects</p> <p>a. Healthcare provider documenting ≥ 2 characteristic signs</p> <p>OR</p> <p>b. Healthcare provider documenting ≥ 3 new post-exposure characteristic symptoms</p> <p>OR</p> <p>c. Autopsy evidence of pesticide poisoning</p> <p>3. Cause-effect relationship</p> <p>The health effects must:</p> <p>a. be characteristic of the pesticide</p> <p>AND</p> <p>b. occur within a reasonable time period after exposure</p>

d. National Environmental Health Norms and Standards for Premises and Acceptable Monitoring Standards for Environmental Health Practitioners, GGN 39561 of 24 December 2015.

This document prescribes the investigation of chemical poisoning cases using the chemical/pesticide incident report form as a service standard expected of EHPs.

e. The Scope of Profession for Environmental Health Practitioners, GNR 698 of 26 June 2009.

Development of environmental health control measures to prevent environmentally induced diseases is one of the EHPs functions in the Scope of Profession. Chemical safety and hazardous substances control functions are also included in the list of environmental health functional areas, and it entails monitoring the

manufacture, transport, storage and application of all chemicals, including permitting and licensing the supply. Chemical safety public education activities are also listed in the chemical safety functional area of EHPs.

2. Purpose of the guideline

The purpose of this guideline includes:

- To provide practical systematic procedures for investigation of complaints and notifications of chemical poisoning cases.
- To provide a framework on assessment and management of chemical exposure risks to human health.
- To advice on intervention strategies relating to chemical poisoning cases.

Although the guideline is meant for the purposes outlined, implementation thereof by EHPs can provide the opportunity for a good surveillance system, research, identification of problematic chemicals as well as policy gaps.

3. Scope of application

This guideline applies to all intentional and non-intentional human chemical exposure and poisoning cases notified in terms of Regulations relating to Surveillance and Control of Notifiable Medical Conditions, R 1434 of 15 December 2017, which are to be investigated by EHPs, but excludes radioactive substances and infectious substances. However, the guideline can be used to investigate other human chemical poisoning cases that are not notifiable, but have been reported, and which the district considers necessary for investigation with the expertise of an EHP.

4. The key functions of EHPS in the control of chemical poisoning cases

The key functions of EHPs for the control of chemical poisoning cases are case surveillance, effective investigation, chemical risk assessment, public education, and implementation of appropriate intervention measures, such as law enforcement, when required.

An EHP has the following key roles to play in the assessment, investigation, and surveillance chemical poisoning cases:

- a. Preliminary assessment
 - Receive, record and interpret queries and concerns.
 - Identify the cause of concern or complaint, the location and associated parties.
 - Provide initial response and support to concerned persons.
 -
- b. Inspection, hazard evaluation and risk assessment
 - Identify individuals or groups at risk.
 - Identify compounding risks (e.g. occupational, home or environmental exposure to chemicals, etc.).
 - Identify sources and types of chemicals implicated and pathways of exposure.
 - Collect samples if appropriate.
 - Interpret laboratory results if appropriate.
 - Assess the likely health risk from the information collected.
- c. Information and risk communication
 - Communicate chemical risk information to affected population groups/ property or household or business owners/occupiers.

- Consult other relevant stakeholders/sectors/NGOs/Communications and Stakeholder Management Unit through the relevant environmental health manager, where appropriate.

d. Management plans

- Determine appropriate chemical exposure control strategies for implementation to protect public health.
- Maintain communication and cooperation with other stakeholders/sectors/NGOs.
- Monitor the implementation of the public health aspects of the plan.
- Evaluate the effectiveness of the management plan and control outcomes to identify further prevention measures and weaknesses for improvement.

5. Notification and reporting procedures

5.1 Who is to Notify or Report NMC cases

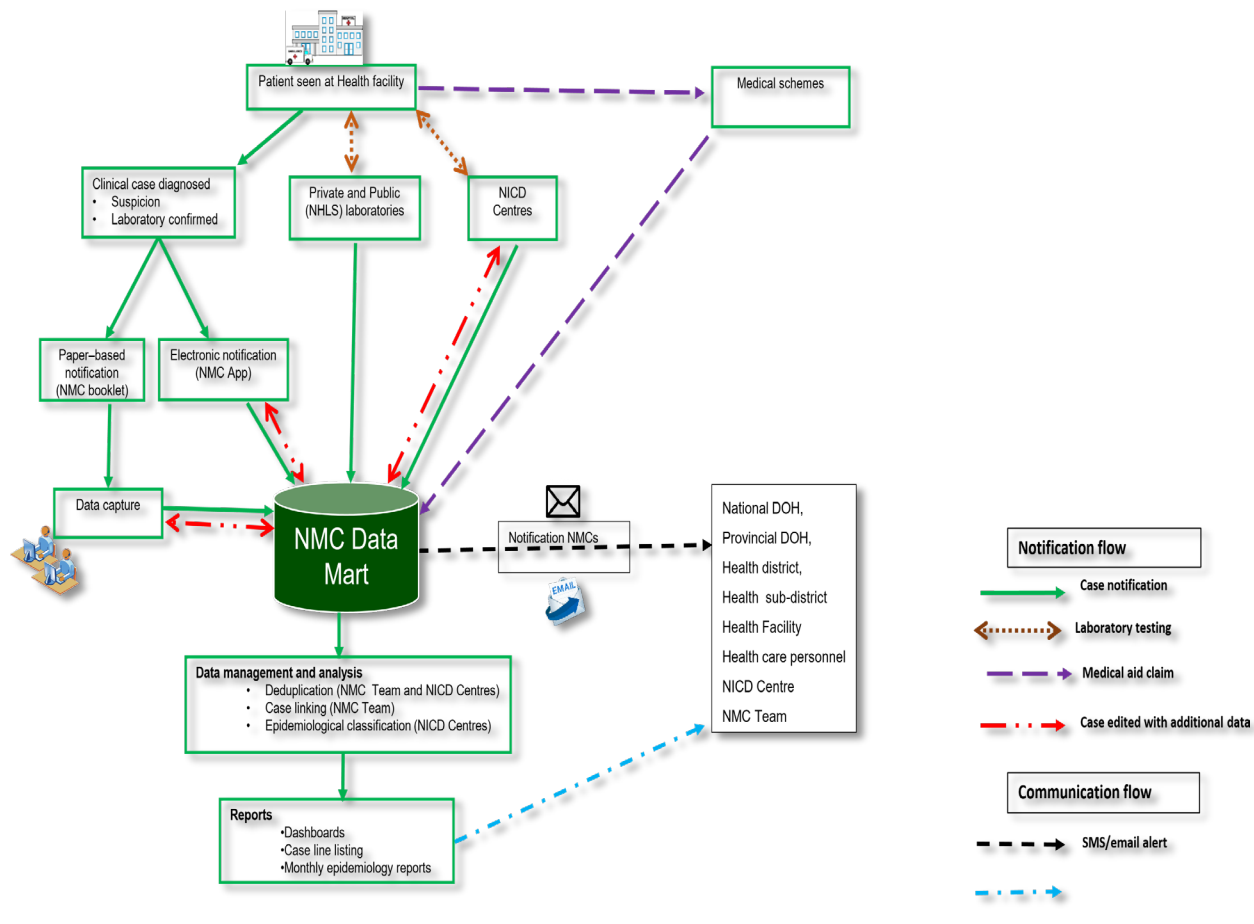
The Regulations relating to Surveillance and Control of Notifiable Medical Conditions, R 1434 of 15 December 2017, stipulates that the following people or institutions are required to notify chemical poisoning cases which are classified as Category 2 NMC (i.e. Lead poisoning, mercury poisoning and agricultural or stock remedy poisoning):

- Healthcare providers
- Pathologist and or laboratory personnel
- Medical Schemes
- Heads of institutions including but not limited to a training or education institution, a care or residential institution, or a correctional services institution
- Any member of the community, including community health workers, local leaders, traditional or religious leaders are to report to the nearest health establishment.

Notifications can be done manually by completing the notification form from the NMC booklet and submitted via fax, e-mail or by sms using the electronic notification done through the NICD NMC App which is available on the web using a computer or on mobile devices.

The below diagram show the flow of data on the NMC Surveillance System.

Figure 1: Data flow on the NMC Surveillance System



Source: NICD

5.2 Where must notifications be reported and timeframes

The Regulations further outline to whom notifications should be sent and the required timeframes, as per below information:

- a. Healthcare providers and health establishments to report to the focal person at the Health Sub-District level within seven days of diagnosis through a written or electronic notification. In case of a diagnosed patient who subsequently dies, notification to the focal person at the health sub-district level must be by the most rapid means available
- b. A pathologist or laboratory personnel must notify the focal person at the health sub-district level of any diagnosed poisoning case within seven days of diagnosis, through a written or electronic notification.
- c. Heads of institutions, including but not limited to a training or education institution, a care or residential institution, or a correctional services institution are to immediately report to the healthcare provider within the institution or to the nearest health establishment
- d. Medical Scheme must report a chemical poisoning condition for which it has received a claim from a healthcare provider, a pathologist or laboratory personnel, to the NDOH within a month.

6. Control in the spread of notifiable category 2 chemical poisoning cases

According to the Regulations relating to Surveillance and Control of Notifiable Medical Conditions, R 1434 of 15 December 2017, district health managers are required to inform relevant stakeholders on notified Category 2 NMC (i.e. Lead poisoning, mercury poisoning and agricultural or stock remedies poisoning) cases where environmental control measures are required and must ensure these stakeholders are involved in the prevention and control of notified chemical poisoning cases.

Environmental health programme in the relevant municipalities is a key role player that must be informed on these cases so that investigations can be conducted with the support of relevant stakeholders where necessary, to ensure preventative and remedial measures are implemented, to prevent further cases from taking place.

The identification of environmental health hazards; conducting risk assessments; facilitating advice and education on chemical safety and ensuring health measures are instituted to protect public and environmental health from environmentally induced diseases, are some of the functions expected of environmental health professionals as outlined in the Regulations defining the Scope of the Profession of Environmental Health, GNR. 698 of 29 June 2009, as amended.

7. Steps in the environmental health investigation of chemical poisoning cases

Once poisoning cases are reported, all levels of government are expected to do surveillance and monitoring to strengthen prevention and intervention measures.

The role of an EHP is to conduct an environmental investigation using the investigation report form in **Annexure A** in the case of agricultural and stock remedy/pesticide or any other chemical poisoning. In the case of lead poisoning investigation, the investigation form in **Annexure B** is to be used. All sections of the agricultural and stock remedy /pesticide/chemical/lead poisoning investigation form are to be completed legibly. Completed investigation forms are to be faxed or e-mailed to the Environmental Health Directorate in the NDOH.

The investigation form for agricultural and stock remedy/pesticide or chemical poisoning case (**Annexure A**) consists of the following sections that are to be completed while conducting the investigation:

- Patient details
- Pesticide/chemical involved

- Poisoning event
- Workplace poisonings
- Interventions
- Details of the official completing the investigation report

The investigation form for lead exposure/poisoning case (**Annexure B**) consists of the following sections that are to be completed:

- Patient details
- Identification of source of lead exposure/poisoning
- Poisoning event
- Interventions
- Details of the official completing the investigation report

The following guiding steps should be followed in conducting the investigation:

STEP 1: Notification Receipt and Information Verification

- 1.1 The notification of a chemical poisoning case is received by the EHP from the environmental health manager/supervisor.
- 1.2 The EHP identifies and verifies the following details by referring to the received notification form, and if some information is not found in the form by contacting the patient or the next of kin. In case where the patient has passed on, the next of kin to be contacted. This information will enable efficient follow up investigation of the case:
 - a. Patient/next-of-kin names
 - b. Patient/next-of-kin contact number
 - c. Patient residential address
 - d. Address where the poisoning incident occurred
 - e. Names and contact number of the notifying person/institution
 - f. If the patient died, the names and contact number of the family, forensic pathology laboratory and investigating SAPS personnel

STEP 2: Description of the Chemical Involved

- 2.1 In cases of chemical poisoning, the **type, nature, trade name, active ingredient, GHS hazard classes and categories** of the chemical involved, including **restrictions in terms of the local legislations**, should be investigated and identified, through:
- Conducting a patient interview to ask what chemical product was consumed or exposed to, if the patient survived. If the patient did not survive, interview a family member of the patient.
 - Physical observation of the chemical product and inspection of the label of the chemical product involved, if the chemical is labelled,
 - In a situation, where the product is unlabeled, medical diagnosis from blood/urine laboratory results may be helpful in identifying the substance involved, including sampling of a chemical product for laboratory testing.
 - Searching for additional information in the SDS of the chemical product that can be obtainable from the manufacture or importer or supplier or do desktop research of the online version of the Classification and Labelling (C&L) Inventory of the European Chemicals Agency (ECHA), which is a database that contain basic harmonised classification information on chemicals according to their toxicological properties.
(NB. Access link- <https://echa.europa.eu/information-on-chemicals/annex-vi-to-clp>)
 - Identify if the chemical/product is restricted for supply, use or storage under the relevant legislations (i.e. Hazardous Substances Act, 1973 (Act No.15 of 1973) National Environmental Management Act, 1998 (Act No. 107 of 1998), Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), Agricultural, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) as amended).

STEP 3: Chemical Exposure/Poisoning Event Assessment

- Identify date, time and location of exposure.
- Identify the source of the chemical (supplier).
- Identify source of exposure (activity/object/environmental media, e.g. soil, water and air/contaminated food responsible for the exposure).

NB. Chemicals can be found in households and different industries.

It should also be determined where the chemicals involved were purchased, e.g. from street trader, retail shop, etc.

Household chemicals can be found in the kitchen, bathroom, garage or storerooms. Household chemicals include cosmetics, personal care products, medicines, detergents, disinfectants, paints, paint strippers, pesticides, building materials, home furnishings and craft materials such as glues, adhesives, and permanent markers. Products containing formaldehyde in households include furniture with wood panels, latex, new carpets, carpet backings, and some textile products.

Combustion of fuels (e.g. paraffin, gas, wood), tobacco products; asbestos-containing materials; damp carpets; and aerosol household cleaning products may be sources of household indoor air pollution that leads to chemical exposure.

The sources of lead may include the following:

- lead water pipes and fixtures, * jewellery, * food or spices grown in lead-contaminated soil, * some solders in food cans, * lead contaminated dust on protective clothing, * certain Aruveydic and other traditional medicines, * construction materials,
- old lead-containing paint, **leaded paints and pigments, * dust and chips from peeling,
- cracking leaded paint, * leaded gasoline, * smelting of fishing weights, *lead mining,
- recreational shooting with guns using leaded bullets, * emissions from lead waste incinerators, * workers bringing lead dust home on clothes and shoes.

- Computers, cellular phones, electrical appliances, batteries and cables are not sources of exposure while they are intact, but can be sources if their waste products are not properly managed or recycled.
- Occupational exposure to lead can occur in work where lead materials are handled such as handling ceramic glaze, glasswork or stain-glass windows; manufacturing of products containing or coated with lead (e.g., metal equipment parts, batteries, etc.); melting of products containing lead (e.g., scrap metal smelting; incinerators, foundries/ casting); industrial mineral processing activities, such as mining extraction or smelting; painting or sanding on industrial equipment and steel structures; recycling materials, including batteries and e-waste; and repair, renovation or remodelling of buildings, including abatement and clean-up activities, among other activities.

3.4 Consult the SDS to identify the possible route of exposure. Determine the route of exposure based on the how the product was used or the main activity at the time of exposure and how the incident occurred.

NB: If the information is unavailable, contact the Poisons Information Helpline (0861 555 777) for further information specifically on South African products. Avoid Google as a source of information.

- Chemicals can enter the body through inhalation, ingestion, or absorption through the skin or eyes. Consider each possibility separately when conducting a risk assessment.
- Inhalation may be an important route of entry. Exposure occurs by breathing in chemicals in the form of an aerosol, vapour, mist or suspended dust.
- Skin contact is a potential route of entry as some chemicals are readily absorbed through the skin or eyes. Formulations which contain solvents and surfactants may increase skin absorption. Higher temperatures or humidity may increase absorption.
- Ingestion is a common route of exposure, especially in self-harm cases. Children are also vulnerable to accidental ingestions. Accidental splashing while mixing or spraying, or smoking or eating while handling chemicals, may occasionally be a cause of ingestion.
- Lead occurs naturally in the environment, and as a result can be an impurity in cosmetic products. Exposure to lead in cosmetic products can occur through accidental ingestion by swallowing lead from lipstick when a consumer licks her lips, and by absorption through the skin, when a body lotion or shampoo is applied.
- Lead can be found in cosmetics products such as lipsticks, eye shadows, blushes, compact powders, shampoos, and body lotions.
- Inhalation, ingestion and absorption can also occur through contamination of food, air, soil and water.

3.5 Identify symptoms experienced as well as the time period since the exposure, based on information on the notification form as well as interviewing the patient, or the family if the patient is deceased.

3.6 In the case of workplace exposure, inspect the workplace to determine the type of occupational setting, chemical use/application method, status of workers OHS training, use and type of personal protective equipment and climatic conditions in case of a chemical product that was used in the outside environment at the time of exposure.

NB Consider a comprehensive chemical risk assessment, as per Annexure C in case of workplace settings incidents, chemical incident spillages and suspected environmental contamination incidents.

In case of an incident that took place in a workplace handling hazardous chemicals, the EHP should involve the Department of Employment and Labour (DEL) inspector for joint investigation and management of the incident and outcome reporting.

In case of an incident that has impacted or suspected to have impacted environmental resources e.g. natural water resources and ambient air), the EHP should involve the Department of Forestry, Fisheries and the Environment (DFFE) national or provincial or local air quality officer, and/or the environmental management inspector whoever would be relevant for the case.

The EHP may identify and involve other appropriate authorities that are necessary for joint investigation.

Where more than one level of government is involved in investigations, efforts should be made to co-ordinate the activities of these governments.

- 3.7 For assessment of lead exposure through paint, dust, soil or contaminated water, cosmetics and food, take samples where applicable and use **Annexure D** for guidance on leaded paint hazards and guiding standards of acceptable levels of lead in different articles/settings for comparison with sample results.

STEP 4: Environmental Health Intervention

In order for an EHP to determine the appropriate chemical exposure control strategies for implementation to protect public health, the following must be ensured:

- a. All follow up investigation actions under step 2 and 3 are conducted to identify the chemical involved and how the exposure or the poisoning event occurred.
- b. It should also be investigated if the chemical product involved requires the following, in order to inform the relevant authority about the chemical product involved in the alleged poisoning case, for further investigation and action on the product, if necessary:
 - a Hazardous Substance license, or
 - National Regulator for Compulsory Specifications (NRCS) registration, or
 - Department of Agriculture, Land Reform and Rural Development (DALRRD) registration, or
 - a DFFE permit or environmental authorisation, or atmospheric emission license or
 - a permit under relevant municipal By-Laws
- c. It should also be determined if the incident happened in a workplace setting, in order to ensure the involvement of the relevant authority to refer the case to, if necessary.

The key interventions by an EHP following investigation include:

- a. Health education to raise awareness of possible poisoning exposures, safe storage, removal and disposal and other chemical exposure preventive and control measures. Refer to **(Annexure E)** on **“Preventative and Intervention Measures for Human Chemical Exposure and Poisoning”**, to guide on measures that must be taken.
- b. Law enforcement, where appropriate, to improve compliance.
- c. Liaison with other sectors/stakeholders, to ensure implementation of wider intervention.
- d. Surveillance of poisoning cases to monitor trends of cases.
- e. Monitoring the effectiveness of intervention strategies to ensure sustainability of interventions.

STEP 5: Investigation Conclusion

All areas of the investigation form are to be fully completed. In order for the country to identify problematic chemicals that should be reported to the Secretariat of the Rotterdam Convention, the following key aspects must be thoroughly investigated:

- chemical trade name
- name of manufacturer
- active ingredient
- type of formulation
- source of poison
- source of exposure
- cause of poisoning/main activity at time of exposure
- patient's reaction to the chemical
- chemical exposure interventions recommended and exercised

The investigation form should be accompanied by a written report to provide comprehensive information. The investigating EHP must provide his/her full names, contact details, date of investigation and signature on the form. The completed investigation report form is to be verified by the manager for completeness before submission to NDOH.

8. Conclusion

Environmental Health forms part of preventative medicine, an essential part of the healthcare system. It is the first line of defense against diseases, including poisoning from chemicals. EHPs have a role to play in preventing all poisoning cases, irrespective of whether they are accidental or intentional, or whether the patient survived or not.

It is the duty of EHPs to investigate chemical poisoning cases and to monitor, control, eliminate and prevent conditions that lead to poisoning from chemicals, whether poisoning is accidental or intentional.

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health

Department:
Health
REPUBLIC OF SOUTH AFRICA



PESTICIDE/CHEMICAL INCIDENT REPORT FORM

January 2022

Pesticides/ chemical incident report form

Special Instructions / Information on Usage of Form

1. This tool will replace the old “Epidemiological Investigation: Toxicology form” from the Department of National Health and Population Development. This form is available on the Department of Health’s website at www.doh.gov.za. Starting from April 2011.
2. The purpose of the tool is to ensure that information gathered during an investigation of a pesticide / chemical poisoning is much more comprehensive, integrated and practical so that national statistics are accurate, and poisoning prevented through relevant interventions, strategies and actions. Further, it will impact directly on policy and legislative changes.
3. In terms of the Rotterdam Convention, of which South Africa is a signatory, all human health incidents must be reported to the Secretariat of the Convention. In South Africa, the Designated National Authority is the National Department of Environmental Affairs to which the national Department of Health must report these incidents on a six-monthly basis. This new form complies with and is in line with the human health incident report form outlined by the Rotterdam Convention. <http://www.pic.int/> (see forms and instructions).
4. Reporting procedure: Once the form/s are completed, the Municipality must forward them to the province. Province will then submit them to the national Department of Health at: Fax: (012) 395 8802
5. E-mail: Ramsook.Loykisoonal@health.gov.za or Flavia.Makobe@health.gov.za
6. All questions must be completed fully, as far as possible, by the Environmental Health Practitioner (EHP).
7. For more information, please contact:
Ramsook Loykisoonal
Tel: 012 395 8781
Cell: 082 308 2211

Pesticides/ chemical incident investigation report form

This form should be completed for each individual exposed in a given incident Please fill in the blank spaces and tick the appropriate block/s

I. Patient Information – Demographics

1.	Name of Patient								
2.	Address of Patient	Residential:							
		Work: (if applicable)							
3.	Questionnaire information provided by		Patient				Mother/parent/ caregiver		
			Farmer/manager						
			Other (please specify)						
4.	Contact details of patient/care giver								
5.	Address where poisoning occurred:								
6.	Sex		Male				Female		
7.	Date of birth (DD/MM/YY)	D	D	M	M	Y	Y	Y	Y
	or Age								
	If age unknown		Child (0-5yrs)				Child (6-12yrs)		
		Adolescent (13-17yrs)				Adult (18 yrs and older)			
8.	Race		African				Coloured		
			White				Asian/Indian		
9.	Occupation								
10.	Grade/Standard passed (<i>indicate which</i>)								

11.	Main activity of patient at time of exposure (check one or more of the following):							
	<input type="checkbox"/>	Home garden application	<input type="checkbox"/>	Lead paint	<input type="checkbox"/>	School/creche		
	<input type="checkbox"/>	Application in industry	<input type="checkbox"/>	Mixing/loading	<input type="checkbox"/>	Veterinary/pet application		
	<input type="checkbox"/>	Household application	<input type="checkbox"/>	Vector control application	<input type="checkbox"/>	Manufacturing		
	<input type="checkbox"/>	Selling pesticides/chemicals	<input type="checkbox"/>	Reused empty container				
	<input type="checkbox"/>	Other (please specify)						
12.	Were other individuals poisoned in the same incident?				Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
12.1	If yes, please supply names and contact details:							

II. Pesticide / Chemical Involved

13.	Name of the active ingredient(s) in the formulation					
14.	Trade name and name of manufacturer					
15.	Type of formulation (check one of the following):					
	<input type="checkbox"/>	Liquid/Emulsifiable Conc. (EC)	<input type="checkbox"/>	Wettable Powder (WP)	<input type="checkbox"/>	Dustable powder (DP)
	<input type="checkbox"/>	Water Soluble Powder (SP)	<input type="checkbox"/>	Vapour	<input type="checkbox"/>	Tablet (TB)/ balls
	<input type="checkbox"/>	Granular (GR)	<input type="checkbox"/>	Coil/pads	<input type="checkbox"/>	Pellets/bait
	<input type="checkbox"/>	Shampoo	<input type="checkbox"/>	Lotion/roll-on		

	Other (please specify)							
	If not known, describe pesticide/chemical as best as possible (colour, smell, liquid, granules, etc)							
16.	Relative amount of each active ingredient in the formulation (per cent concentration, g/l, etc.) (if available):							
17.	If exposed to more than one pesticide/chemical formulation at the same time, respond to all points below for each formulation:							
	(i) Was the pesticide/chemical in its original container?				Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
	(ii) Was the label available and legible?				Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
	If yes, was patient able to read and understand health and safety information on label?				Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
	If no, why not		<input type="checkbox"/>	Low literacy level	<input type="checkbox"/>	Cannot read label language	<input type="checkbox"/>	Was not aware of health and safety information on label
	Copy/ies of the label(s) attached?					Yes	<input type="checkbox"/>	No
18.	Application method: (How was product applied e.g. hand, bucket and brush, soil injection, spray, irrigation, aerial (helicopter, plane, etc)?)							
19.	Describe why the pesticide/chemical was being used:							

20.	Where was the pesticide/chemical sourced from?					
		Local store/ supermarket		Farmer's cooperative		Street vendor/informal market
		From pesticide/ chemical store on farm		Provided by farmer/ manager		Pesticide/ agrochemical dealer
		Other (please specify)				
21.	Name of supplier of pesticides/ chemical:					
22.	Pesticide/ chemical GHS hazard classification:					
23.	Does the pesticides/chemical require product registration?				Yes	No
24.	Is the pesticides/chemical restricted/prohibited?				Yes	No

III. Pesticide / Chemical Involved

25.	Date of poisoning:		D	D	M	M	Y	Y
26.	Location of poisoning:	Farm/village/factory/company/work premises						
	Other (please specify)							
27.	Time of poisoning		Morning		Midday		Afternoon	
			Dusk (just before dark)					Night-time
28.	Cause of poisoning		Accidental		Occupational (during work)		Homicide	
			Suicide		Domestic use		Intentional	Uncertain
			Other (please specify)					

29.	Describe in detail ow the incident occurred:												
30.	Patient's reaction to pesticide/chemical exposure (tick one or more of the following):												
	<input type="checkbox"/>	Dizziness			<input type="checkbox"/>	Headache			<input type="checkbox"/>	Blurred vision			
	<input type="checkbox"/>	Excessive sweating			<input type="checkbox"/>	Hand tremor			<input type="checkbox"/>	Convulsion			
	<input type="checkbox"/>	Staggering			<input type="checkbox"/>	Narrow pupils/miosis			<input type="checkbox"/>	Excessive salivation			
<input type="checkbox"/>	Nausea/vomiting			<input type="checkbox"/>	Other symptoms (please specify)								
31.	Outcome:		<input type="checkbox"/>	Survived			<input type="checkbox"/>	Died					
32.	Route of exposure (check main route or more than one if applicable)												
	<input type="checkbox"/>	Mouth (ingestion)		<input type="checkbox"/>	Skin (absorption)		<input type="checkbox"/>	Eyes		<input type="checkbox"/>	Inhalation		
	<input type="checkbox"/>	Other (please specify)											
33.	Interventions (can tick more than one)												
	<input type="checkbox"/>	Saw traditional healer			<input type="checkbox"/>	Saw minister of a religion			<input type="checkbox"/>	Went to a private doctor			
	<input type="checkbox"/>	Went to clinic			<input type="checkbox"/>	Went to hospital							
	<input type="checkbox"/>	Other (please specify)											
34.	Hospitalisation		<input type="checkbox"/>	No		<input type="checkbox"/>	Yes, but not ICU		<input type="checkbox"/>	Yes, in ICU		<input type="checkbox"/>	Unknown
35.	Treatment given		<input type="checkbox"/>	No		<input type="checkbox"/>	Yes		<input type="checkbox"/>	Unknown			
36.	Was the person poisoned in the previous year(s) by pesticides/chemicals?							<input type="checkbox"/>	No		<input type="checkbox"/>	Yes	

	If yes, when			
	What active ingredient(s)			
37.	Has the site where the poisoning occurred (farm, home, workplace, ect.) in the last year reported any pesticides/chemical poisoning?			
		No		Yes, when

IV. Workplace Poisoning

38.	Occupational setting		Agriculture		Pest control operator		
		Forestry		Transport – road	Street/informal market vendor		
		Distribution/sales		Transport – sea	Govt/ municipal sprayer		
		Factory worker		Veterinarian	Industry		
		Other (please specify)					
39.	Was personal protection equipment (PPEs) available to worker when poisoning occurred?				Yes		No
40.	Was personal protection equipment (PPEs) used during application?				Yes		No
	If no, please explain why?						
	If yes, briefly describe (check one or more of the following)						
		Gloves		Overalls		Eyeglasses	
	Dust mask		Boots/shoes		Long-sleeve shirt		Long pants
	Other, please specify						
41.	Has the worker had training on pesticide/chemical health and safety in the last five years?				Yes		No
42.	Application method: (how was produce applied eg hand, bucket and brush, soil injection, spray, drip irrigation, aerial (helicopter, plane etc.?)						

	Other (please specify)								
43.	Briefly describe climatic conditions are the time poisoning occurred with respect to:								
	a. Raining		Yes		No				
	b. Wind		No wind		Light breeze		Windy		
	c. Humidity		Dry		Humid				
	d. Sun		Rising		Full sun		Setting		Cloudy/ overcast
	e. Any other factors (please specify)								

V. Interventions (for guidance, refer to Step 4 of investigation steps and Annexure E of the guideline)

44.	What interventions did the EHP institute took?							
		Health education		Training		Awareness		Distribution of IEC material
		Other please specify						

VI. Person completing report

45.	Name and address of EHP										
46.	Contact details:										
	Tel:	0	0	0	0	0	0	0	0	0	0
	Cell:	0	0	0	0	0	0	0	0	0	0
	Fax:	0	0	0	0	0	0	0	0	0	0
	E-mail										
47.	Date of investigation										
48.	Signature of EHP										



LEAD EXPOSURE/POISONING CASE INVESTIGATION FORM

JANUARY 2022

1. Patient Information

1.1	Patient name and surname:				
1.2	Patient Residential address:				
1.3	Age				
1.4	Occupation if employed				
1.5	Work address				
1.6	Name of School/ Creche if learner				
1.7	Address of School/ Creche if learner				
1.8	Gender	<input type="checkbox"/>	Male	<input type="checkbox"/>	Female

Source of exposure/poisoning identification

2.1	Painted Walls					
2.1.1	Are the walls painted?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	
2.1.2	If yes, what is the colour of the paint?					
2.1.3	Are the leaded paint hazards (refer to annexure D for guidance) identified?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	<input type="checkbox"/> N/A
2.1.4	If yes, describe the leaded paint hazards identified.					
2.1.5	If the answer to 2.1.3 is yes			If the answer to 2.1.3 is no		
	Take paint peel/chips samples to accredited laboratory	or	Test all different colours of painted wall surfaces, doors, window seal and frames with a calibrated XRF analyzing device or another recognized device	Move to 2.2 Loose ground soil		
	Compare sample results with standard references (Refer Annexure D)					
	If the standard results are within acceptable levels, move to 2.2 and the rest of the questionnaire. If the test results are within unacceptable levels, take intervention action (For guidance, refer to Step 4 of investigation steps and Annexure E of the guideline)					
2.1.6	What is the level of lead content in sampled paint chips or on painted wall surface in ppm or per cent or mg/kg or mg/cm ²					

2.2	Loose ground soil	
	Is there loose ground soil on the premises that is contaminated by paint chips or other lead containing material?	
	Yes	No
	Compare sample results with standard references (Annexure D)	Move to 2.3 and continue to the rest of the questionnaires
	If the standard results are within acceptable levels, move to 2.3 and continue to the rest of the questionnaires. If the test results are within unacceptable levels, take intervention action. (For guidance, refer to (step 4 of investigation steps and Annexure E of the guideline)	

2.3	Water/bottled water						
2.3.1	Is drinking water the suspected source?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	N/A
2.3.2	Is bottled water the suspected source?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	N/A
	Yes	No					
	Visit the water supply authority and check the water quality results of the supplied drinking water in relation to acceptable lead levels in water as prescribed in SANS 241. Sample drinking water, irrespective of the source of drinking water supply and compare results with SANS. OR sample the bottled water and compare sample results with Regulations. Refer to Annexure D for reference on standards.	Move to 2.4 and continue to the rest of the questionnaire					
	Taking interventions (For guidance, refer to step 4 of investigation steps and Annexure E of the guideline)						
	Does the water/bottled water comply?						
2.3.3	Yes	No					
	Move to 2.5 and continue to the rest of the questionnaire	Take intervention action (For guidance, refer to step 4 of investigation steps and Annexure E of the guideline)					

2.4	Child's parent workplace/ adult patient workplace			
	Type of occupational setting that the adult patient works in:			
	Plumbing	<input type="checkbox"/>	Yes	<input type="checkbox"/> No
	Construction/ renovation industry	<input type="checkbox"/>	Yes	<input type="checkbox"/> No
	Paint manufacturing industry	<input type="checkbox"/>	Yes	<input type="checkbox"/> No
	Jewellery manufacturing industry	<input type="checkbox"/>	Yes	<input type="checkbox"/> No
	Melting fishing weights	<input type="checkbox"/>	Yes	<input type="checkbox"/> No
	Smelting or recycling lead acid batteries	<input type="checkbox"/>	Yes	<input type="checkbox"/> No
	Cabling industry	<input type="checkbox"/>	Yes	<input type="checkbox"/> No
	Radio and TV sets manufacturing	<input type="checkbox"/>	Yes	<input type="checkbox"/> No
	Shooting range	<input type="checkbox"/>	Yes	<input type="checkbox"/> No
	Informal mining	<input type="checkbox"/>	Yes	<input type="checkbox"/> No
2.4.1	Is lead a chemical used in the manufacturing process?	<input type="checkbox"/>	Yes	<input type="checkbox"/> No
2.4.2	Is the inhalation of released lead fumes in the workplace setting possible, due to ineffective or lack of personal protective equipment (respiratory/face masks)?	<input type="checkbox"/>		<input type="checkbox"/>
2.4.3	Is there possible contamination of lunch/snack food to be consumed by the adult patient due to poor personal and environmental hygiene?	<input type="checkbox"/>		<input type="checkbox"/>
2.4.4	If the answer is yes to the questions above, consider chemical risk assessment (Refer to Annexure C and if interventions are required, for guidance refer to step 4 of the investigation steps and Annexure E of the guideline)			

2.5	Occupation setting protective clothing					
2.5.1	Are occupational protective clothing washed at the workplace or home?		Workplace		Home	
2.5.2	If taken home, is occupation protective clothing taken home, washed separately?		Yes		No	
					If occupational protective clothing taken home is not washed separately advise on intervention measures	
2.5.3	Is personal protective clothing provided? (Only ask if the workplace is the suspected location where poisoning took place in case of an adult patient)		Yes		No	N/A

2.6	Leisure/habitual activities					
2.6.1	Are parents of the child patient or the adult patient involved in any of the following leisure/habitual activities?					
	Melting fishing weights		Yes		No	If parents of the child patient or the adult patient involved in any of the leisure /habitual activities advise on intervention measures (refer to (step 4 of investigation steps and Annexure E of the guideline).
	Burning gun magazines for home heating		Yes		No	
	Burning battery casings for home heating		Yes		No	

2.7	Cosmetic or aruyvedic medicines							
2.7.1	Is a cosmetic or aruyvedic medicine a suspected source of poisoning?							
	Yes			No				
	Take sample to the laboratory for lead content analysis			Move to 2.8 and continue to the rest of the questionnaires				
2.7.2	Are the results indicating levels of level in cosmetic or aruyvedic medication?					Yes		No
2.7.3	If the answer to question 2.7.2 is yes, what is the level?							

	Refer to Annexure C1 for guide on acceptable limit. Follow up on investigation on where was it purchased from for further investigation, if standard is exceeded. If interventions are required, for guidance, refer to section 5, section 7 (step 4) and Annexure D of the guideline).
2.7.4	If the answer to question 2.7.2 is No, move to 2.8 and continue to the rest of the questionnaires.

2.8	Food consumed	
2.8.1	Is food or cooking utensils/pots a suspected source of poisoning?	
	Yes	No
	Take sample to the laboratory for lead content analysis	Conclude the investigation and complete section 3, 4 and 5
	Are there levels of lead content in the results?	
2.8.2	Yes	No
	Compare results with acceptable lead content in food on Regulations for Maxim Permissible Levels of Metals in Foodstuffs, (Refer Annexure D) If acceptable limit is exceeded, advise and follow up with further investigation regarding where was it purchased from. If interventions are required, for guidance refer to step 4 of investigation steps and Annexure E of the guideline.	Conclude the investigation and complete section 3, 4 and 5

2. Source of poisoning analysis

3.1	What is the analysis in terms of identification of the source of poisoning from section 2 and the reason for identification?

3. Intervention measures

4.1	What intervention measures did you undertake or advise on?

4. Details of person completing the investigation

Name of the EHP		
Address of the EHP		
Contact details	Tel:	
	Cell:	
	Fax:	
	E-mail	
Address of the EHP		
Date of investigation		
Signature of EHP		

CHEMICAL RISK ASSESSMENT

Introduction

Chemical risk assessment is a process of identification and characterisation of risks in order to prioritise and select appropriate prevention and control strategies, for the prevention of exposure to populations and the environment.

A risk assessment may need to be revisited when, for example:

- there are new or changed processes in hazardous substance manufacturing
- there are significant changes in the transport of hazardous substances
- there are major incidents such as chemical spillages, explosions, fire, or when human or environmental poisoning/ contamination occur
- there is new technology offering scope for improvements
- new information about the behaviour or effects of the chemical substance becomes available
- there are proposals for new construction or other changes in premises of the hazardous substance dealer
- when an updated SDS is produced by the supplier
- a new chemical is introduced
- five or more chemical poisoning cases involving a similar chemical exposure occur in the same area/environment
- risks to users occur as a result of preparation and use of chemicals

Chemical Risk Assessment Steps

The following steps are to be followed when conducting a chemical risk assessment:

Step 1: Chemical Hazard identification

This step entails gathering background information on the chemical identity and defining its properties, registration, sources, stressors and effects.

1.1 Identify chemical involved

- Determine the type of substance involved and whether it is an industrial chemical, a pesticide, disinfectant, pharmaceutical, or plant.
- Determine if the chemical substance involved requires registration or licensing in terms of the Hazardous Substances Act, Agricultural and Stock Remedies Act, Medicines and Related Substances Act, or National Regulator for Compulsory Specifications Act.
- Determine the group category classification listing under the Hazardous Substances Act or Agricultural and Stock Remedies Act if it is an agricultural remedy/pesticide.
- Identify if the chemical/product is restricted for supply, use or storage under the relevant legislations (i.e. Hazardous Substances Act, 1973 (Act No.15 of 1973) National Environmental Management Act, 1998 (Act No. 107 of 1998), Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), Agricultural, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) as amended).

- Identify the active ingredient/s on the label.
 - Identify product trade name on the label.
- 1.2 Identify physical properties and toxicological properties of the chemical. Identify the GHS hazard classification and hazard categories (e.g. physical hazards i.e. explosive, flammability, etc., health hazards, e.g. acute or chronic toxicity, or environmental hazards, e.g. ecotoxicity, etc.), by reading the label and the SDS.
- 1.3 Identify the usage pattern of the hazardous chemical substance on the premises.
- 1.4 Identify the exposure pathways of the hazardous chemical substance. Refer to SDS sheet or conduct desktop research.

Step 2: Chemical exposure risk analysis

This step entails gaining a clear understanding on the interrelationships between chemical exposure pathways, effects and the control measures implemented.

- 2.1 Identify the total number of people affected and categorise them according to gender, age group, geographical area (in case of contamination in the neighbouring community), and/or production process area (in case of a hazardous chemical dealer's premises).
- 2.2 Analyse data on previous exposure incidents that took place in the workplace, if an incident register is kept.
- 2.3 Analyse data from samples taken in comparison with standards. Refer to Annexure D for guiding standards.
- 2.4 Identify the route of chemical exposure pathway that took place.
- 2.5 Describe how the chemical exposure incident occurred.
- 2.6 Assess the current workplace measures to control chemical exposure risks in terms of whether:
- first aid requirements are met
 - compliance of indoor air quality is met
 - spill containment requirements are met
 - hazardous zones and spill cleanup materials are available
 - chemical risk assessment had been conducted by the dealer
 - Implementation of risk control measures had been done, such as;
 - elimination
 - substitution
 - isolation
 - engineering controls
 - administrative
 - use of PPE
 - emergency planning and implementation
 - fire safety controls
 - staff training

NB. Also make reference to control measures prescribed in the Lead Regulations and the Hazardous Chemical Substances Regulations, as amended under Occupational Health and Safety Act, 1993, in case of workplace exposure controls.

- Inspection of the actual work location and work practices.
- In case of environmental contamination, take appropriate environmental samples (soil, water, air or other potentially contaminated items) to the relevant laboratory for analysis.

2.7 Draw or plot a map of the location where the neighbouring community contamination took place, using Geographic Information System (GIS). This map should include the following:

- where the contamination occurred (any roads, property boundaries, buildings, water courses, soil surfaces, etc.)
- an arrow indicating the path of the contamination
- the sampling locations and sample numbers of any environmental samples
- the location of the exposed people at the time the contamination occurred
- an indication of the relevant topography
- any other relevant feature(s)

Step 3: Chemical risk characterization

This step entails integrating information to estimate and evaluate the degree of each risk by means of quantitative or qualitative techniques, as well as communicating the risk.

- 3.1 Determine the degree of risk created by the chemical hazards by considering the following aspects:
- regulatory concerns (licensing/registration or prohibition)
 - the degree of toxicity of the chemicals
 - the chemical exposure level based on sampling results or other records

NB. Refer to the relevant legislations and guidelines with regards to recommended maximum permissible exposure/emission level of metals/chemicals//articles/settings in/for:

Metals/ Chemicals/ Articles/settings	Legislation
Foodstuffs	NDOH-Regulations relating to Maximum Levels for Metals in Foodstuffs, R588- 15 June 2018
Cosmetics	NDOH -Regulations Prohibiting the Use of Any Active or Potentially Active Depigmenting Ingredient, Lead and its Salts, Mercury and its Salts and the Cosmetic Category Skin Bleacher, Skin Lightener or Skin whitener. No. R.1861 of 10 August 1990 as amended
Drinking water, including bottled water	Drinking water - SANS 241:2015. NDOH- Bottled water- Regulations relating to all packaged water. GNR.455 of 26 May 2010.
Indoor environment in the domestic environment	NDOH- National Indoor Air Quality Guidelines

Occupational exposure limits (OEL) (maximum and restricted) in the workplace environment	<p>For other hazardous chemicals – DEL- Hazardous Chemical Substances Regulations, 1995 under Occupational Health and Safety Act, 1993, GNR. 1179 of 25 March 1995</p> <p>For other hazardous chemicals DEL - Regulations for Hazardous Chemical Agents, 2021, GNR 280 of 29 March 2021 (NB. This Regulation repeals GNR 1179 of 25 March 1995, however the check effective dates of certain Regulations/Annexure and Tables)</p>
Metals/ Chemicals/ Articles/settings	Legislation
Substance or mixture of substances resulting from listed activities which result in atmospheric emissions and which the Minister or MEC reasonably believes have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage, in terms of Section 21 of National Environmental Management: Air Quality Act 39 of 2004, as amended.	DFFE - List of activities, which result in atmospheric emissions, which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage. GNR. 893 of 22 November 2013, as amended under National Environmental Management: Air Quality Act 39 of 2004, (Act No. 39 of 2004) as amended.
Carbon monoxide, lead, benzene, ozone, particulate matter, nitrogen dioxide and sulphur dioxide	DFFE - National Ambient Air Quality Standards. GNR. 1210 of 24 December 2009 as amended
Particulate matter of aerodynamic diameter of less than 2.5 micro meter (PM2.5)	DFFE - National ambient air quality standards for Particulate matter of aerodynamic diameter of less than 2.5 micro meter (PM2.5). GNR. 486 of 29 June 2012 as amended
NB. For ambient air emissions, compare the results with standards in the and the WHO air quality guidelines for ubiquitous pollutants in ambient (i.e. outdoor) air (particulate matter, ozone, nitrogen dioxide, sulfur dioxide, nitrogen dioxide, sulfur dioxide and carbon monoxide), in order to estimate the exposure risk, as WHO guidelines are intended to support actions to achieve air quality that protects public health in different contexts.	Reference- WHO global air quality guidelines. Particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide (2021). WHO: Geneva Link: https://www.who.int/publications/i/item/9789240034228

NB. Refer to Annexure D for other lead standards/ hazards standards in other article and settings, and related legislations/ guidelines

Always check the latest amended versions of the legislations/guidelines and the effective dates of the Regulations when making reference

- period of exposure
- risk posed to employees, or environment/ecosystem or neighbouring community/population or municipality/ province/ country; and
- control measures implemented.

3.2 Assign risk conclusion

Evaluate the information collected to answer the following key questions:

- Were workers/neighbouring populations exposed?
- Were workers/neighbouring populations exposed to limits within regulatory/recommended prescripts?
- Did environmental chemical contamination occur?
- Did the owner/manager of the business take all reasonable precautions to minimise environmental chemical contamination?
- Did the operator take all reasonable precautions to minimise environmental chemical contamination?
- What else could have been done?
- Is there evidence that the law has been broken?

3.3 Risk Communication

Information is disseminated or exchanged on issues involving human health or environmental risks to interested and affected industries, institutions, the affected communities, through internal institutions external communication protocols.

Step 4. Risk Management

This step entails determining appropriate measures to control risks and improving existing controls.

- 4.1 Appropriate measures to control risks are determined and implemented.
- 4.2 Implemented control measures are checked to determine success.
- 4.3 The reduction in risk as a result of proposed corrective action/ control measures is assessed.

LEADED PAINT HAZARDS AND LEAD STANDARDS IN SELECTED ARTICLES AND SETTINGS

1. Leaded paint hazards

Definitions

“**Deteriorated paint**” means any interior or exterior paint or similar coating material that is peeling, chipping, chalking or cracking, or any paint or similar coating material located on an interior or exterior surface or fixture that is otherwise damaged or separated from the substrate.

“**Leaded paint**” refer to the definition in the active NDOH Leaded Paint Declaration Notice;

“**Children’s product**” means a consumer product designed or intended primarily for children 12 years of age or younger and includes but is not limited to the following children’s products:

- a. furniture designed for use by children
- b. gates and other enclosures for confining a child
- c. children’s toys and play equipment
- d. school stationary supplies
- e. children’s jewellery.

Leaded paint hazards

- a. Where there is lead-based paint on interior or exterior surfaces that children can chew or that get a lot of wear and tear, such as on windows and windowsills, doors and door frames, stairs, railings, banisters, and porches.
- b. Where there is lead-based paint on an interior or exterior surface which can be subjected to damage by repeated impact or sudden force from a related building component.
- c. If there is any damage or deteriorated lead-based paint on the interior or exterior of any residential building or child-care facility.
- d. Lead equal to or exceeding 10 micrograms (μg) of lead in dust per 0.09 m^2 or 900 cm^2 on floors of childcare and residential premises.
- e. Lead equal to or exceeding 100 micrograms of lead in dust per 0.09 cm^2 or 900 cm^2 on interior windowsills of child care and residential premises.
- f. Lead equal to or exceeding 400 parts per million (ppm) of lead in bare soil in children's play areas or 1200 ppm average for bare soil in the rest of the yard of the residential or childcare premises.

2. Lead standards in different articles

Article/environment	Lead standard/ guidance estimates of lead hazards in painted surfaces/lead occupational exposure limits	Reference for the standard
New packaged decorative paint	600ppm – from 2009 until the GNN 801 of 31 July 2009 is repealed and a new replacement GNR is in place and is effective	NDOH. Declaration of Leaded Paint as a Group I Hazardous Substance. GNN 801 of 31 July 2009
Painted wall surface	If measuring lead on painted wall surface using an XRF- 0.06% (600ppm) – from 2009 until the GNN 801 of 31 July 2009 is repealed and a new replacement GNR is in place and is effective	NDOH. Declaration of Leaded Paint as a Group I Hazardous Substance. GNN 801 of 31 July 2009
Paint chips from painted wall surface	<p>NB. For paint chip laboratory analysis – results can be reported as a percentage (%) of lead by sample weight or as milligram per square centimeter (mg/cm²).</p> <p>- If the paint chip laboratory analysis results are reported in %, refer to the active NDOH Leaded paint Declaration Government Gazette Notice.</p> <p>- If the paint chip laboratory analysis results are reported mg/cm², the USEPA standard of 1.0 mg/cm² or more as positive for lead should be used when interpreting the results to determine and estimate lead exposure hazard, together with reference to the below WHO and UNEP Technical Brief guiding standards that are to be read in conjunction with the applicable permissible lead content limit in paint as per the active NDOH Lead Paint Declaration Notice and related Regulations</p> <p>* For paints with a lead content of 10 000 ppm, a 1 cm² paint chip is estimated to contain between 65 µg and 650 µg of lead, depending on the number of layers of paint (range 1–10 layers)</p> <p>* For a paint containing</p>	<p>NDOH. Declaration of Leaded Paint as a Group I Hazardous Substance. GNN 801 of 31 July 2009</p> <p>USEPA – Hazard Standards for Lead in Paint, Dust and Soil- Toxic Substances Control Act of 1996 as amended</p> <p>WHO and UNEP - Global elimination of lead paint: why and how countries should take action. Technical brief. WHO: 2020</p>

Article/environment	Lead standard/ guidance estimates of lead hazards in painted surfaces/lead occupational exposure limits	Reference for the standard NB. Always check the latest copy of the national regulation or standard, where applicable, and the effective dates of the law
	<p>500 ppm of lead, the amount of lead in a 1 cm² paint chip is estimated to be between 3.2 µg and 32 µg.</p> <p>* For a paint containing 90 ppm of lead, a 1 cm² paint chip would contain 0.6 µg of lead if there was one layer of paint and 6 µg if there were 10 layers.</p>	
Ground soil (Child care and residential premises)	< 400 parts per million (ppm) in play areas of bare soil in children's play areas	USEPA – Hazard Standards for Lead in Paint, Dust and Soil- Toxic Substances Control Act of 1996 as amended
	<1,200 ppm (average) in bare soil in the remainder of the yard	
Indoor - dust (Child care and residential premises)	100 micrograms of lead in dust per square foot (ft ²)/(0.09 m ²) or (900 cm ²) on interior window sills.	
	10 micrograms (µg) of lead in dust per square foot (ft ²)/(0.09 m ²) or (900 cm ²) on floors	
Drinking Water	≤ 10 µg/L	SANS 241:2015
Packaged (Bottled) water	0,01- Maximum level (mg/l) 0,01 – 0,05 - Acceptable range (mg/l)	NDOH. Regulations relating to all packaged water. GNR.455 of 26 May 2010.
Cosmetics	Lead and its compound is 0 (zero) – Total prohibition	NDOH. Regulations Prohibiting the Use of Any Active or Potentially Active Depigmenting Ingredient, Lead and its Salts, Mercury and its Salts and the Cosmetic Category Skin Bleacher, Skin Lightener or Skin whitener. No. R.1861 of 10 August 1990 as amended
Food Commodities	Lead standard	
Berries and other small fruits (excluding cranberry, currant and elderberry)	0.1	
Cranberry, Currant and elderberry	0.2	

Article/environment	Lead standard/ guidance estimates of lead hazards in painted surfaces/lead occupational exposure limits	Reference for the standard NB. Always check the latest copy of the national regulation or standard, where applicable, and the effective dates of the law
Fruit, except berries and other small fruits (After removal of stem, cap, stone, crown and/or seeds but calculated on whole fruit)	0.1	NDOH. Regulations relating to Maximum Levels for Metals in Foodstuffs, R588-15 June 2018
Brassica vegetables	0.1	
Bulb vegetables	0.1	
Fruiting vegetables (excluding fungi and mushrooms)	0.05	
Leafy vegetables	0.3	
legume vegetables	0.1	
Pulses	0.1	
Root and tuber vegetables	0.1	
Canned fruits	0.1	
Jams, jellies and marmalades	0.4	
Mango chutney	1	
Canned vegetables (excluding canned brassica vegetables)	0.1	
Preserved tomatoes	0.05	
Table olives	0.4	
Pickled cucumbers	0.1	
Processed tomato concentrates	1.5	
Fruit juice concentrate, nectars and ready to drink fruit drinks/juices (excluding juices and nectars from Berries and small fruits and passion fruit juices)	0.03	
Cereal grains (excluding buckwheat, canihua, and quinoa)	0.2	

Article/environment	Lead standard/ guidance estimates of lead hazards in painted surfaces/lead occupational exposure limits	Reference for the standard NB. Always check the latest copy of the national regulation or standard, where applicable, and the effective dates of the law
Canned chestnuts and canned chestnuts puree	0.05	
Meat and fat of cattle, pigs and sheep (without Bones)	0.1	
Meat and fat of poultry (without bones)	0.1	
Cattle edible offal of	0.5	
Fish (whole commodity or portions, without the viscera)	0.3	
Edible fats and oils	0.1	
Fat spreads and blended spreads	0.1	
Natural mineral waters	0.01	
Milk	0.02	
Secondary milk products (products made from milk)	0.02	
Infant formula, formula for special medical purposes intended for infants and follow up formula	0.01	
Salt, food grade	2	
Wine	0.2	
Pig, edible offal of	0.5	
Poultry edible offal of	0.5	
Acceptable workplace level of airborne lead (OEL), Acceptable workplace level of airborne lead (OEL),	in the case of " tetra-ethyl lead " - not more than 0,10 mg lead per cubic metre of air, " other than tetra-ethyl lead " - not more than 0.15 mg lead per cubic metre of air	DEL. Lead Regulations, 2001 under Occupational Health and Safety Act, 1993

Article/environment	Lead standard/ guidance estimates of lead hazards in painted surfaces/lead occupational exposure limits	Reference for the standard
Acceptable workplace exposure level	<p>For ingestible lead, the blood lead level is less than 20 pg/100ml or</p> <p>For lead alkyls, the urinary lead level is less than 120 pg/l</p>	DEL. Lead Regulations, 2001 under Occupational Health and Safety Act, 1993
Lead national ambient air quality standards	<p>Concentration - 0.5 µg/m³</p> <p>Averaging period - 1 year</p> <p>Frequency of exceedance – 1 year</p>	DFFE- National Ambient Air Quality Standards. GNR. 1210 of 24 December 2009 as amended
Listed activity- Subcategory 4.13: Lead Smelting	Make reference to relevant DFFE legislation in column 3	DFFE. List of activities, which result in atmospheric emissions, which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage. GNR. 893 of 22 November 2013, as amended.

PREVENTATIVE AND INTERVENTION MEASURES FOR HUMAN CHEMICAL EXPOSURE AND POISONING

Human exposure to chemicals can be prevented and controlled through various measures. The following intervention and control measures should be promoted and be used by EHPs to guide communities, institutions, and industries in different environmental settings to prevent further human chemical poisoning cases.

1. Household chemical products storage tips

- Always store medicines, laundry products and household chemical products out of reach and out of sight of children.
- Never use empty detergent containers for storage of any other materials.
- Never use drink containers such as cups or bottles to store household and chemical products in.
- Store food in a separate area to household cleaning products and chemicals.
- Buy products in child-resistant packaging whenever possible and close the container tightly after each use.
- Keep cleaning products in their original container with their original label intact.

2. Child access and exposure to medicines and household chemical products prevention tips

- Never leave medicine out on a kitchen counter or at a sick child's bedside.
- Install safety latches or locks on cabinets used to store medicines and household chemical products.
- Ensure children cannot use chairs or other items to climb up to products stored out of their reach.
- Always close medicines and other household chemical products if interrupted while using them, because a poisoning incident can occur when an adult is distracted (e.g. by the telephone or visitor).
- Keep batteries out of a child's reach.
- Always close all household cleaning product containers immediately after use
- Keep handbags out of reach of children.
- Never let empty medicines and household chemical containers lie around, dispose safely.
- Medication poisonings, in children including household products such as caustics may be severe and result in the need for medical attention.

3. Household chemical products and pesticides application and safety tips

- Remove children, pets, and toys before applying pesticides (inside or outside the home).
- Follow label directions to determine when children and pets can return to the area that has been treated.
- Regularly clean floors, windowsills, and other surfaces to reduce possible exposure to pesticide residues.

- Use products with a tamper-resistant bait station, where possible to protect children from exposure.
- Turn on fans and open windows when using household cleaners and chemicals.
- Make it a practice to check the spray nozzle on products before use to ensure that it is directed away from your face and other people.
- Wear protective clothing, including long-sleeved shirts, long pants, socks, shoes and gloves, when spraying pesticides and other chemicals.
- Stay away from areas that have recently been sprayed with pesticides or other chemicals.
- Do not smell chemical containers, whether you know what is inside or not
- Never combine household cleaning products because some chemical mixtures may release irritating gases, e.g. bleach and vinegar.

4. Medicine Safety Tips

- Read medicine and product labels before each use and follow directions exactly.
- Clean out the medicine cabinet periodically, and safely dispose of medicines that are expired or no longer needed. Take expired medicines to your local pharmacy or health facility.
- Always store medicines away, out of reach and sight from children
- Buy medicines in child-resistant packaging whenever possible and close the container tightly after each use.
- Don't remove medicines from a child-resistant package and put it in another type of easy to open container.
- Never share or sell your prescription medicines.
- Keep medicines in their original bottles or containers whenever possible.
- Never take more than the prescribed amount of medicine.
- Never "borrow" a friend's medicine or take old medicines.
- Monitor the use of medicines prescribed for children and teenagers, such as medicines for attention deficit disorder.
- Seek help if there is suspicion of depression. Always keep medicines locked away.

5. Poisoning from poisonous plants prevention tips

- Remove any poisonous plants from the house and yard. Contact the Department of Agriculture, Forestry and Fisheries on information about poisonous plants.
- Do not grow poisonous plants.

Anyone in contact with poisonous plants should:

- Immediately rinse skin with lots of water.
- Gently clean under nails with a brush.
- Call the Poisons Information Centre (0861 555 777) for assistance with identifying the poisonous plant and advice on further management.
- Seek professional medical attention or go to the nearest health clinic or hospital.

N.B For more information on images and books of poisonous plants in South Africa visit website link- https://images.search.yahoo.com/yhs/search?p=poisonous+plants+in+south+africa&fr=yhs-adk-adk_sbyhp&hspart=adk&hsimp=yhs-adk_sbyhp&imgurl=http%3A%2F%2Fmediacdn.nhbs.com%2Fjackets%2Fjackets_orig%2Fkpics%2F133796.jpg#id=78&iurl=http%3A%2F%2Fimg.bidorbuy.co.za%2Fimage%2Fupload%2Fuser_images%2F651%2F390651_110821130320_Kalanchoe_luciae6a.jpg&action=close

Visit a book- Poisonous Plants of South Africa - Authors: Ben-Erik van Wyk, Fanie van Heerden, Bosch van Oudtshoorn

6. Disposal safety tips

- Properly dispose of old batteries after they have been removed from an appliance or take them to the nearest available battery collection point/center.
- Children are usually curious, always remember to rinse and re-cap laundry containers before throwing away or recycling.
- To protect the environment, pesticides and chemicals must not be disposed of in drinking and washing water.
- Avoid dumping pesticide containers indiscriminately.
- Read labels as there might be disposal instructions.
- Hazardous waste containing chemicals to be properly assessed for disposal at appropriate waste disposal site.

7. Teaching children

- Teach children to always ask an adult before eating, drinking or touching anything.
- Teach children that laundry and other cleaning products and their containers are not toys.
- Teach children that medicines and house chemical products (detergents, cosmetics, etc.) are dangerous.

8. Mercury Poisoning Prevention Tips

Prevention of mercury poisoning is difficult if the source of the mercury is unknown. Consequently, prevention of mercury poisoning begins with identifying the potential or known sources and stopping production or isolating contaminated areas (e.g. informal mining areas) so that people will not come into contact with people. These situations are usually found in industrial or environmental sites contaminated with mercury and may require both industrial and governmental assistance to design ways to prevent human and further environmental exposure.

At home, there are a few mercury- containing items, for example, thermometers, medical devices, some disinfectants, fluorescent light bulbs) that can potentially be a source of mercury poisoning.

The following should be done to prevent mercury exposure:

8.1 For mercury containing equipment and materials

- Read the labels on products to see if they contain mercury and follow precautionary measures on the warning label to prevent toxic exposure.
- Follow directions on the label regarding disposal of a broken or non-useable product or call the Poisons Information Helpline.

- Mercury-free equipment and materials should be preferred and promoted for use in order to phase mercury-based equipment and materials.

Storage of mercury-containing equipment and materials in HCFs to prevent exposure from breakage spillage

- Mercury-containing thermometers and other equipment used in HCFs should be kept in hard containers. Plastic containers are recommended to minimise the possibility of breakage.
- Maintenance of mercury-based instruments, which includes cleaning and refilling of instruments with mercury, should be done only in a designated place (reserved room) and only by a properly trained and authorised staff, in accordance with the manufacturers' handling procedures.
- Maintenance/calibration of devices should be done by keeping the device over a tray and covering drains to prevent discharge of mercury into waste water drainage.
- Mercury-based devices should be used only in rooms with smooth flooring and never in rooms with carpeting.
- Mercury devices should not be used in units with beds that have high structures or projections that can break wall-mounted sphygmomanometers, or in areas where patients cannot be moved quickly in the event of mercury spills.
- Consider establishment of a recycling program for mercury containing bulbs in premises generating a large amount of such waste e.g. schools, health facilities, office buildings.

8.2 Mercury Exposure Prevention from Amalgam Fillings

- Discuss choices for dental fillings with the dentist and consider alternative dental filling material, in keeping with the Minamata Convention on Mercury and WHO policies to phase out mercury-based medical devices and substances
- Parties to promote the use of alternative cost-effective and clinically effective mercury-free dental restoration to prevent exposure from mercury and its compounds.

8.3 Clean up/collection of mercury spill/mercury spill management:

Steps for cleanup mercury spill:

8.3.1 Evacuate area

- Remove everyone from the area that has been contaminated and shut the door.

8.3.2 (A) Follow precautionary measures

- All the heaters and air conditioners which are in use should be turned off to minimise volatilisation of the mercury spillage.
- Ensure proper ventilation by opening windows and doors once area is evacuated.
- Any ventilation system that could spread mercury vapour to other sensitive areas should be closed. If possible, lower temperature should be maintained as this process lowers the amount of mercury that can vaporise.
- Cover the mercury spill with plastic to reduce evaporation into indoor air if the mercury is not going to be cleaned up immediately and is confined to a small area.
- Vacuum cleaners must never be used to clean up mercury spills as heat from the cleaner will vaporise the mercury and increase exposure to the surrounding environment, and the mercury will contaminate the vacuum cleaner requiring it to be disposed of.
- Never use a broom to clean up mercury as it breaks up the mercury into droplets and increases the production of mercury vapour.
- Precautions should be taken not to handle mercury waste with bare hands.

- Mercury waste should never be discharged into the drain/sewer as it can lodge in the plumbing, and contaminate the septic tank and sludge in sewage treatment plants, as well as contaminating the environment;
- Mercury-contaminated items should not be washed in a washing machine as the mercury can contaminate the sewage system and the washing machine.
- All items such as shoes, clothing, fabric or any item that has been contaminated with mercury during a mercury spill collection process should not be burned in open yards to avoid mercury fumes contaminating the atmosphere.
- After handling mercury, hands must be carefully washed before eating or drinking.

8.3.3 (B) Get required tools

- Secure required tools as prescribed below.
 - a. **“Mercury Spill Kits”** are essential for the management of mercury spills and breakages.
- Mercury spillage collection kit should be kept at all the suitable places in healthcare facilities to allow rapid access in the event of mercury spillages, to contain spilled mercury and to limit the amount of mercury released into the air.
- Every healthcare facility (HCF) should have at least a minimum of two or three kits that are replaced once used. Central and academic hospitals should have at least one kit in each department.
- All spill kits should have a record sheet attached indicating date used and verifying that the used supplies have been replaced. The sheet should be signed and dated by the responsible staff.
- Mercury Spill Kits should be used only by trained personnel to prevent further exposures.

NB. Although mercury spill kits are commercially available, a spill kit can be made by putting together the following items and storing them in a marked box or portable container:

Containers:

Air-tight, sealable plastic bags (small and large sizes, thickness: 40 to 150 microns).

Small air-tight, rigid plastic container or glass bottle half filled with some water or vapor suppression agent for collecting elementary mercury.

Air-tight, puncture-resistant, rigid plastic or steel jar or container with a wide opening for collecting mercury-contaminated broken glass.

Plastic tray

Regular plastic waste bags (thickness: 40 to 150 microns)

Other requisites for removing mercury

Flashlight (electronic torch) to locate shiny mercury beads.

Plastic-coated playing cards or thin pieces of plastic to push mercury beads into plastic scoop or pan, if these are not available, use index cards, pieces of cardboard, or stiff paper.

Small plastic scoop or plastic dust pan to catch the mercury beads.

Tweezers to remove small broken glass pieces.

Eyedropper or syringe (without the needle) to draw up large mercury beads.

Duct tape or sticky tape to pick up tiny mercury droplets.

Vapor suppression agents: Sulfur powder (available from pharmacies) or Zinc or copper flakes to absorb mercury.

Commercial absorbent pads or vapor suppressants which contain a foam pad saturated with a suspension containing small amounts of sodium thiosulfate, copper sulfate, calcium chloride, and potassium iodide. NB Small quantities of x-ray fixer (which contains thiosulfate) or a propylene glycol solution of sodium thiosulfate and copper sulfate have also been used as vapor suppression agents.

Brush to remove powder or flakes.
Utility knife blade.

Materials for decontamination:

Vinegar, hydrogen peroxide and cotton swabs for final cleaning when using sulfur powder.
Decontamination solution or commercial decontaminant (made of 10 per cent sodium thiosulfate solution or a mixture of sodium thiosulfate and Ethylenediaminetetraacetic acid (EDTA 7)

8.3.2 (C) Use protective clothing

- Appropriate personal protective equipment should be used while handling mercury.
- Jewellery should be removed, as mercury will bind with the metal.
- Put on protective clothing as described below.

Personal protective equipment (PPE):

- rubber or nitrile gloves
- safety goggles or protective eyewear
- respiratory protection (Fit-tested full- or half-face piece air-purifying respirator with mercury vapor cartridges, or face mask with sulfur or iodide impregnated activated carbon, or face mask made of sandwiched activated charcoal-impregnated cloth, or other specialty mask or respirator designed particularly for mercury, or if no specialty masks are available: a face mask with a 0.3 micron HEPA filter to capture amalgam particles and mercury-laden dust)
- overalls
- apron
- disposable shoe covers

8.3.3 Collect broken glass pieces

- Carefully collect any broken pieces of glass or sharp objects with tweezers.
- Place all broken objects on a paper towel, fold the paper towel and place in a puncture proof plastic bag or container provided with lid.
- Secure the plastic bag/container and label it “mercury contaminated waste”.

8.3.4 Collect mercury beads

- Locate mercury beads on the spilled surface.
- Locate all mercury beads in any surface cracks or in hard-to-reach areas of the floor.
- Check a wide area beyond the spill.
- Use the flashlight to locate additional glistening beads of mercury that may be sticking to the surface or in small cracked areas.
- Use cardboard sheets to push and assemble the spilled beads of mercury together.
- Use syringe without a needle/eyedropper to suck and remove larger beads.
- Use sticky tape to remove and collect smaller hard-to-see beads of mercury.
- Carefully place collected mercury into an unbreakable plastic container/glass bottle with an airtight lid half filled with water.
- Use sticky tape to pick up small bead of mercury and place the sticky tape in a puncture-proof plastic bag and secure properly.
- Use commercially available powdered sulfur or zinc to stain mercury and make smaller beads easier to see. Powder sulfur makes the mercury more visible as a color change from yellow to

brown may occur when it binds with mercury. This suppresses the vaporisation of any missing mercury, and it can be more easily removed.

- Place all the materials used during the cleanup, including PPE and collected mercury spills into a leak-proof plastic bag or container with lid; seal properly and label “mercury contaminated waste”.

8.3.5 In case of larger mercury spill, the following additional precautions need to be taken:

- Cleanup of mercury-contaminated products should be placed in steel or polyethylene drums typically used for hazardous waste.
- Handle wastes at temperatures below 25°C, if possible, because of the increased volatility of mercury at higher temperatures.
- Place plastic sheeting or absorbent mats under containers before opening them if the surface of the containment area is not coated with a smooth surface material (paint, urethane or epoxy).
- Remove liquid wastes either by removing the drain plug or by pumping with a peristaltic pump and suitable chemical-resistant tubing.
- Use dedicated pumps, tubing and drums, not used for any other purpose, to transfer liquid wastes.
- Clean up any spills with cloths, paper towels or absorbent; Triple rinse contaminated surfaces with a solvent such as kerosene.

8.3.6 Cleaning and Decontamination of Contaminated Floor Surfaces

- Cleaning and decontamination in HCF should be done by trained personnel, and as follows:

A. Cleaning

- Sprinkle sulfur or zinc powder over the floor surface area. Either powder will quickly bind any remaining mercury. If zinc powder is used, moisten the powder with water after it is sprinkled and use a paper towel to rub it into cracks in the flooring.
- Use cardboard and then dampened paper towels to pick up the powder and bound mercury.
- Place all towels and cardboard in a plastic bag,
- Seal all the bags that were used and store in a designated area in the HCF.

B. Decontamination

- All the mercury spill surfaces should be decontaminated with 10 per cent sodium-thiosulfate solution.
- Keep a window open for 24 to 48 hours to ventilate after the cleanup.
- After ensuring all the mercury has been removed, resume normal vacuuming and utilise the cleaned area for routine operation.

8.3.7 (A) Storage of collected mercury waste:

- All mercury waste amalgam from dental healthcare facilities, mercury-containing broken equipment and/or obsolete mercury devices and other items contaminated with elemental mercury should be properly labeled “mercury contaminated waste” and stored safely in separate collection containers or puncture proof bags in a designated healthcare risk waste storage area or authorised centralised storage in the HCF.
- The gloves used during handling of mercury should be segregated and stored safely in a designated place.
- Lengthy storage of mercury bearing waste within the healthcare facility should be avoided. The accumulated wastes in the centralised temporary storage area should be safely disposed of within 90 days.
- Routine inspection for leaks, degradation of container materials, vandalism, integrity of fire alarms and fire suppression systems and general status of the site should be conducted.

(B) Mercury waste storage area should have:

- a temperature control provision to avoid vaporisation of mercury
- adequate lighting
- concrete or durable floors with epoxy lining
- mercury spill kit
- proper mercury spill collection pit
- fencing, posts, walls or locked dedicated room in order to limit access
- labelled waste storage site regarding type of waste stored, its quantity, storage duration, and contact details in case of any emergency
- inspection checklist on conditions of the storage area, name of inspector, and date of inspection, and
- a copy of the SDS should be available in the area.

9. Lead Poisoning Prevention tips

Know the health effects and the vulnerable groups

Box 1: Learn about the effects of lead exposure on health

In children, exposure to lead can cause:

- Nervous system and kidney damage
- Digestive problems
- Learning disabilities, attention-deficit disorder, and decreased intelligence
- Speech, language, and behavior problems
- Poor muscle coordination
- Decreased muscle and bone growth
- Hearing damage
- While low-lead exposure is most common, exposure to high amounts of lead can have devastating effects on children, including seizures, unconsciousness, and in some cases, death

In adults, exposure to lead can cause:

- Harm to a developing fetus
- Increased chance of high blood pressure during pregnancy
- Fertility problems (in men and women)
- High blood pressure
- Digestive problems
- Nerve disorders
- Memory and concentration problems
- Muscle and joint pain

Box 2: Learn why children are at increased risk

- Lead is especially dangerous to children under the age of six.
- At this age, children's brains and nervous systems are more sensitive to the damaging effects of lead.
- Children's growing bodies absorb more lead.
- Babies and young children often put their hands and other objects in their mouths. These objects can have lead dust on them.
- Lead is dangerous to a developing fetus, therefore exposure in women of childbearing age should be avoided.
- Women with a high lead level in their system before or during pregnancy risk exposing the fetus to lead through the placenta during fetal development.

9.1 Measures to reduce Lead Exposure if using Lead Bullet Guns or Ammunition

- Don't use lead bullet ammunition, use safer alternatives.
- Avoid melting lead to cast bullets, as the user and children or nearby people can inhale lead fumes, and the environment may be contaminated.
- Never melt lead indoors.
- Avoid high risk practices such as keeping bullets or airgun pellets in your mouth.
- When handling guns or ammunition, use gloves if possible.
- Always wash hands, arms and face after shooting or handling ammunition of any kind.
- If you practise at an indoor shooting range, make sure that it is fitted with proper ventilation and air filtration systems, has handwashing facilities (water, soap and paper towels for drying hands) and is cleaned by wet methods.
- Where there are limited or poor handwashing facilities, use wet wipes (or lead decontamination wipes) if necessary and dispose of them immediately.
- Never, eat, drink, smoke or chew gum while shooting, especially at an indoor range.
- Outdoor shooting ranges are associated with lower levels of lead exposure relative to indoor shooting ranges.
- Change clothing immediately after shooting (before leaving the firing range).
- Wash clothing used at the shooting range separately from the family's clothing.
- Avoid taking children to a shooting range.
- If you are a regular shooter, have your blood lead level tested annually.
- Women of pregnancy age and young children could eliminate or significantly reduce the consumption of game shot ammunition from their diet if there is some uncertainties about the type of ammunition used.

9.2 Measures to reduce Lead Exposure from melting Lead to make Fishing Weights or Sinkers

NB. Melting lead to make fishing weights or sinkers is very dangerous

What can be done to prevent lead exposure from melting Lead to make Fishing Weights:

- Most importantly, try not to melt lead at all.
- If possible, try to make use of safer, non-lead sinkers, such as those made from tin, tungsten, steel or bismuth.
- If it is essential for you to melt lead take care to do so in a safe and well-ventilated place. Do not melt lead inside your home or in a place where children play.
- Children should be kept away while lead is being melted.

- Ensure that children's toys are kept well away from places where lead is melted.
- Work in a well-ventilated area.
- Keep the work area clean, and use water with soap or another detergent to clean dust off work surfaces, walls and floors.
- Protective clothing, such as certain types of dust masks and gloves may help reduce exposure to lead.
- After melting lead, wash your hands thoroughly with soap and water.
- Remove the clothing and shoes worn while melting lead and wash them separately from other clothing. Do not take home clothing worn while melting lead.
- Shower or take a bath after melting lead, and clean the bath or shower cubicle thoroughly before anyone else makes use of it.
- Store your lead fishing sinkers, as well as all equipment and utensils used to melt lead, out of reach of children.
- Never put a lead sinker in the mouth.
- Keep the house clean by using soapy water to mop floors, rather than sweeping with a dry broom. Similarly, dust the house, especially the windowsills, with a cloth soaked in soapy water, rather than with a dry cloth or duster.
- Keep fingernails short and clean, and especially children's fingernails.
- Do not melt lead close to sites where fruit or vegetables are grown.

9.3 Measures to reduce Lead Exposure from Contaminated Soil

- Cover the loose soil in the ground yard surface with lawn surfaces or other suitable affordable means to prevent children from being exposed to contaminated soil.
- Prevent children from playing in dusty areas or in soil, except for a designated sandpit that should be treated and enclosed while not in use.
- Keep the house clean to ensure that there is no dust on floors, furniture and other surfaces inside the house.
- Teach children to wash their hands after playing.
- Educate caregivers on regular washing of children's playing equipment and toys.
- Wipe soil off shoes before entering the house.

9.4 Measures to reduce Lead Exposure from Contaminated Water

- Advise the water service provider on the level of contamination by lead in comparison to acceptable standards, and make recommendations for taking remedial action. Take samples again after the remedial action is instituted, to determine the effectiveness of the remedial action.
- Advise the water service provider on consideration of treatment techniques, such as increasing the pH of acidic waters, to minimise corrosion and reduce leaching of lead in the distribution system.
- Advise the water service provider on consideration of replacing problematic lead piping and other lead-containing fixtures, where appropriate.
- Before drinking tap water, run the tap.
- Regularly clean water tap faucet screens.

9.5 Measures to reduce Lead Exposure from Contaminated Foodstuffs

(A) Agriculture

- If possible, avoid planting food crops near industrial facilities, roadways, and ordinance depots, rifle ranges and military firing ranges, as the soil may contain higher levels of lead.
- Avoid using lands that have been treated with lead arsenate pesticide.

- Consider choosing crops that are less vulnerable to airborne deposition. In areas with high atmospheric lead levels, leafy vegetables are more vulnerable than non-leafy vegetables, or root vegetables to deposition from airborne lead.
- Protect food crops from lead contamination (e.g. exposure to atmospheric lead, soil, dust) during transport to processing facilities.
- Practice good gardening practices for soils with mildly elevated lead levels e.g. mixing organic matter into the soil, and adjusting soil pH to reduce availability of lead to plant.
- Protect water used for irrigation from sources of lead contamination and monitor lead levels to prevent or reduce lead contamination of crops.

(B) Food manufactures

- Choose food and food ingredients, including ingredients used for dietary supplements, that have the lowest lead levels possible.
- Ensure thorough washing of vegetables, particularly leafy vegetables.
- Ensure that the water supply for food processing complies with maximum limits for lead as per SANS 241.
- Use food-grade metals for all metal surfaces that come into contact with food and beverages.
- Do not use lead solder to repair broken equipment in food processing facilities.
- Ensure that lead paint peelings do not contaminate food during food processing.
- Occasionally test incoming raw materials and finished products for lead to verify that control measures are functioning effectively.

(C) Food packaging

- Avoid the use of lead dyes or lead-based printing inks in or outside food packaging materials e.g. brightly colored candy wrappers or food plastic bags or boxes. Even if such wrapping does not come in direct contact with foods, children may be tempted to put the brightly colored wrappers in their mouths. Handling plastic bags or boxes with exteriors treated with lead-based dyes or lead-based printing inks during cooking or reuse by consumers for storing other food items, can cause lead contamination.
- Avoid packing foods for sale in traditional lead-glazed ceramics because these ceramics may leach significant quantities of lead into the foods.

(D) Food consumers (Public)

- Avoid storing foods, particularly acidic foods or foods for infants and children, in decorative ceramic ware, lead crystal, or other containers that can leach lead.
- Wash vegetables and fruit thoroughly to remove dust and soil that may contain lead.
- Avoid eating Calabash chalk known in South Africa as “Choko” to help alleviate morning sickness during pregnancy or for any other reason because the levels of lead in this product are often high (greater than 10 mg/kg).

9.6 Measures to reduce exposure to lead dust and leaded paint

A. Know the leaded paint exposure pathways

Lead-based paint is usually not a hazard if it is in good condition and if it is not on an impact or friction surface like a window.

Lead dust can form when lead-based paint is scraped, sanded, or heated. Lead dust also forms when painted surfaces containing lead bump or rub together.

Activities such as demolition, window replacement, opening up walls, etc., can also release accumulated lead dust into the home. Even after a typical renovation cleanup, dangerous levels of lead dust can remain.

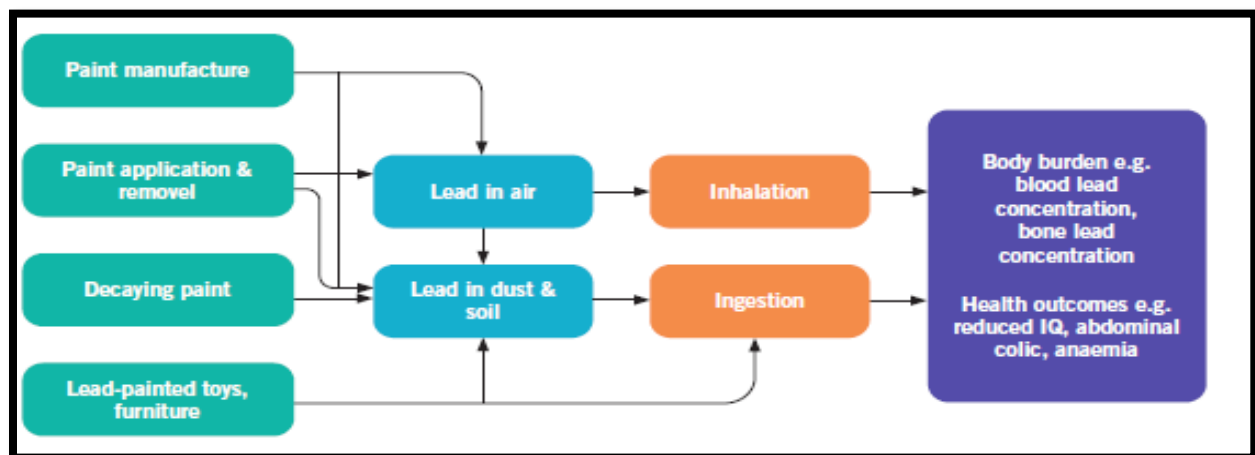
Lead paint chips and dust can get on surfaces and objects that people touch. Settled lead dust can re-enter the air when the home is vacuumed or swept, or when people walk through it.

Box 3: Lead dust and leaded paint exposure pathways

- Lead dust and leaded paint gets into the body when it is swallowed or breathed in.
- People, especially children, can swallow lead dust as they eat, play, and perform other ordinary hand-to-mouth activities.
- People may also breathe in lead dust or fumes while they work on jobs to sand, scrape, brush, blast or otherwise disturb painted surfaces that contain lead paint

Exposure to lead can occur at any stage of the life cycle of lead paint; as the below figure, sourced from WHO and UNEP (2020). Global elimination of lead paint: why and how countries should take action. Technical brief.

Figure 2: Pathways and routes of human exposure to lead from paint



Source: WHO and UNEP. (2020). Technical brief

B. Precautions at home and in childcare facilities

- Always keep painted surfaces in good condition to minimise deterioration.

- Regularly clean floors, windowsills, and other surfaces.
- Take precautions to avoid exposure to lead dust when renovating.
- Make sure children eat healthy, low-fat foods high in iron (e.g. eggs, peanut butter, beans, lentils, oats, breakfast cereals, green leafy vegetables, etc.), calcium (e.g. milk, cheese, yogurt, etc.), and vitamin C (e.g. oranges, other citrus fruits and juices, papayas, spinach, green peas, fish, potatoes, etc.).
- Wash children's hands, bottles, pacifiers, and toys often.
- Do not allow children to chew nails, windowsills, other painted surfaces, or eat soil, suck fingers or put non-food objects in the mouth.
- Do not burn painted wood as the paint may contain lead.
- Do not allow children to play with old batteries and construction materials.
- Keep children's fingernails short.
- Get to know about the lead exposure pathways, vulnerable population, and health effects. Refer to section 9.6A and Box 1, 2 and 3.

C. Practical steps and precautions during do-it-yourself paint renovation

This steps can be practiced when doing DO-IT-YOURSELF paint renovation.

Step 1: Determine the possibility or potential for exposure to lead dust and leaded paint.

- Understand exposure to lead dust and leaded paint, exposure pathways, vulnerable populations, and health effects. Refer to section A and Box 1, 2 and 3.

Step 2: Painting renovation work preparation

- Remove all furniture, rugs, curtains, food, clothing, and other household items until cleanup is complete. Alternatively, items that cannot be removed from the work area should be tightly wrapped with plastic sheeting and all edges and seams sealed with tape.
- Cover floors and other applicable surfaces with heavy plastic sheeting.
- Contain the work area to prevent dust and debris from leaving the work area and ensure that all dust or debris generated by the work remains within the area protected by the plastic.
- Close windows and doors in the work area, however doorways in the work area that are used while the painting renovation is taking place should be covered with plastic sheeting or other impermeable material that allows workers to pass through while confining dust and debris to the work area.
- Close and cover all duct openings in the work area.
- Prevent access to the area by pets, children and other people not engaged in the work.
- Provide the correct personal protective equipment (PPE) (overalls, hat, gloves, effective disposable respirators, disposable shoe covers) for self-protection and to protect other family members from lead exposure.
- If the work is outside, avoid working in high winds, if possible.

Step 3: Health Protection Practices during painting renovation

- Ensure use of PPE (overalls, hat, gloves, effective respirators).
- Ensure no smoking, drinking or eating is allowed in the work area.
- Ensure washing of hands and faces every time painting renovation is stopped, and most importantly before eating.

- When renovating paint, minimise and control the spread of dust by using the right tools and following the practices and precautions listed below:
 - When using a hand tool to stripping old paint, spray water on lead-painted surfaces to keep dust from spreading.
 - Use tools such as:
 - ✓ Low-temperature heat gun (under 1100 degrees Fahrenheit)/(593.4°C)
 - ✓ Chemical strippers without methylene chloride
 - ✓ Power tools with HEPA filter equipped vacuum attachment
 - Avoid open-flame burning or torching, using heat guns at greater than (593.4°C).
 - Avoid paint stripping in a poorly ventilated space using a volatile paint stripper.
 - Avoid sanding, grinding, needle gunning, or blasting with power tools and equipment not equipped with a shroud and HEPA vacuum attachment.
- Clean as you go.

Step 4: Health Protection Practices after the painting renovation work is complete

- Ensure that all tools, other items and people engaged in the renovation are free of dust and debris before leaving the work.
- Work area should be cleaned up daily after the work shift. The area must be cleaned up using special cleaning methods, such as;
 - thorough vacuum of all surfaces and objects in the work area, including furniture and fixtures, with a HEPA vacuum or wipe with a damp cloth.
 - thorough mopping of uncarpeted floors. Use one bucket for the cleaning solution and the other bucket for rinsing. Change the rinse water frequently and replace rags, sponges, and mops often.
- Avoid use of regular household vacuum cleaners as they may release harmful lead particles into the air.
- Ensure washing of hands and faces at the end of cleaning the whole work area.
- Wash work clothes and PPE separately from family laundry.
- All paint renovation waste generated should be collected, sealed and stored in a heavy-duty bag or sheeting. The protective plastic sheeting that was used should also be disposed of, but the dirty side must be folded inward.
- Paint renovation waste stored and transported, must be contained to prevent release of dust and debris.

NB. The information presented is based on current available scientific and technical information. Following the advice given cannot be guaranteed to necessarily provide complete protection in all situations or against all health hazards that can be caused by lead exposure.

Getting Medical Help

- Check and follow the first aid information provided on the label of the product and the SDS.
- If you think someone has been poisoned, call the Poison Information Helpline, at the number below. Keep the Poison Information Helpline number near a telephone at home, childcare centers, schools, HCFs and in the personal mobile phone directory.

- For medical assistance go to your nearest medical doctor, clinic or hospital. A simple blood test can detect lead and is usually recommended for children or other family members who have been exposed to high levels of lead.

Poison information centres in South Africa

Poisons Information Helpline: All hours 24/7: Tel. No: 0861 555 777

Red Cross Children's Hospital Poison Information Centre: Office hours Tel. No: 021 658 5308

Tygerberg Poison Information Centre: Office hours Tel. No: 021 938 9334