Eskom	Procedure	

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COMPILED BY	FUNCTIONAL RESP	SUPPORTED BY	AUTHORISED BY
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Note: This document has been seen and accepted by the ELC and is duly supported by the General Manager Corporate Sustainability, and authorised by the Managing Director Corporate Services Division.

Contents

1 Introduction

Eskom Holdings Limited supports government's commitment to waste reporting and tracking as a means of ensuring the protection of South Africa's environment as defined in the National Waste Management Strategy, government's National Environmental Management Act, and the Waste Management Bill, not excluding other relevant environmental legislation and international agreements to which South Africa is a party.

Effective waste management is pivotal to the well-being of industry, society and the environment. An integrated approach is required to minimise and manage waste and the associated risks in an environmentally acceptable and cost-effective manner. Eskom Holdings Limited will manage waste in a responsible manner through the identification and proactive management of waste. The reduction of waste generation and the conservation of resources must be promoted through judicious resource utilisation, recycling, reuse and the disposal of waste.

In support of the Safety, Health and Environment (SHE) Policy (EPL 32-94) and legislative requirements, it is essential that waste be reported and tracked. Waste reporting must be undertaken in accordance with Annex K: Waste-reporting Requirements, contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

This procedure aims to address the management of all relevant waste streams within Eskom Holdings Limited. It therefore does not relieve any person in any way from any of his/her legal responsibilities in respect of environmentally sound waste management of waste streams not addressed in this procedure. Changing legislative requirements need to be monitored, and reporting procedures modified appropriately.

2 Document content - Requirements

The waste management procedure has the following sections as annexes. Refer to the annexes of this document for more details and waste management requirements.

Annex A	Fluorescent tube and mercury-containing device management
Annex B	Disposal and safe handling of sulphur hexafluoride gas (SF_6) and By-products
Annex C	Polychlorinated biphenyl (PCB) management
Annex D	Oil management
Annex E	Asbestos management
Annex F	Health care risk waste
Annex G	Metals
Annex H	E-waste
Annex I	Solvents
Annex J	Ozone-depleting substances
Annex K:	Waste-reporting requirements, contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249

General Requirements:

- This document takes note of the following national and international agreements:
    - Waste Management Bill for general comment, Notice 1832 of 2007
    - ECA, NEMA, NWMS
    - Basel Convention on the trans-boundary movement of hazardous waste
    - Stockholm Convention on the identification and removal of persistent organic pollutants
    - Kyoto Protocol on the removal of greenhouse gases
    - Montreal Protocol on the removal of ozone depleting substances.

- Permitted/licensed waste disposal facilities must be used.
- All Eskom waste disposal sites must be licensed in line with the latest national legislation (Department of Water Affairs and Forestry/DEAT/other authorities).
- When applicable, environmental impact assessments (EIAs) must be undertaken before establishing waste disposal and storage sites, in accordance with EIA regulations.
- Eskom will, where sustainable, practicable and feasible, use technology that supports waste reduction.
- Standards, operating procedures and guidelines as well as emergency preparedness/ contingency plans for waste management must be implemented at all Eskom business units as part of their management systems.
- Personnel involved in waste management must be appropriately trained in all aspects of waste management, including the requirements of the Occupational Health and Safety Act, No 85 of 1993.
- Appropriate information systems must be implemented to monitor performance relating to sound waste management. This will, as a minimum, include a register of waste types, volumes, and disposal destinations.
- Audits must be conducted at appropriate intervals and include suppliers of goods and services, contractors, and commercial and municipal waste facilities.
- All waste contractors transporting hazardous waste will be required to provide Eskom with a route risk analysis and waste manifest procedure detailing the transportation, type of waste disposed of, quantities disposed of, and how and where the waste was disposed of, and providing a certificate of disposal. The transport of waste must be in accordance with national legislation.
- All records must be maintained in accordance with applicable legislation.
- All waste reporting must be in accordance with Annex K: Waste-reporting Requirements, as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.
- The storage of hazardous waste must be in accordance with the specifications of the DEAT/DWAF requirements.

3 Supporting clauses

Index of supporting clauses

3.1 Scope

3.1.1 Purpose

The purpose of this procedure is to outline the waste management requirements throughout Eskom Holdings Limited, its divisions, subsidiaries and entities wherein Eskom has a controlling interest. All environmental and waste reporting must be in accordance with Annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

3.1.2 Applicability

This Waste Management Procedure EPC 32-245 will apply throughout Eskom Holdings Limited, its divisions, subsidiaries and entities wherein Eskom has a controlling interest.

3.2 Normative/informative references

Parties using this waste management procedure must apply the most recent edition of the documents listed in the Eskom Environmental Procedure: Environmental Control Document EPC 32-96.

3.2.1 Normative

The latest version of all documents must apply:

Eskom Safety, Occupational Health, and Environmental Policy EPL 32-94

Specific references are included in relevant annexes of this document.

3.2.2 Informative

The latest version of all documents must apply:

Eskom Safety, Occupational Health, and Environmental Policy EPL 32-94

Specific references are included in relevant annexes of this document.

3.3 Definition

Refer to the relevant annexes of this document and the procedure - Environmental Procedure: Environment Control Document (EPC 32-96) for the lists of definitive definitions and abbreviations for Eskom's environmental documentation.

3.4 Abbreviations

3.4.1 BCF: Bromochlorodiflouromethane

3.4.2 BTM: Bromotriflouromethane

3.4.3 CFC: Chlorofluorocarbons

3.4.4 CFL: Compact Fluorescent Lamp

3.4.5 CO_2.: Carbon dioxide

3.4.6 CRT: Cathode Ray Tube

3.4.7 CS: Corporate Sustainability

3.4.8 CT: Current Transformer

3.4.9 DEAT: Department of Environmental Affairs and Tourism

3.4.10 DWAF: Department of water Affairs and Forestry

3.4.11 e.g.: example

3.4.12 ECA: Environment Conservation Act

3.4.13 EIA: Environmental Impact Assessment

3.4.14 ELC: Environmental Liaison Committee

3.4.15 etc: etcetera

3.4.16 E-Waste: Electronic waste

3.4.17 GHG: Green house gases

3.4.18 GIS: Gas Insulated System

3.4.19 H:h: Low hazardous

3.4.20 H:H: High hazard

3.4.21 HCFCs: hydrochlorofluorocarbons

3.4.22 HCRW: Health Care Risk Waste

3.4.23 HCW: Health Care Waste

3.4.24 HFCs: Hydrofluorocarbons

3.4.25 Hg: Hectogram (mercury)

3.4.26 HV: High voltage

3.4.27 IARC: Research on Cancer

3.4.28 kg: kilogram

3.4.29 KOH: potassium hydroxide

3.4.30 KPIs: Key Performance Indicator

3.4.31 l: litre

3.4.32 LCDs: Liquid crystal displays

3.4.33 Ltd: Limited

3.4.34 MD: Managing Director

3.4.35 mg: milligram

3.4.36 NEC: neutral earthing compensator

3.4.37 NEMA: National Environmental Management Act

3.4.38 NWMS: National Waste Management Strategy

3.4.39 ODS: Ozone depleting substance

3.4.40 PCB: Polychlorinated biphenyl

3.4.41 POPs: persistent organic pollutants

3.4.42 ppb: parts per billion

3.4.43 PPE: Personal Protection Equipment

3.4.44 ppm: parts per million

3.4.45 PVC: polyvinyl chloride or vinyl

3.4.46 RSA: Republic of South Africa

3.4.47 SA: South Africa

3.4.48 SF_6: Sulphur Hexafluoride

3.4.49 SHE Safety, Health and Environment

3.4.49 TRF: transformer

3.4.50 UV: ultraviolet radiation

3.4.51 vs: versus

3.4.52 VT: Voltage Transformer

3.4.53 WEEC: Waste Electrical and Electronic Equipment

3.4.54 WHO: World Health Organisation

3.4.55 WIS: Waste Information System

3.4.56 WMF: Waste Management Forum

3.4.57: CTAD: Corporate Technical Audit Department

Note: Refer to relevant annexes of this document and the procedure - Environmental Procedure: Environment Document Control (EPC 32-96) for the lists of definitive definitions and abbreviations for Eskom's environmental documentation.

3.5 Roles and responsibilities

3.5.1 Division Environmental Manager is responsible for the development and implementation of procedures specific to the business and for ensuring compliance with this procedure. He or she is also responsible for assuring the MD and the ELC (Environmental Liaison Committee) that appropriate waste management practices are implemented and that relevant auditable waste reporting is taking place.

3.6 Implementation date

The implementation date is August 2007.

3.7 Process for monitoring

The monitoring and maintenance of this procedure must be through the ELC, with annual verification by CTAD against the Eskom ELC Performance Indicator Reporting Procedure EPC 32-249.

3.8 Related documents

Environmental Procedure: Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure, EPC 32-249

Environmental Procedure: Environmental Control Document, EPC 32-96

4 Authorisation

This document has been seen and accepted by:

Name	Designation
PJ Maroga	Chief Executive
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MM Ntsokolo	Managing Director (Transmission Division)
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5 Revisions

Date	Rev.	Remarks
June 2006	0	New document in terms of policy review process
August 2007	0	EDC ISO formatted

6 Development team

This document was developed by the Waste Management Forum (WMF) members, with input from the Environmental Liaison Committee (ELC).

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Annex A
(informative)

Management of Fluorescent Tubes, Compact Fluorescent Lamps (CFLs) and Mercury-Containing Devices

A.1 Introduction

Fluorescent tubes contain small quantities of mercury, cadmium and antimony, and proper disposal throughout Eskom is essential. It should also be realised that lack of knowledge does not imply "no liability".

CFLs contain an average of 5mg of mercury (Hg) per lamp as an essential ingredient for the generation of light. Mercury is a bioaccumulative toxicant that is easily absorbed through the skin, respiratory and gastrointestinal tissues and should therefore be treated as a hazardous substance or waste type.

The efficiency with which CFLs transform electricity into light, the extended lamp hours compared to incandescent lamps and the associated environmental benefits (which includes reduced mercury emissions from coal-fired power stations resulting from energy efficiency) justifies the use of mercury containing lamps.

Furthermore, the use of mercury within the CFL offers an opportunity to keep the mercury contained for responsible disposal or preferably, if facilities are available, to reclaim the mercury for re-use.

Currently South Africa has limited legislation and infrastructure to accommodate CFL disposal from domestic use.

If not correctly disposed of, the mercury may leach through landfills and end up in groundwater. Small amounts of mercury can contaminate a sizeable water supply, thereby endangering water users. Compounds are chemically stable, thus do not readily break down over time.

Mercury is an essential compound in fluorescent lamps, high-pressure sodium lamps and other lighting devices. Lamp manufacturers use mercury because it is cheap, plentiful and conducts electricity with great efficiency. However, the mercury vapour that is released into the environment when lamps are broken, or disposed of in a landfill, or incinerator causes a problem. The toxic metal vapour will contaminate the air, soil, surface water and groundwater. Despite the fact that the fluorescent tubes contain mercury, their use as a consumer product still makes environmental sense. They are three to four times more efficient than incandescent light bulbs, thus much less electricity is required to operate them. This translates into less air pollution from power plants *(The Mercury Menace-http://www.portland.commercury/).*

Fluorescent tubes and lamp ballasts are found throughout the environment in residences and commercial buildings. However, because of their mercury content, their disposal can create hazardous waste. According to the information presented by the main suppliers and internet searches, the quantity of mercury in fluorescent tubes varies from approximately 2 mg to > 40 mg per lamp *(RES/RR/99/00098).*

A.2 Purpose

The purpose of this section is to communicate a standard environmental approach, in accordance with the relevant legislation, to the safe handling and disposal of fluorescent tubes and ballasts by both Eskom and any contractor providing services to Eskom.

All waste reporting must be done in accordance with annex K: Waste-reporting Requirements as contained in the Eskom ELC Performance Indicator Reporting Procedure EPC 32-249.

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(continued)

A.3 Abbreviations and definitions

Hg: Mercury

A.4 Health effects

Mercury (Hg) is the only metal in a liquid form at room temperature. The major source of human exposure to mercury is through the consumption of contaminated fish and fish products via a process of bio-accumulation in these aquatic organisms. Mercury vapour can be absorbed through inhalation. The lungs are the primary target organ of acute respiratory exposure. Once absorbed, mercury, in all forms, is distributed via the blood stream to all tissues in the body. This is only critical when the mercury is in a concentrated form. Exposure to very high concentrations of mercury vapour for brief periods can cause symptoms such as respiratory difficulties, chest pains and inflammation of the mouth. The primary reason for mercury being a toxicological problem is the fact that it accumulates in the body and therefore increases in concentration as it gets consumed up the food chain. Another route of mercury exposure is via skin absorption (handling mercury without gloves or long sleeves) and ingestion (eating without washing hands). The target organs also include the central nervous system and the kidneys.

The hazardous waste classification of mercury can be obtained in the Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste, as published by the Department of Water Affairs and Forestry (DWAF) (second edition, 1998) or latest version.

Employees handling the disposal of used tubes and lamps must have the proper equipment and training to comply with legislative requirements. Crushing activities must be restricted to a dedicated, demarcated area. Proper ventilation is required. Appropriate breathing apparatus and safety gloves must be worn by the operator at all times. Full-face protection must be worn to prevent eye injuries.

A.5 Requirements

A.5.1 Eskom-owned sites

Bulk or large quantities of fluorescent tubes from business premises or industries must be disposed of at a registered hazardous waste site. All Eskom sites that produce bulk fluorescent tubes should invest in a crushing facility as this contributes to waste minimisation, and is economically more viable as the disposal of untreated whole tubes is a more expensive option. Please refer to management options for further information relating to disposal and handling.

Smaller numbers of tubes can be stockpiled for a period of no longer than three (3) months before being crushed at a central crushing facility, or disposed of whole at a registered hazardous waste disposal site.

A.5.2 Non-Eskom sites

The building owner is responsible for the disposal of the used fluorescent tubes. This disposal should be covered in the lease agreement, and the responsible Eskom person must confirm that such disposal is in accordance with legal and other requirements.

A.6 Management option

Fluorescent tubes and lamp ballasts are found throughout the environment and can create hazardous waste because of their mercury content. Hazardous waste must be handled by either a treatment, a storage, a disposal or a recycling facility.

Annex A
(concluded)

The following options are available for the management of fluorescent tubes:

A.6.1 Crushing

The crushing of whole fluorescent tubes contributes to waste minimisation and is economically more viable, as the disposal of untreated whole tubes is much more expensive due to the volume of tubes to be disposed of. To contribute to waste minimisation and ensure that the mercury is adequately immobilised, the preferred specifications for a tube crushing unit/facility include: a water spray to facilitate the rapid condensation of mercury vapours, thereby reducing the amount of hazardous mercury vapours produced; crushing units must be situated in well-ventilated areas and personnel must be equipped with the necessary safety equipment, including breathing apparatus; the crushed tubes must be treated with an equivalent amount of sodium sulphide to immobilise the mercury before disposal at a registered hazardous waste disposal site.

At a number of sites Eskom has, tube-crushing units, which are operated to reduce the volume of hazardous waste and the disposal costs. The crushed tubes are contained in a 210 litre drum with a suitable lid and locking device. When the drum is full, the content is treated with an equivalent amount (50:50) of sulphur and sodium sulphide before disposal at a registered hazardous waste disposal site. This is the recommended option for use within Eskom.

A.6.2 Incineration

Due to the emission and dispersal of mercury vapours over large areas, this option is not recommended for Eskom at this stage.

A.6.3 Recycling

Recyclers separate the tubes into their component materials such as glass, metal, phosphor powder and mercury in order to recycle or reuse these materials. Fluorescent tubes can be recycled to reclaim 80 % glass and 15 % aluminium and other metals. Due to the lack of mercury recovery facilities in South Africa, the re-utilisation of mercury is not an option currently.

A.6.4 Disposal

The acceptable risk level for mercury is 0.9 ppb (0.0009 mg/kg or mg/l) for disposal at an H:H waste site. Mercury may only be disposed of at an H:h site if the concentration in the waste is less than 0.0009 ppb ($9x10^{-6}$ mg/kg or mg/l) and the mercy component is less than 1 % of the total waste stream.

Fluorescent tubes collected in large quantities are considered as extremely hazardous waste, since they contain approximately 2 mg/kg of mercury. Mercury in large quantities or bulk must be disposed of at a registered hazardous waste disposal site.

A.6.5 Reference

- The Mercury Menace-http://www.portland.commercury/

Annex B
(informative)

Disposal and safe handling of Sulphur Hexafluoride Gas (SF_6) and its by-products

B.1 Introduction

Sulphur hexafluoride (SF_6) is a colourless, odourless, non-flammable gas which is primarily used in the electrical and electronics industry as insulation in switchgear and circuit breakers commonly referred to as gas-insulated switchgear (GIS). SF_6 has been identified as a greenhouse gas (under the 1997 Kyoto Protocol) which is 22 500 times more effective in trapping infrared radiation than an equivalent amount of CO_2.

Sulphur hexafluoride gas is widely used in switchgear installations as an insulating and arc-extinguishing (quenching) medium. The potential hazards associated with SF_6 and its by-products are described in this procedure.

B.2 Purpose

The purpose of this section is to communicate and ensure the safe handling and disposal of SF_6 gas and/or its by-products.

All waste reporting must be in accordance with annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

B.3 Abbreviations and definitions

SF_6: Sulphur hexafluoride

CO_2: Carbon dioxide

B.4 Health effects

Pure sulphur hexafluoride is non-toxic. It can act as a simple asphyxiant by displacing the amount of oxygen in the air necessary to support life. Inhalation of 80 % SF_6 and 20 % O_2 for five (5) minutes can produce peripheral tingling and some altered hearing. Inhalation of SF_6 gaseous decomposition products, on the other hand, can lead to serious health complications.

SF_6 leakage management procedure:

In the event of an SF_6 leakage:

- Evacuate the affected areas and report any incident to the Risk Manager of the unit/area immediately.
- Remove sources of heat and electrical arcing. Provide adequate ventilation by ventilating the area until the air/oxygen levels are normal (a minimum volume of 18 % O_2).
- Carry out air quality monitoring with calibrated measuring equipment.
- Emergency personnel must use self-contained breathing equipment when entering areas where leaks have occurred. Remove leaking containers or cylinders outdoors into an open area with good ventilation. Allow gas to discharge at a moderate rate.
- Defective cylinders must be tagged as defective. Close valve after gas discharge.

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(continued)

Precautions during a major leak of SF_6 gas

- Sulphur hexafluoride is more than five times heavier than air; asphyxiation is a possibility in low-lying, confined spaces where this heavy gas can become concentrated and displace normal air. Enter these areas with appropriate caution.

- All persons entering the area must wear self-contained breathing apparatus.

The decomposition/by-products of SF_6 poses the following hazards:

B.4.1 Disulphur decafluoride (S_2F_{10}) is the most toxic but least understood product. It is odourless and non-irritating to the respiratory tract. It has a low melting point and is insoluble in water. It can be fatal at levels higher than 0.025 ppm in air.

B.4.2 Thionyl fluoride (SOF_2) is soluble in hot and cold water to produce toxic corrosive vapours. The gas is irritating to the skin, eyes, mucous membranes and lungs.

B.4.3 Sulphuryl fluoride (SO_2F_2) is a colourless and odourless gas. It is soluble in cold water and reacts to emit toxic and corrosive vapours. It may act as a narcotic at high concentrations. Oral exposure may cause death or permanent injury.

B.4.4 Hydrogen fluoride (HF) is highly corrosive. Contact can cause severe burns to the eyes, skin and respiratory tract. It can penetrate the skin and destroy deep tissue layers as well as bone.

B.4.5 Aluminium trifluoride (AlF_3) is a colourless, solid substance. It forms part of the white powder deposit which can be found in electrical apparatus; in particular the breaking chambers of switchgear. It causes irritation of the skin and eyes.

B.4.6 Hydrogen sulphide (H_2S) has an odour similar to that of rotten eggs. It can cause eye irritations at relatively low levels, while it can be fatal at high concentrations.

B.4.7 Carbon tetrafluoride (CF_4) is a colourless, odourless and non-flammable gas. It is narcotic and can act as an asphyxiant.

B.4.8 Sulphur tetrafluoride (SF_4) is a colourless gas with an odour similar to that of sulphur dioxide. It is very toxic and deadly at concentrations over 0.1 ppm in air.

B.4.9 Sulphur dioxide (SO_2) is a colourless, non-flammable gas with a strong suffocating odour. The gas is oxidised in water to form sulphurous acid, which can be further oxidised to sulphuric acid. The gas is fatal at concentrations over 2 ppm in air. It is also irritating to the eyes, skin and respiratory tract, mainly because it is an acidic gas.

B.5. Requirements

B.5.1 A minimum of two (2) persons must enter an affected area and they must be fully equipped with protective equipment. A third person, fully equipped with protective equipment, must be on standby at the entrance of the area for purposes of emergency rescue.

B.5.2 Smoking, drinking and eating are prohibited in affected areas, since inhalation or ingestion of toxic by-products or decomposition products can occur. Avoid wiping the eyes, nose or face other than with clean paper tissue.

B.5.3 The use of protective equipment is compulsory.

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(continued)

B.5.4 Emergency showers and ablution facilities must be provided at power stations and substations where an extensive GIS (gas-insulated system) is employed, e.g. Croydon, Craighall, Drakensberg, Alpha, Beta, Invubu and Koeberg.

B.5.5 All SF_6 (GIS) plants and storage areas must have a clearly visible safety sign at the entrance identifying the plant as an SF_6 plant. Signs indicating the following must also be provided:

- Prohibiting smoking during maintenance work or emergencies
- The location of protective equipment (respiratory protection)
- Warnings that when plant fails or where maintenance work is being done on switchgear, SF_6 gas and its by-products are hazardous, and that protective equipment must be used (e.g. spilling, burning through, maintenance)
- The location of an emergency shower
- A notice stating that enclosed and lower-situated areas must be ventilated when emergencies occur.

B.5.6 All safety signs must comply with the requirements of SANS 0140, Parts 1 and 2, and the colours must comply with SANS 1091.

B.5.7 Inspection, handling, storage, transport, use and marking of SF_6 metal containers

Sulphur hexafluoride (SF_6), a high-pressure liquefiable gas, is kept in Class 1 containers. Cylinders must be inspected, handled, stored, transported and used in accordance with the requirements set out in SABS 019.

B.6 Management options

B.6.1 Cylinder marking

SF_6 cylinders are supplied to Eskom by the gas suppliers such as Afrox, Fedgas (now operating as Messer) and Air Products, with testing markings, volume and mass capacities and serial numbers stamped on the cylinder shoulder to indicate quality testing. Identifying colours are pink and green, with a silver shoulder cap.

B.6.2 Disposal of empty cylinders (B49-SABS 0140)

SF_6 cylinders are classified as Class 1 - Seamless steel containers. Only refilling with SF_6 gas is allowed. The re-use of cylinders for any gas other than SF_6 or any other purpose, is subject to the prior approval of the Department of Labour and compliance with the requirements of SABS 019. Cylinders should be returned to the supplier when empty.

B.6.3 Disposal of solid SF_6 by-products or decomposition products

The solid SF_6 by-products or decomposition products are treated with calcium chloride ($CaCl_2$ $6H_2O$) or sodium bicarbonate ($NaHCO_3$) to form a non-toxic end product. Disposal of hazardous waste must be done at permitted/licensed facilities.

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B.6.4 Thermal destruction

Destruction of redundant SF_6 cylinders may be done using thermal de-sorption. Only DEAT-approved facilities may be used for this activity.

B.7 References

TRMPVAES6 - Procedure for Topping Up SF_6 For Gas Insulated Switchgear (GIS)

TRMPVADX8 - Sprecher and Schuh Hgf 100/200 SF_6 Circuit Breakers Maintenance Manual

NRS 087:2006 **-** guidelines for the management of SF_6 (sulfur hexafluoride) for use in electrical equipment

Annex C
(informative)

Polychlorinated Biphenyl (PCB) Management

C.1 Introduction

Polychlorinated biphenyls are synthetic liquids with exceptionally high chemical and thermal stability. PCBs were mainly utilised as substitutes for mineral oil in high-powered electrical equipment to enhance thermal resistance. Their characteristics make them non-biodegradable, bio-accumulative and persistent organic pollutants (POPs) under the Stockholm Convention.

PCB is the generic term for a broad class of fire-resistant synthetic insulating liquids. PCBs comprise a family of 209 chemical compounds, commonly referred to as congeners, for which there are no known natural sources. PCBs are soluble in most organic solvents, but insoluble in water. It is denser than water. Most PCB mixtures are non-volatile at around 40 ℃, with a flash point in excess of 300 ℃.

PCBs are found in equipment manufactured to intentionally contain them or which contains them due to accidental mixtures with uncontaminated oils through processes such as oil filtration, top-ups, regeneration or oil replacement. An inventory is the starting point for the identification of management options to deal with PCB-containing materials. The purpose of the inventory is to identify and record all equipment or material that (might) contain PCBs. This information is essential in compiling a plan for replacement/disposal.

PCBs had been commercially produced as complex mixtures since 1929, but production ceased in 1976 when it became evident that PCBs were environmental contaminants. The sale and use of PCB has been banned in various countries since 1977.

South Africa is a party to several international agreements on the proper management of PCBs and their end-of-use and destruction within specified timeframes. These agreements include UNEP's 2001 Stockholm Convention on Persistent Organic Pollutants and the 1989 Basel Convention on Trans-boundary Movement of Hazardous Waste. With regard to the elimination of the use of PCBs in equipment (e.g. transformers, capacitors or other receptacles containing liquid stocks) the Stockholm Convention outlines specific requirements with respect to the management of their phase-out by 2025.

The Stockholm Convention (2001) states that with regard to the elimination of the use of polychlorinated biphenyls in equipment (e.g. transformers, capacitors or other receptacles containing liquid stocks) by 2025, action should be taken in accordance with the following priorities, subject to review by the Conference of the Parties:

(a) Making determined efforts to identify, label and remove from use equipment containing more than 10 percent polychlorinated biphenyls and volumes greater than 5 (five) litres

(b) Making determined efforts to identify, label and remove from use equipment containing more than 0.05 percent polychlorinated biphenyls and volumes greater than 5 (five) litres

(c) Endeavouring to identify and remove from use equipment containing more than 0.005 percent polychlorinated biphenyls and volumes greater than 0.05 litres.

Consistent with the priorities stipulated above, the following measures must be promoted in order to reduce exposure and risks and to control the use of polychlorinated biphenyls:

(a) Use only in intact and non-leaking equipment and only in areas where the risk from environmental release can be minimised and quickly remedied.

(b) Do not use in equipment in areas associated with the production or processing of food or feed.

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(continued)

(c) When used in populated areas, including schools and hospitals, all reasonable measures must be taken to protect the equipment from electrical failure which could result in a fire, and regular inspection of equipment for leaks must be done.

(d) PCB may not be exported or imported, except for the purpose of environmentally sound waste management.

(e) Except for maintenance and servicing operations, its recovery for the purpose of reuse in other equipment with a polychlorinated biphenyl content above 0.005 percent (50 ppm) is not allowed

(f) Make determined efforts designed to lead to environmentally sound waste management of liquids containing polychlorinated biphenyls and equipment contaminated with a polychlorinated biphenyl content above 0.005 percent (50 ppm) as soon as possible but not later than 2028, subject to review by the Conference of the Parties

(g) Endeavour to identify other articles containing more than 0.005 percent (50 ppm) polychlorinated biphenyls (e.g. cable sheaths, cured caulk and painted objects) and manage their safe disposal

(h) Provide a report every five (5) years on the progress of eliminating polychlorinated biphenyls and submit it to the Conference of the Parties

C.2 Purpose

The purpose of this section is to communicate a standard environmental approach to the safe handling, storage and disposal of materials contaminated with polychlorinated biphenyl, including oil, capacitors, soil, etc., by both Eskom and any contractor in fulfilment of the requirements set by Eskom, the Department of Water Affairs and Forestry, the Department of Environmental Affairs and Tourism, and the Stockholm Convention on Persistent Organic Pollutants.

All waste reporting must be in accordance with annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

C.3 Abbreviations and definitions

PCB: Polychlorinated biphenyls

C.4 Health effects

A study of the health and environmental impacts of PCBs was undertaken by the United Nations Environmental Programme. The key findings of the UNEP study are summarised below.

Bio-accumulation of PCBs in organisms

- PCBs are easily absorbed through the skin, inhalation, etc. by humans and animals and remain in the fatty tissue, where they tend to accumulate. More than 90 % of ingested PCBs cross the intestinal walls and are retained in the organism. PCBs are generally stored in the liver.

Carcinogenicity of PCBs

- Epidemiological studies have shown no significant increase in the incidence of cancer among individuals exposed to PCBs. Skin cancer, liver tumours and leukaemia have been attested; however, scientific analyses have failed to establish a link between increased skin and pancreatic cancer rates and occupational exposure of the victims to PCBs.

Annex C
(continued)

- The International Agency for Research on Cancer (IARC), which is part of the World Health Organisation (WHO), measures the carcinogenic risk of various chemicals and classifies them in two groups:
    - Those which are “carcinogenic to humans” – Group 1;
    - Those which are “potentially carcinogenic to humans” – Group 2.
    - Group 2 is further subdivided into groups A and B:
    - For Group 2A, evidence of carcinogenicity is “fairly well established”;
    - For Group 2B, evidence is less well established.
    - PCBs are classified as Group 2B.
    - The airborne limit of permissible exposure is 1 mg/m^3 (42 % chlorine) and 0.5 mg/m^3 (54 % chlorine) over eight (8) hours of exposure

C.5 Requirements

All waste reporting must be in accordance with annex K: Waste--reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

C.5.1 PCB classification

C.5.1.1 Mineral insulating oils tested for the presence of PCB must be classified according to the PCBs content of the oil.

C.5.1.2 The oil must be classified in terms of one of the levels in Table 1.

Table 1: Classification of mineral insulating oils

1	2	3
PCB content levels mg/kg	**PCB level**	**PCB levels, common names**
Undetectable	0	PCB-free materials
1 - 10	1	Non-PCB materials
11 - 20	2	
21 – 50	3	
51 - 500	4	PCB-contaminated materials
> 500	5	PCB materials

C.5.1.3 Any equipment or items (capacitors, transformers, etc.) that are sealed and intentionally filled with PCBs, with the PCB concentration unknown, must be handled and managed as PCB level 5.

Annex C
(continued)

C.5.2 PCB labelling

C.5.2.1 Equipment or any containers that contain or come into contact with mineral insulating oils classified in accordance with Table 1 must be labelled with visible, indelible markings in accordance with SANS 0290: Mineral insulating oils – Management and Handling of Polychlorinated Biphenyl (PCB).

C.5.2.2 In the case of it being established that sealed equipment is PCB-contaminated, equipment with the same/similar risk profile must be labelled and handled as PCB-contaminated.

C.5.2.3 The appearance and dimensions of the labels for each particular PCB level must be identical and in accordance with those stipulated in annex C of SANS 0290: Mineral insulating oils – Management and Handling of Polychlorinated Biphenyl (PCB).

C.5.2.4 In addition to the labelling required, information pertaining to the disposal of PCBs and the maintenance and use of equipment that contains PCBs must be available.

C.5.3 PCB storage and transportation

Storage and transportation must comply with relevant and the latest applicable legislation. A designated area or a facility in a designated area must be established for the temporary storage of PCB-contaminated and PCB electrical equipment/insulating oil destined for disposal. This temporary storage must be properly secured and marked in accordance with the national requirement detailed in DWAF's Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste, Section 10: Waste Handling, Storage and Transportation, Subsection 10.2 Collection and Storage, or the latest version. The storage period must be in line with legislation.

C.5.4 PCB-contaminated equipment testing and inventory

Divisions must test equipment for PCB content and compile an inventory as per the latest template.

	Total number owned	**Not tested**	**Tested/status**				**Number labelled**	**Number not labelled**	**Litres of PCB**
			0 – 19 ppm	**20 – 49 ppm**	**50 – 499 ppm**	**>500 ppm**			
No of TFRs (HV yard & storage, spares)									
Litres of contaminated oil (under status									
No pole-mounted TFRs									
Litres of contaminated oil (under status									

Annex C
(continued)

C.5.4 PCB-contaminated equipment testing and inventory (cont.)

	Total number owned	Not tested	Tested/status				Number labelled	Number not labelled	Litres of PCB
			0 – 19 ppm	20 – 49 ppm	50 – 499 ppm	>500 ppm			
No capacitors									
Litres of contaminated oil (under status									
No NEC									
Litres of contaminated oil (under status									
No VTs									
Litres of contaminated oil (under status									
No CTs									
Litres of contaminated oil (under status									
Other									
Litres of contaminated oil (under status									
TOTAL VOLUME									

Annex C
(continued)

C.5.5 PCB-contaminated equipment phase-out plan

Divisions must develop phase-out plans as per the latest template.

Criteria for PCB phase-out

1. Maintenance
   - Technical performance
   - End of useful life
   - Equipment replacement
2. Environmental risk
3. Stockholm requirements

Division: _____

Region: _____ Compiled by: _____

Equipment type	Level of PCB concentration	Location (substation, power station, power line)	Serial number	Criteria for phase-out	Proposed phase-out 0 < 20 PPM	Proposed phase-out > 50 PPM
Transformer						
Pole-mounted TFR						
Minisub TFRs						
Capacitor cans						
NEC (neutral earthing compensator)						
VT (voltage transformer)						
CT (current transformer)						
Breakers						
T-switches						
Metal-clad switchgear						
Other						

Current disposal method(s): _____

Current facility used for disposal: _____

Date(s) of disposal since 2000: _____

Where can certificates be obtained? _____

Annex C
(continued)

C.6 PCB management options

Disposal will only be undertaken by disposal or decontamination facilities approved and licensed by DEAT/DWAF.

PCB-contaminated materials containing >500 parts per million (ppm) will NOT undergo de-contamination (these will typically be found in capacitor cans and are commonly referred to as Askarel). These materials will undergo destruction at a licensed thermal destruction facility and will not be land-filled in its PCB state.

Oil removed from service for purposes of disposal must be placed in approved drums for placement in approved storage areas. The PCB levels in each individual drum must be determined and the drums must be labelled accordingly. Drums of oil containing PCB >50 ppm but <300 ppm must be disposed of by means of decontamination. In order to phase out PCB-contaminated oil from the Eskom insulating oil pool, the following action will be taken:

- Equipment containing insulating oil with a PCB content greater than (>) 500 parts per million (µl/l or ppm) will be drained and the oil replaced with oil containing between 0 and 50 ppm. The oil removed from the unit will need to be destroyed by a licensed PCB destruction process.

- Equipment containing insulating oil with a PCB content between 50 and 499 ppm and undergoing major repairs (e.g. the unit is removed from site) or repairs on site during which the oil is removed from the unit will be refilled with oil between 0 and 50 ppm. The oil removed from the site will be re-processed to remove the PCB by a licensed PCB removal method.

- New equipment will be filled with insulating oil with a non-detectable PCB content.

- Units that were in a workshop will preferably be filled with oil containing 0 – 50 ppm, providing that the equipment's previous PCB classification is not exceeded. (The oil used should not be of a PCB level greater than the previous level of contamination, e.g. a transformer containing oil of 30 ppm must be filled with oil containing less than 30 ppm.)

- All oil of 0 – 50 ppm will remain in the system (oil pool), but oil placed in a transformer may not increase the level of the initial PCB classification.

- Reclassification of a transformer (retesting for PCB) must occur three (3) months after oil replacement, and in the case of failure (within the three (3) months), the oil must be retested before scrapping/disposal.

The decontaminated oil will only be used by informed users. The purchaser must enquire about the origin of the regenerated oil and it is the responsibility of the vendor/retailer to inform the user.

Polychlorinated biphenyls (PCBs) from ballasts

Some fluorescent lamp ballasts may contain PCBs. PCBs are banned substances and include a family of man-made chemicals that contain 209 individual compounds. In fluorescent fixtures, PCBs were usually found in ballasts, either within small capacitors or in the form of a black tar compound. PCBs were banned from manufacture in 1979, as evidence indicated that they accumulate in the environment and are detrimental to human health.

The following should be used to determine if ballasts contain PCBs: All ballasts manufactured before 1979 may contain PCB. Ballasts manufactured after 1979 that do not contain PCBs are labelled "NO PCB". If a ballast is not labelled "NO PCB", assume that it contains PCBs (ballasts can operate for 20 years or more).

Annex C
(concluded)

C.7 References

SANS 0290: 2006 Draft Editions 1: Mineral Insulating Oils – Management and Handling of Polychlorinated Biphenyl (PCB). This standard covers the requirements, classification, labelling, handling, storage, transportation, decontamination and disposal of PCB-contaminated oil. It also covers management provisions for the phase-out of the use of PCB-contaminated mineral insulation oils.

NRS 085-1 *(draft):* 2004 Polychlorinated Biphenyl Management Part 1: Guidelines for the Development of a PCB Phase-out Plan for Inhibited and Uninhibited Insulating Oils.

NOTE: The above-mentioned documents will become the national standards for PCB management once published.

Annex D
(informative)

Oil Management

D.1 Introduction

Due to the strategic nature of insulating oil in Eskom equipment, aspects such as usage, handling, storage, transport and general control of this commodity need to be carefully managed. Macro political factors necessitated Eskom to purchase and maintain large volumes of oil as strategic stock. The issuing and receiving of all used and regenerated oil were managed centrally. This management system was effective. However, due to the ever-changing business needs, the opening of world markets to South Africa and the influx of oil operators, these processes were modified to ensure the desired quality.

Insulating oil originates as a fossil fuel (crude oil) and may be classified as napthenic, parrafenic or aromatic, depending upon relative proportions of these compounds. Eskom has standardised the use of uninhibited napthenic insulating oil in electrical equipment. This oil is also often referred to as a mineral oil.

Insulating oil and other related hydrocarbon compounds pose a serious pollution problem once released into the environment. Not only do these compounds pose a fire hazard, but with 1 (one) litre of oil having the potential to contaminate in excess of a million litres of water, it needs to be handled with care. Oil may rapidly penetrate certain soil types, which may lead to extensive environmental as well as groundwater and surface water contamination.

D.2 Purpose

Numerous factors such as unscrupulous oil handlers, processes, pricing decisions, the definition of and terminology regarding insulating oil as well as inappropriate handling resulted in the contamination of Eskom's oil pool. This has had an adverse effect on the expected life of the equipment. The purpose of this section is to communicate and ensure the correct handling, storage, transportation and disposal of mineral insulating (transformer) oil.

All environmental and waste reporting must be in accordance with Eskom's Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

D.3 Abbreviations and definitions

PCB: Polychlorinated biphenyls

D.4 Health effects

Toxicological information on mineral transformer oils is as follows:

D.4.1 Inhalation

Only at elevated temperatures excessive concentrations may cause nervous system depression, headache and weakness leading to unconsciousness.

D.4.2 Skin contact

Prolonged or repeated contact may cause the skin to become dry or cracked.

D.4.3 Eye contact

Causes eye irritation.

Annex D
(continued)

D.4.4 Ingestion

Swallowing of this material may result in health problems (pneumonia due to aspiration).

Control of exposure to the occurrences set out above can be obtained by using appropriate personal protective equipment. Refer to NRS 079-2, Appendix 1 for the full material safety data sheet for transformer oil.

D.5 Requirements

Management requirements must be as listed in the NRS 079-2 document entitled: Mineral insulating oils (uninhibited) – Purchase, management, maintenance, testing and safe disposal.

D.6 Management options

The disposal of mineral oil is governed by the following factors:

D6.1 PCB contamination levels

Oil draining/leaking from equipment that has not been tested previously for PCB must be tested for PCB.

- Pure PCB as well as redundant PCB equipment must be disposed of as hazardous material at licensed facilities.

D.6.2 Acid content

All used insulating oil removed from equipment, including all switchgear oil, has an acidity level of 0.2 mg KOH/g oil.

D.6.3 Synthetic fluid and other solvent contamination

All insulating oil removed from any electrical equipment for inclusion in the Eskom oil pool will be tested for the presence of contaminants such as solvents and synthetic oils, including electrical cleaner, silicone oil and motor oils.

D.6.4 Levels of metal, carbon and particulate contamination

All used oil not suitable for regeneration will be sold as scrap oil or to be used as fuel oil. This includes oil removed from electrical equipment with an acidity of more than 0.2 mg KOH/g oil and/or containing contaminants such as synthetic fluids and PCB.

NOTE: The above will be determined by means of analysis.

Disposal of insulating oil will be handled by Eskom's Assets Disposal section.

- PCB-contaminated and PCB oil will be disposed of as per the criteria set out in Annex C of this document. The asset owner will be liable for the costs incurred for the destruction.

- Scrap oil will be sold on the open market as a burning fuel, and not as insulating oil. This is to prevent the oil from re-entering the system.

NOTE: Re-usable oil should always be retained for re-use in Eskom.

Annex D
(concluded)

D.7 References

- The Eskom Insulating Oil Manual: http://teknowrep.eskom.co.za/Ins_Oil_Manual/Default.htm
- NRS 079-1: Mineral insulating oils (uninhibited) – Purchase, management, maintenance, testing and safe disposal.

Annex E
(informative)

Asbestos Management

E.1 Introduction

This annex only deals with the disposal of asbestos and asbestos-containing materials, equipment and articles. For more information on the general management of asbestos and the safe processing, storage, removal and handling of asbestos-containing materials, equipment and articles, the Eskom procedure ESKPVAAG5 (or its latest revision) should be used.

E.2 Purpose

The purpose of this section is to highlight management requirements that relate to Annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

E.3 Abbreviations and Definitions

Eskom procedure ESKPVAAG5 or its latest revision should be used *(under revision)*

E.4 Health effects

For more information on the general management of asbestos and the safe processing, storage, removal and handling of asbestos-containing materials, equipment and articles, the Eskom procedure ESKPVAAG5 (or its latest revision) should be used.

E.5 Requirements

All waste management and waste reporting must be in accordance with annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

For more information on the general management of asbestos and the safe processing, storage, removal and handling of asbestos-containing materials, equipment and articles, see the latest version of the Eskom procedure stated above.

E.6 Management options

All asbestos and asbestos-containing material must be disposed of only at registered waste disposal sites specifically designated for this purpose in terms of the Environment Conservation Act, 73 of 1989, or the latest waste legislation. Where such a registered site for asbestos dumping is not locally available, the employer must apply to DEAT/DWAF in writing before negotiating with any site owner.

Only after a suitable site has been allocated by the department will the detailed arrangements of asbestos disposal be agreed upon with the appropriate site owner.

Asbestos-containing waste must be deposited in such a manner as to minimise dust dispersion and the need for further disturbance of the waste. The permit conditions for each site must be adhered to. The waste must be covered with at least 200 mm of topsoil, or sand, or other suitable material capable of forming a seal to prevent the dispersion of dust. No asbestos waste should be left uncovered at the end of a workday.

All used air filters from vacuum cleaners, air conditioners and ventilation equipment containing asbestos, must be stored in impermeable bags or similarly effective containers. These containers must be sealable for disposal (the outside of all containers must be cleaned before leaving the workplace).

Annex E
(concluded)

Liquids or sludge containing asbestos must be collected in collecting tanks, from where it may be pumped into sealable drums, or closed-type tankers for transit to the waste disposal site. Transport and disposal must take place in such a way that there is no risk of the material drying out before it has been disposed of and covered as provided for above.

High-density materials such as asbestos cement products and sheets containing asbestos are not likely to release asbestos dust when handled by hand. However, a hazard may arise if the waste is subjected to pounding by vehicles passing over it, or tipping from the vehicles, therefore these should also be covered.

The employer concerned with the collection, transport and disposal of asbestos waste is responsible for complying with the provisions of the Occupational Health and Safety Act, the National Road Transport Act, SANS 0228 and the relevant regulations.

E.7 References

Eskom procedure ESKPVAAG5: Requirements for the Safe Processing, Storing, Removing and Handling of Asbestos and Asbestos-containing Materials, Equipment and Articles.

Annex F
(informative)

Health Care Risk Waste

F.1 Introduction

The requirements of this section should be followed for the management of health care risk waste (medical waste) in order to comply with the National Management Act, 107 of 1998, and the Bill of Rights Act, 108 of 1996.

Health care waste must be managed adequately in order to control the potential spread of infectious diseases that can put waste disposal workers and the public at risk. Health care waste (HCW) comprises general health care waste (the non-hazardous component of medical waste) and Health Care Risk Waste (HCRW); waste capable of producing disease). Eskom generates HCW and HCRW at the various clinics it operates.

F.2 Purpose

The purpose is as follows:

(a) To ensure the safe collection, handling, storage and disposal of all medical waste generated by Health Services (clinics) in Eskom

(b) To minimise the occupational health risks associated with the handling and disposal of health care waste

(c) To ensure compliance with all national, provincial and municipal regulations and legislation

(d) To describe the criteria for the segregation, collection, handling, storage and disposal of health waste.

All waste reporting must be in accordance with annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

F.3 Abbreviations and definitions

HCRW: Health Care Risk Waste

HCW: Health Care Waste

F.4 Health effects

HCRW is capable of producing disease and, if not managed properly, may cause the spread of infections to individuals and in communities. Of particular concern is the spread of infectious diseases.

HCW handlers should be provided with suitable protective clothing and equipment to perform the task.

F.5 Requirements

HCW in Eskom is disposed of based on contracts. Eskom is obliged to contract with registered HCW transporters, transfer facilities and treatment facilities. Refer to the Provincial Regulations for registered licensed waste management contractors in each province.

Annex F
(continued)

Health care facility

An Eskom clinic is a health care facility and a generator of HCW. Every clinic must comply with the requirements of SANS 10248: 2004 Edition 2, Section 5, namely:

- The health care facility must have the following and assign duties and responsibilities accordingly:
    - Waste Management Policy
    - Waste Management Team
    - Waste Management Plan
        - including contractual commitments; documentation and data control; waste management procedures; inspection and quality control; health, safety and environmental policy and work procedures
    - Training, supervision and workplace hygiene

HCW disposal contracts

The HCW disposal contract may only be entered into once the Waste Management Team is satisfied that the waste management contractor has fully disclosed all its licensing and permit obligations and is adequately equipped for the activities proposed.

The HCW disposal contract must include at least the following:

- Description of the volume and types of HCW to be collected for treatment and/or disposal
- The disposal and/or treatment process to be used
- The method for calculating the numbers of different HCW units collected
- The verification of the physical condition of the HCW packages that are received
- A statement about the infection risks and other hazards of each package
- The responsibility for the sorting, counting and collection of the HCW packages received

F.6 Management options

Waste storage

Sharp and liquid HCW (including swabs, bloodied bandages, etc.) at Eskom clinics must be stored in suitable bins that comply with SANS requirements. The HCW disposal contract must stipulate waste removal intervals appropriate for each health care facility.

The storage of HCW must pose the minimal risk hazard of contamination of foodstuffs and textiles, or of infection of personnel, or the public. Infectious waste storage areas/ bins must clearly display the international infectious hazard label and must be marked “Infectious Waste”. Chemical, or pharmaceutical waste storage areas/bins must display the appropriate international hazard labels and be marked “Chemical Waste”.

Waste minimisation, segregation and packaging

HCW waste should be minimised by adequate stock management, the recycling of waste where possible, and resource recovery.

Annex F
(concluded)

Waste segregation is the responsibility of the waste generator and should be done at the source. Annual training on correct waste segregation and identification should be presented to ensure the integrity of the action.

HCW waste should be packaged in appropriate containers according to SANS 10248 Edition 2: 2004 Management of healthcare waste, Section 7.3.

Collection and transport

The HCW disposal contract must stipulate the following regarding collection and transport:

- The categories of HCW to be collected
- The volume or mass of each waste category that may require treatment and/or disposal
- The collection schedule as negotiated between the waste management contractor and the Eskom clinic
- Health and safety requirements, e.g. PPE and immunisation
- Emergency procedures to be followed where normal collection and treatment/disposal procedures fail
- The contractor must provide the following:
    - Signatures of the responsible person at the Eskom clinic upon collection of the HCW
    - The date and time of collection
    - The amount and category of waste collected

.....

Spillages

The HCW disposal contract must stipulate the actions that should be taken in the event of an HCW spill. The waste management contractor must provide proof that it has the capacity and suitable equipment available in all instances to be able to handle an emergency spill of the categories of waste that is being handled.

Treatment and disposal

- The contractor must provide the following:
    - Proof of final treatment or disposal of the HCW
    - The treatment and/or disposal method for each individual waste category

F.7 References

- THRPV0218: Disposal of Medical Waste Simmerpan Occupational Health Care
- DISPVAEV9: Medical Waste Management
- SANS 10248 Edition 2: 2004 Management of healthcare waste
- Environment Conservation Act, No 73 of 1989 - Gauteng Health Care Waste Management Regulations, 2004

Annex G
(informative)

Metals

G.1 Introduction

Metals can be divided into two broad categories: ferrous- and non-ferrous metals. Ferrous metals are iron and surface-treated iron, while non-ferrous metals include copper and copper alloys, zinc, lead, aluminium, tin and precious metals such as gold and silver. Metal equipment may be coated with paints (paint may be lead-based) or PCB-containing oil, which may have separate serious environmental hazards of their own (refer to annex C for PCB waste management).

Eskom's plant and operating equipment (e.g. transformers, electrical cable, substation equipment, etc.) consist largely of metal. Once equipment is replaced or decommissioned, metal parts are either re-used, sold as scrap metal through the procurement process, or disposed of along with other materials. Scrap metal, whether sold or disposed of, is a waste stream that requires management in order to prevent environmental degradation or threats to human health and well-being.

G.2 Purpose

The purpose of this section is to provide guidelines for the recycling, disposal and selling of metals in a manner that promotes sustainability and prevents pollution, in line with the Eskom SHE Policy (EPL 32-94).

All waste reporting must be in accordance with annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

G.3 Abbreviations and definitions

CTs: Current transformers

VTs: Voltage transformers

G.4 Health effects

Ferrous metal (iron) rusts when it is exposed to the elements. Rusting iron may contaminate surface water and soil. Heavy metals are categorised as non-ferrous metal. Heavy metals such as lead contaminate the environment and are persistent in ecosystems where long-term health effects may become evident.

Metal equipment may be coated with lead-based paint or insulating oil that may contain PCB. Children are especially sensitive to the effects of lead poisoning – symptoms may include kidney dysfunction, and nerve and circulatory disorders. The health effects of PCB are discussed in annex C.

G.5 Requirements

The sale of an Eskom asset should be performed as per procurement policies and procedures.

All waste reporting must be in accordance with annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

Annex G
(concluded)

G.6 Management options

In line with the principles of waste minimisation, scrap metal should first be reused or recycled before disposal to landfill is considered. All disposals of Eskom assets will be in compliance with the commercial policies and procedures applicable and the process approved by the approved delegated authority. The Procurement Department is responsible for ensuring that contracts for the selling and the disposal of scrap metal address the matters outlined below:

Non-ferrous metals (copper, aluminium, etc.)

Disposals of all metals, including non-ferrous metals, must be done through the Procurement Department.

Sources of non-ferrous metal waste:

- Collection from stores
- Collection from substations and constructions camps
- Dismantling of disused lines
- Collections from re-conductoring projects

Scrap steel, etc. (ferrous metal)

To maximise the return of Eskom scrap returned to stores and simplify the disposal process of these commodities, local or regional annual contracts will be established, covering all stores and workshops. To improve the monetary return of the sale, it is suggested that some form of sorting into the different commodities be performed, e.g.:

- Steel subgrade
- Steel heavy grade
- CTs, VTs (current transformers, voltage transformers) and switchgear
- Plastic and PVC
- Wood/general cleanup

The Procurement Department will be used to establish such a contract and to obtain the necessary approval.

Metals coated with other hazardous substances

Metal equipment contaminated with PCB-contaminated oil may not be sold. Such metal equipment must either be disposed of at a registered H:H landfill site, or be destroyed by thermal destruction.

Metal equipment coated with paint must be stripped of the paint before being sold or disposed of.

G.7 References

http://www.bafu.admin.ch/abfall/01472/01486/index.html?lang=en

Annex H
(informative)

E-Waste

This annex covers (a) e-waste and (b) cartridge recycling.

(a) E-waste (WEEE)

H.(a).1 Introduction

In South Africa any electronic and electrical waste that is recycled is firstly dismantled and manually sorted into its various fractions, which include printed circuit boards (PCBs), cathode ray tubes (CRTs), cables, plastic components, precious metals, strategic metals and base metals (ferrous and non-ferrous), condensers and other (nowadays) invaluable materials such as batteries, LCDs and even wood.

The valuable fractions are processed further by the large recyclers during refining and conditioning processes. The different e-waste fractions are processed into directly reusable components and into secondary raw materials during a variety of refining and conditioning processes.

Solid waste is deposited in a municipal landfill. Systematic gas and leachate-collecting systems are installed on sites permitted in accordance with the Minimum Requirements for Waste Disposal by Landfill, administered by the Department of Water Affairs and Forestry; hence significant emissions into water and the air are controlled. Informal salvaging is discouraged in accordance with government's directives. Very little E-waste is recovered from permitted landfills in South Africa. It is only in the major metros that E-wastes are produced in significant quantities and processes in place for their recovery and disposal.

It is recognised that the management - recycling and resource recovery - of waste emanating from electrical equipment and components has to be environmentally acceptable. The RSA-Swiss E-waste assessment has confirmed possible environmental impacts associated with the recycling of computer waste. However, further assessment needs to be carried out at a national level, covering other components of the Waste Electrical and Electronic Equipment (WEEE) stream. It is thus envisaged that the management of this waste stream will be a legislative requirement in the future. Industry is thus expected to do an inventory of this waste stream to fulfil the requirements of future legislation. A strategy to meet these requirements aims to:

1 Extend the scope of the assessment to cover other components of WEEE.

2 Assess the present WEEE handling in industry, i.e. collection, repair/refurbishment, dismantling, recovery and disposal practices and their environmental and health impacts.

3 The data collected (including past, current and future quantities of equipment) must be recorded as the WEEE element in the National Waste Information System (WIS).

H.(a).2 Purpose

The purpose of this document is to encourage the organisation to be proactive in managing waste emanating from its electrical and electronic equipment. This waste stream is commonly referred to as e-waste, with recycling being the environmentally acceptable strategy in managing this waste. Precious metals such as gold and platinum, and copper and aluminium are the materials being recycled. Industrial recyclers do all the recycling.

All waste reporting must be in accordance with annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

Annex H
(continued)

H.(a).3 Abbreviations and definitions

E-Waste: Electronic waste

WEEC: Waste Electrical and Electronic Equipment

H.(a).4 Health effects

Electrical and electronic equipment is made up of a multitude of components which contain toxic substances, e.g. carcinogens such as lead and arsenic. The recycling processes and disposal of these components, while being a lucrative business proposition for some, pose serious health risks and environmental dangers. The formation or discharge of hazardous emissions during the recycling of electrical and electronic equipment depends heavily on the handling of electronic waste. Hence hazardous substances contained in computers and televisions do not automatically pose a risk to the environment and human health. Some recycling processes applied in transition and developing countries can cause serious health problems and contaminate air, water and soil.

H.(a).5 Requirements

Key legislation and processes relevant to waste management activities in South Africa have been identified and are briefly outlined below:

H.(a).5.1 *The National Environmental Management Act (Act 107 of 1998) (NEMA):* intends to provide the principal framework for integrating good environmental management into all development activities. NEMA provides for waste management through the principles of avoidance or minimisation and remediation of pollution, including waste reduction, reuse, recycling and proper waste disposal, as well as the principles of the "polluter pays" and "cradle to grave".

H.(a).5.2 *Minimum requirements for the handling, classification and disposal of hazardous waste:* provides guidelines for collection and storage. A generator who treats, stores for a period exceeding 90 days, or disposes of hazardous waste on site is subject to Section 20(1) of the Environment Conservation Act and must apply for a permit for a waste disposal facility to the department. This should change with the change in the latest legislation.

H.(a).5.3 *The Municipal Services Act (Act 32 of 2000):* provides the principles and mechanisms to achieve effective governance at a local level, and includes the implications of exercising environmental management at local government level (which includes waste management).

H.(a).5.4 *The Hazardous Substances Act (Act 15 of 1973):* provides the regulations to control the management of hazardous substances and the disposal of hazardous waste. However, at present there is no specific legislation for the handling or recycling of E-waste in South Africa.

H.(a).6 Management options

Electronic waste can be disposed of as solid waste after having completed its life cycle but otherwise should be refurbished or reused or recycled (remanufactured, restored, renovated, repaired, or recharged). Hazardous materials should be disposed as per national requirement.

Annex H
(continued)

H.(a).7 References

- http://www.hp.com/hpinfo/globalcitizenship/environment/productdata/pdf/ij_c9434a_eng_v1.pdf
- http://www.hp.com/hpinfo/globalcitizenship/environment/productdata/pdf/sp_51600coriginal_eng_v1.pdf
- http://www.nwmsi.co.za
- http://www.environment.gov.za/ProjProg/WasteMgmt/Polokwane_declare.htm

(b) Cartridge recycling

H.(b).1 Introduction

The 2001 Polokwane Declaration sets the objectives and goals with regard to waste management. The recycling component of the declaration states that the recycling of waste is to be increased and extended. Furthermore, the declaration reaffirms South Africa's commitment to the Integrated Pollution and Waste Management Policy, the National Waste Management Strategy and the principles of waste minimisation, reuse, and recycling for sustainable development.

The recycling component of the National Waste Management Strategy states the following:

- In the pilot areas new waste streams will be identified
- Existing initiatives will be expanded and improved
- New initiatives will be implemented
- Appropriate mechanisms that promote sustainable recycling by all members of the recycling chain will be identified and developed
- Appropriate mechanisms for recycling in specific circumstances will be based on an appraisal of the social, environmental and economic benefits and the costs of recycling in comparison with one-way consumption and disposal

H.(b).2 Purpose

The objective of Eskom's cartridge recycling component of the waste management strategy is to develop a realistic and practical approach towards a culture of recycling, and compliance with prospective legislation.

All waste reporting to be in accordance with annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

H.(b).3 Abbreviation and definitions

Recycling: A series of activities that includes the collection of recyclable materials that would otherwise be considered waste, the sorting and the processing of recyclables into raw materials such as fibres, and the manufacture of these raw materials into new products.

Annex H
(concluded)

H.(b).4 Health and environmental effects

The ink in the cartridge has certain health effects. The potential routes of over-exposure are the skin and the eyes. Inhalation of vapour and ingestion are not considered to be significant routes of exposure under normal use conditions. Ingestion of the ink will pose acute health hazards. It may cause kidney and liver damage and could depress the central nervous system.

Some kinds of toner dust contain hazardous materials. Inkjet inks can also contain a range of chemicals that are harmful to the environment. These materials pose no threat while they are contained within the cartridge. However, these pollutants can escape when cartridges are pulled apart during poorly managed refilling or recycling operations or when dumped cartridges start to deteriorate in landfill. Toner dust is also extremely fine (5 – 15 microns), so it can easily leach from landfills into nearby waterways, ground water and ultimately the oceans.

H.(b).5 Requirements

Divisions are encouraged to do the following:

- Set up targets for printer cartridge recycling
- Initiate contracts for printer cartridge recycling
- Monitor the progress of recycling

H.(b).6 Management options

A cartridge can be disposed of as solid waste after having completed its life cycle as a consumer item, but otherwise should be refurbished for reuse (remanufactured, restored, renovated, repaired, or re-charged). Refurbishing a cartridge is defined as disassembling the cartridge, cleaning it, changing parts if needed, and refilling it with toner.

H.(b).7 References

- http://www.hp.com/hpinfo/globalcitizenship/environment/productdata/pdf/ij_c9434a_eng_v1.pdf
- http://www.hp.com/hpinfo/globalcitizenship/environment/productdata/pdf/sp_51600coriginal_eng_v1.pdf
- http://www.nwmsi.co.za
- http://www.environment.gov.za/ProjProg/WasteMgmt/Polokwane_declare.htm

Annex I
(informative)

Solvents

I.1 Introduction

Solvents and cleaners are widely used in Eskom for the removal of waxes, greases, oils, carbon and various other contaminants from equipment during routine maintenance and general cleaning. Increasing environmental and worker safety concerns as well as tightening government regulations have drawn attention to these solvents and cleaners, many of which are classified as toxic.

Government regulations have already excluded the use of some of these chemicals and restricted the use of various halogenated hydrocarbons because of their atmospheric ozone-depleting effects and their cancer-related risks. Current legislation provides guidelines on the use of these materials in such a way as to protect human health and the environment.

I.2 Purpose

The purpose of this procedure is to provide controlled methods for managing solvents throughout the organisation. It covers Eskom's requirements for the storage, handling, disposal and reporting of all solvents. This procedure does not relieve any person from any of his/her legal responsibilities in any way.

All waste reporting must be in accordance with annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

I.3 Abbreviations and definitions

MSDS: Material safety data sheet

PPE: Personal protective equipment

I.4 Health effects

The health and safety of workers and members of the public, and the protection of the environment against pollution are important to Eskom. Solvents can be regarded as hazardous due to their potential environmental impacts, including air pollution, water and soil contamination, harm to wildlife, fire hazard and health hazards, among others poisoning, damage to the human body and disorders.

Exposure to solvents and other organic liquids is one of the most common chemical health risks at places of work. Some solvents produce vapours, which are heavier than air and may move at ground level to a distant ignition source. These vapours may be ignited by a welding spark, or a burning cigarette, or static electricity may cause ignition (cell phones have recently been related to some incidents abroad). Vapours from solvents can also accumulate in confined places and stay there for a long time, posing health and property risks.

Solvents enter the body by inhalation, by swallowing and through the skin, and are normally excreted in the urine and sweat, or they may be exhaled. The effect depends on several factors, such as:

- The concentration of the solvent in the air at the place of work
- How easily the solvent evaporates at ambient temperature
- The characteristics of the solvent; - is it water-soluble or fat-soluble?
- How long the exposure lasts
- Whether light or heavy work is involved (panting increases the amount inhaled)

Annex I
(continued)

Solvents and their associated vapours and mists have various effects on human health. These effects may include, but are not limited to:

- A narcotic effect, causing fatigue, dizziness and intoxication. High doses may lead to unconsciousness and death.
- Slow reaction time, with an effect on rational judgment.
- Irritation of the eyes and the respiratory tract.
- Solvents can rob the skin of its natural oils. This is a very common cause of skin disorders and dermatitis. Some solvents penetrate the skin and enter the bloodstream.
- Solvents can damage the liver, kidneys, heart, blood vessels, bone marrow and nervous system.

I.5 Requirements

This procedure covers Eskom's requirements for the storage, handling, disposal and reporting of all solvents.

All waste reporting must be in accordance with annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

I.6 Management options

I.6.1 Storage

- Storage of solvents must be in accordance with the specific minimum requirements of the Materials Safety Data Sheet (MSDS).

Chemical substances cannot be stored in any room available. To ensure the safe storage of chemicals, the store must be designed to cater for possible spills, fire and other mishaps, and must conform to the minimum requirements specified in ESKAMAAD1 and SABS 0108.

- Determine the flash points and volatility of solvents, and ensure that the storage facility caters for these factors.
- Use the appropriate personal protective equipment as recommended on the MSDS or the container label.
- Store all solvents in temperature-controlled environments, or as specified on the MSDS, and away from direct sunlight.
- Store flammable solvents, if possible, where special ventilation and electrical systems minimise the possibility of accidental fire or explosion.
- Store flammable solvents in tightly closed safety containers.
- Dispense solvents, from safety-approved nozzles and dispensers only, into clearly marked containers.
- Store solvents away from oxidisers.

Annex I
(continued)

- Check storage containers regularly to make sure that the spout, cap and container are in good working order and not leaking.
- Immediately replace damaged container parts such as flame arrester screens.
- Never smoke or eat around solvent storage or dispensing containers.
- Never carry lighters, matches or sparking devices when handling solvents.
- Know the location of spill control stations and materials, eyewash stations and safety showers.

I.6.2 Usage

- Never smoke or eat when using solvents, or in an area where solvents are being used.
- Always use the prescribed PPE and other protection measures when working with solvents, unless otherwise stated in the Occupational Health and Safety Risk Assessment.
- All solvents must be used in conjunction with safe working procedures.

I.6.3 Disposal

Every solvent manufacturer has its own disposal procedures, and these must be reflected on the MSDS. All hazardous waste must be disposed of at the relevant licensed facility.

Some additional information:

- Solvent waste must be removed from the work area and disposed of only at registered sites and by using appropriate removal contractors, in accordance with the relevant regulations.
- Final disposal of solvent waste, including the mode of transport, must be in accordance with the relevant legislation and is subject to approval by the applicable business unit.
- In the case of a contractor, Eskom must impose a penalty for every litre of solvent waste being disposed of in a manner that does not conform to the requirements of this procedure.
- Process water, likely to be contaminated with solvents, must be collected and disposed of by an approved method prescribed by legislation.
- Records must be kept of the quantities disposed of and of the permits of registered disposal sites. Records of all workers trained on the disposal and usage of solvents must be kept, as well as relevant audit reports.
- It is important to know whether contaminated clothing, PPE, rags and materials should be decontaminated, cleaned or disposed of in accordance with Eskom's procedure (Disposal of waste in tightly covered safety containers).
- Always dispose of flammable solvents into approved containers, never into sewers, storm water drains, garbage dumps or onto the ground.
- Never smoke or light fires around disposal sites or containers.
- Know the location of spill control stations and materials, eyewash stations and safety showers.

Annex I
(concluded)

I.6.4 Training

- Ensure that all users of solvents are informed about or trained in the purchase, storage, usage and disposal of solvents.
- Employees must be informed about the contents of an MSDS.

I.6.5 Audit

- A compliance audit must be carried out periodically.

I.7 References

Not applicable

Annex J
(informative)

Ozone-Depleting Substances

J.1 Introduction

Ozone-depleting substances (ODSs) are compounds that contribute to the depletion of stratospheric ozone. During the 1970's and 1980's scientists first suspected, and then detected, an increase in the depletion of the ozone layer. It was subsequently discovered that it was accompanied by an increase in UV-B radiation reaching the earth's surface. It was also discovered that the levels of UV-B radiation were even higher at the poles, particularly in the Antarctic region in the Southern Hemisphere. South Africa was identified as one of the countries susceptible to this ozone damage.

These ODSs are generally very stable in the troposphere and degrade under ultraviolet light in the stratosphere, releasing chlorine or bromine atoms, which deplete ozone.

J.1.1 The following controlled substances are most frequently utilised commercially:

- CFC11- Air-conditioning, insulation materials, aerosols, solvents
- CFC12- Refrigeration, air-conditioning, insulation materials, aerosols
- CFC113 - Insulation materials, aerosols, solvents, air-conditioning
- CFC114 - Insulation materials, aerosols
- CFC115 - Refrigeration
- BCF (Halon 1301) – Fire-fighting, fixed installations
- BTM (Halon 1211) – Fire-fighting, fire extinguishers
- Carbon tetrachloride - solvents, pharmaceuticals, feed stock
- 1,1,1 Trichloroethane - Insulation materials, solvents, adhesives
- HCFCs (40 substances) - Refrigeration, air-conditioning, insulation materials, solvents aerosols
- Methyl bromide - pesticides.

Eskom Holdings Limited is committed to phasing out ozone-depleting substances (ODSs) according to South Africa's national commitment to the Montreal Protocol and its amendments. The Montreal Protocol on Substances that Deplete Ozone Layer controls the phasing out of 96 substances grouped into 4 annexes (A, B, C and E) according to their ozone-depleting potential and phase-out dates. The controlled substances are from the following groups of chemicals:

- Chlorofluorocarbons
- Bromofluorocarbons
- Bromochlorofluorocarbons
- Hydrochlorofluorocarbons
- Methyl bromide
- Carbon tetrachloride
- Trichloroethane

Annex J
(continued)

J.2 Purpose

The purpose of this procedure is to provide controlled methods of managing ozone-depleting substances throughout the organisation. It covers Eskom's requirements for the storage, handling and disposal of all ozone-depleting substances.

All waste reporting must be in accordance with annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

J.3 Abbreviations and definitions

ODS: Ozone depleting substance

J.4 Health effects

Any damage to the ozone layer allows more ultraviolet radiation (UV-B) from the sun to reach the earth's surface. Severe exposure to UV-B radiation can:

- Cause eye cataracts that can lead to blindness
- Cause skin cancer
- Suppress the efficiency of the body's immune system.
- Reduce the rate of plant growth/production
- Upset the balance of ecosystems
- Accelerate the degradation of plastics, rubber and organic materials

J.5 Management requirements

Eskom must phase out ozone-depleting substances (ODSs) in accordance with the national commitment for the implementation of the target dates stipulated in the Montreal Protocol (1987) and subsequent amendments.

The Montreal Protocol came into force in 1987. The South African government signed the 1990 London amendment to the Montreal Protocol as a developed country. The country was reclassified, on application, as a developing country in 1997.

The reclassification means that:

- South Africa no longer needs to contribute annually towards the Multilateral Fund which helps developing countries manage their implementation programmes of the Protocol.
- For any phase-out schedule of newly controlled ODSs not yet controlled under the Protocol, South Africa will enjoy the 10-year grace period like any other developing country. This includes the phasing out of HCFCs and methyl bromide.

Annex J
(continued)

However, our re-classification was not without restrictions:

- South Africa has to undertake to honour all obligations undertaken while still classified as a developed country.

- South Africa cannot ask for financial assistance from the Multilateral Fund of the Montreal Protocol.

The Department of Environmental Affairs and Tourism, under the chairmanship of Mr. Sam Manikela, is leading a National Group on the Strategy for the Implementation of the Montreal Protocol.

J.6 Management options

J.6.1 Phase-out dates for controlled substances in South Africa

The following phase-out schedule has been accepted:

Annexe/group	Substances	Phase-out dates in South Africa
annex A Group 1	CFC 11, 12, 113, 114 & 115	Since Jan 1996 the consumption of newly manufactured CFCs has been restricted to zero (with approved exceptions)
annex A Group 2	Halon 1211, 1301 & 2402	Since Jan 1994 the consumption of newly manufactured halons has been restricted to zero (except for essential use)
annex B Group 1	CFC13, 111, 112, 211, 212, 213, 214, 215, 216 & 217	Since Jan 1996 the consumption of newly manufactured CFC's has been restricted to zero
annex B Group 2	Carbon tetrachloride	Since Jan 1996 the consumption of newly manufactured CFCs has been restricted to zero (with approved exceptions)
annex B Group 3	1,1,1 trichloroethane (methyl chloroform)	Since Jan 1996 the consumption of newly manufactured methyl chloroform has been restricted to zero
annex C Group 1	HCFC 21*, 22*, 31, 121, 122, 123*, 124*, 131, 132, 133, 141, 141b*, 142, 142b*, 151, 221, 222, 223, 224, 225, 225ca*, 225cb*, 226, 231, 232, 233, 234, 235, 241, 242, 243, 244, 251, 252, 253, 261, 262 & 271	By 1 January 2040 consumption will be restricted to zero
annex C Group 2	HBFCs (34 substances)	Since Jan 1996 the consumption of newly manufactured HBFC substances has been restricted to zero
annex C Group 3	Bromochloromethane	On 1 January 2002 consumption was restricted to zero
annex E Group 1	Methyl bromide	By 1 January 2015 consumption will be restricted to zero

*** identifies most commercially viable HCFCs**

Annex J
(continued)

J.6.2 Eskom ODS phase-out strategy

- Recharging with halons will be permitted when approved by the Halon Bank of SA.
- Recharging with CFC 11, 12, 113, 114 and 115 (substances annex A Group 1) will be permitted only when the fluid is obtained from own reserves.
- An inventory of ODS types, their location and application as well as quantities in storage and use must be maintained, audited and reported annually. This must be reflected through business division performance indicators.
- A phase-out plan, programme and budget must be developed and approved by the relevant Divisional Managing Directors.
- Suitable storage facilities must be provided for the transition phase-out programme.
- Contaminated fluids must be stored separately from new fluids for controlled destruction or reclamation.
- No purchases of the new ODS fluids (controlled under annex A, B and C Groups 2 and 3) of the Protocol may be permitted.
- No trading with ODSs may be allowed. Ownership of ODSs must only be transferred from Eskom to the registered ODS bank holder.
- Awareness and technology training programmes on the handling of controlled fluids must be implemented.
- Purchases of new equipment, materials or processes which utilise ODSs during manufacture or operation may not be permitted where suitable alternatives exist.
- Portable fire extinguishers containing halon must be replaced and the content disposed of through the Halon Bank of SA.
- Conservation of the CFC and HCFC refrigerants, i.e. recovery and recycling, and leak protection of the equipment and storage facilities must be standard practice.

Reporting on ODSs must be in line with annex K: Waste-reporting Requirements as contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

J.6.3 Accountability and responsibility

Divisions and subsidiaries of Eskom Holdings will be accountable for the implementation of plans and programmes to comply with this procedure as required and to provide appropriate reports.

Annex J
(continued)

J.6.4 Alternatives to ODSs

Below are the industrial sectors where ODSs have been or are being used as well as the corresponding alternative products or technologies of the latest developments:

Sector	Alternatives
Aerosol	Hydrocarbons, dimethyl ether, carbon dioxide, etc.
Foam-blowing	Water, carbon dioxide, hydrocarbons, hydrochlorofluorocarbons (HCFCs), etc.
Refrigeration and air-conditioning	Hydrofluorocarbons (HFCs), HCFCs, hydrocarbons, ammonia, carbon dioxide, water, etc.
Electronics, dry-cleaning, galvanising	Water-based technology, alcohols, hydrocarbons, trichloroethylene, etc.
Fire-fighting	Carbon dioxide, water mists, foam and dry powder, HFCs, HCFCs, etc.
Agriculture	Evaluation programme to find alternatives to methyl bromide to be implemented

J.7 References

- ESKPBAAA4 Rev 2: Ozone Depleting Substances (ODSs) Management & Phase-out, January 2003.
- Ozone depletion and its effects
- http://www.environment.gov.za/Documents/Documents/2003May29/ozone_depletion_29052003.html

Annex K
(informative)

Waste-Reporting Requirements

This covers the requirements as per annex K: Waste-reporting Requirements contained in the Eskom Environmental Liaison Committee (ELC) Performance Indicator Reporting Procedure EPC 32-249.

Waste KPIs for Eskom

Reporting frequency

Reports are required by CS on a six-monthly basis, but data should be collected on a monthly basis by the divisions. The monthly reporting will allow divisions to identify gaps and implement mitigation measures to minimise reporting problems. Monthly reporting will also allow trend analysis and the early detection of problems.

Reporting format

Data can be sent in any format, but must include the following:

- Date of submission and revision number
- Reporting period - period to which report applies
- Area covered by report, including any exclusions
- Name of person submitting report
- Name of responsible manager
- Table of data as per above requirements

Reporting requirements

K.1 All divisions

The following should be reported by all divisions. Where an issue is not applicable, this should be noted.

	Aspect/element	UNIT OF MEASURE	Amount	Method/ destination 1	Comment
1.1	Disposal of PCB mass and equipment type	Ton			Note separate requirement relating to labelling of PCB equipment
1.2	Fluorescent tubes	Number of 210 litre drums			
1.3	Health care risk (medical) waste	Kilograms disposed of			
1.4	SF_6 (volume purchased and fill-ups)	Number of cylinders and volumes purchased			Link to GHG Protocol: replacement
1.5	Number of oil/chemical /herbicide spills	Total number of spills			Oil spills to be reported in line with the oil spill classification table, attached.
1.6	Asbestos	Kg			Refer to Eskom Asbestos Procedure

[1] e.g. landfill, recycling, incineration

Annex K
(continued)

K.2 Ongoing status reports

	Issue	Requirement
2.1	Waste training	Total number of people trained in waste issues, and nature of training
2.2	PCBs	Total number of transformers labelled for PCB status vs total number of transformers
2.3	Solvent inventory	Type and quantity of major solvents purchased
2.4	Storage	Any waste stored in excess of 90 days prior to disposal

K.3 Information pertaining to waste sites owned and managed by Eskom

3.1	Registration status of each site	Including permit reference numbers and competent authority
3.2	Disposal records per site	Include waste types and mass disposed of at the site. (Expressed in kilograms) Waste sources Waste types • General waste • Hazardous waste • Solids • Liquids • Sludges Note: A quarterly report should be prepared for the competent authority.

K.4 Additional reporting based on significance

Based on Divisional Aspect Registers, all significant waste streams should be reported. If data is not available for significant waste streams, the process implemented to gather the data should be noted.

	Volumes of waste recycled, reused, scrapped or disposed of (where feasible)	Unit [2]	Method / destination	Typical density kilogram/m^3
4.1	Ash (tons)	K tons		
4.2	Building rubble	Tons		1 500
4.3	Domestic waste	Kg		Compacted 400 Non-compacted 200
4.4	E-waste, cartridges, etc.	Kg		235
4.5	Metal (kilograms)	Tons		
4.6	Oil	Litres		
4.7	Organic waste	Kg		250
4.8	Paper (kilograms)	Kg		Compacted 400 Non-compacted 200
4.n	Any other significant waste			

[2] There are set conversion factors for converting mass to volume, etc.. See (Annex A) Appendix 1 for a list of densities

Annex K
(concluded)

K.5 Waste Densities

Table 1

Waste Type	Typical contents/Containerisation	Typical Density kilogram/m^3
Domestic waste Non-compacted	Mixed domestic waste	200
Domestic waste Compacted	-Mixed domestic waste in compactor vehicles	400
Mixed Domestic Waste	Contents of closed wheelie bins (e.g. 190-660 litres)	108
	Contents of bags (e.g. 160-240 l.)	95
	Contents of skips (e.g. 6-10 m^3)	70
Organic waste (garden waste and food waste)	In closed plastic containers (190 l.)	250
	In ventilated containers/bags	205
	Contents of compactor vehicles	450
	Organic waste from kitchens for animal fodder	840
Mixed bio-degradable domestic waste	Contents of closed wheelie bins 190-660 litre	60
	Contents of compactor vehicles	400
	Bulky waste in skips	90
	Corrugated cardboard	88
Paper and cardboard	Newspapers and magazines	200
	Office paper (compacted)	475
Other waste	Glass from glass containers	325
	Electronics waste	235
	Batteries	1375
Inert waste	Sand, concrete, bricks and fibre glass	1500
Mixed non-compacted industrial waste	Paper & plastic	150
	Cardboard, gypsum boards, sawdust, textiles, leather	400
	Timber, demolition waste	600
	Casting sand, slag, ashes	1500
Commercial waste - non-compacted	Mixed waste from shops, officers, hospitals, restaurants, parks and garden waste	200
Other waste	Non-specified	1000