Eskom	**Standard**	

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1. Introduction

Eskom Holdings SOC Limited has a systematic and hierarchical approach to integrated waste management, with the goal of zero waste. A proactive prevention approach is followed to ensure cleaner production, effective and sensible reuse, and recycling, as well as responsible treatment and disposal of waste generated.

The National Environmental Management Act (NEMA) 107 of 1998, the National Waste Management Strategy (NWMS) of 2020, and the National Environmental Management: Waste Act (NEMWA) 59 of 2008, as amended, and the regulations under these, not excluding other relevant environmental legislation, municipal by-laws, and international agreements to which South Africa is a party, provide the mechanism to regulate every aspect of the waste and secondary resources value chain in South Africa. The regulations are aimed at “controlling” the sector in an effort to minimise the environmental and human health impacts associated with poor waste management, while, at the same time, striving to drive waste up the hierarchy away from disposal towards reuse, recycling, and recovery.

In a circular economy, resources are kept in use for as long as possible, extracting the maximum value from them while in use and then recovering and regenerating products and materials at the end of each service life. To enable a transition to a circular economy, it is important to establish the factors that will trigger and sustain such an economy and the extent to which aspects of the circular economy are already embedded in the organisation. The opportunity to reduce cost should be a strong driver and should also be sustained for the business to consider waste minimisation, reuse, and recycling of waste.

This standard is necessary to provide the minimum management requirements of waste streams and to ensure legal compliance.

2. Supporting clauses

2.1 Scope

The scope of this document is aligned with the legislated requirements that must be adhered to for the management of the waste streams that can pose a significant risk to Eskom Holdings SOC Limited, with the aim that business units shall pursue the goal of zero waste through implementing proactive measures to eliminate waste, if practicable, or to manage waste in a responsible manner where it cannot be eliminated.

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2.2 Purpose

The purpose of the standard is to pursue the goal of zero waste through implementing proactive measures to eliminate waste, if practicable, or to manage waste in a responsible manner where it cannot be eliminated and ensure alignment with external regulatory and governmental documents.

The Waste Management Standard will give overall direction and governance in Eskom operational areas on what has to be done to implement an effective waste management system.

The aim is to reduce waste production, practise reuse, recycling, and recovery of waste, and ensure safe disposal of waste, thereby reducing the environmental risk and contributing to the sustainability of business operations.

2.3 Applicability

This document shall apply throughout Eskom Holdings SOC Limited and its subsidiaries.

2.4 Effective date

This standard will be effective from the date of authorisation.

2.5 Normative/Informative references

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.6 Normative

[1] Environmental Indicator Reporting Standard (32-249)
[2] Safety, Health, Environment, and Quality (SHEQ) Policy (32-727)
[3] Eskom's Procurement and Supply Chain Management Procedure (32-1034)
[4] Polychlorinated Biphenyl Phase-out Standard (240-8908008)
[5] Requirements for Safe Processing, Handling, Storing, Disposal, and Phase-out of Asbestos (32-303)
[6] Environmental Incident Management Procedure (240-133087117)
[7] Eskom Greenhouse Gas Emission Reporting Procedure (240-125809509)
[8] Standard for Mineral Insulating Oils (Uninhibited and Inhibited): Purchase, Management, Maintenance, Testing, and Disposal (240-775661431)
[9] Position Paper on Management of Coal Waste at Power Stations (ENV18-004)

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[10] Eskom Health Care Risk Waste Management Standard (240-115842952)

2.7 Informative

[1] Environment Conservation Act (ECA) 73 of 1989
[2] National Environmental Management Act (NEMA) 107 of 1998
[3] Minimum Requirements for the Handling, Classification, and Disposal of Hazardous Waste, Department of Water Affairs and Forestry (DWAF), version 2 of 1998
[4] National Environmental Management: Waste Act (NEMWA) 59 of 2008
[5] National Radioactive Waste Disposal Institute Act 53 of 2008
[6] National Waste Management Strategy (NWMS) of 2020: GNR 56, 28 January 2021
[7] National Environmental Management: Waste Amendment Act 26 of 2014
[8] National Health Act 61 of 2003
[9] National Health Act 61 Of 2003: GN 1229, 24 December 2015
[10] National Waste Information Regulations: GNR 625, 13 August 2012
[11] Waste Classification and Management Regulations: GNR 634, 23 August 2013
[12] List of Waste Management Activities that have, or are likely to have, a Detrimental Effect on the Environment: GNR 921, 29 November 2013
[13] National Norms and Standards for the Storage of Waste: GNR 926, 29 November 2013
[14] National Norms and Standards for Disposal of Waste to a Landfill: GNR 636, 23 August 2013
[15] National Norms and Standards for the Storage of Waste: GNR 926, 29 November 2013
[16] National Norms and Standards for the Assessment of Waste for Land Disposal: GNR 635, 23 August 2013
[17] National Norms and Standards for the Sorting, Shredding, Grinding, Crushing, Screening, Chipping, or Baling of General Waste: GNR 1096, 11 October 2017
[18] National Norms and Standards for the Assessment of Waste for Landfill Disposal: GNR 635, August 2013
[19] Norms and Standards for the Remediation of Contaminated Land and Soil Quality in the Republic of South Africa, Government Notice 331 of 2 May 2014
[20] National Environmental Management: Air Quality Act 39 of 2004
[21] National Road Traffic Act 93 of 1996
[22] Asbestos Abatement Regulations: GNR 1196, 10 November 2020
[23] Asbestos Regulations: GNR 341, 2008

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[24] National Greenhouse Gas Emission Reporting Regulations
[25] ISO 9001 Quality Management Systems
[26] SANS 0290: 2020 Mineral Oils – Management and Handling of PCBs
[27] SANS Codes for Transportation of Hazardous Waste – 10228 to 10234, 10206, and 10265, at a minimum
[28] SANS ISO 14001 Environmental Management System: Requirements with Guidance for Use
[29] SANS 10248: 2008 Management of healthcare waste (1 – 3)
[30] Basel Convention on the Transboundary Movement of Hazardous Waste
[31] Implementing the Paris Agreement – Issues at Stake in View of the COP 22 Climate Change Conference
[32] Montreal Protocol on Substances that Deplete the Ozone Layer
[33] Stockholm Convention on the Identification and Removal of Persistent Organic Pollutants
[34] Rotterdam Convention on the Banning of Hazardous Substances
[35] Carbon Tax Act 15 of 2019
[36] Waste Tyre Regulations, 2017: GN 1064 in GG 41157, 29 September 2017

The standard is not exhaustive and/or is not limited to the legislation listed above.

2.8 Definitions

2.8.1. **Asbestos** means the following minerals: (a) amosite, (b) chrysotile, (c) crocidolite, (d) fibrous anthophyllite, and (e) fibrous tremolite, or any mixture containing any of these minerals.

2.8.2. **Asbestos-containing material** means asbestos, as well as any material that contains asbestos, and includes asbestos cement products, asbestos coating, asbestos insulation board, asbestos insulation, asbestos textured decorative coatings, asbestos-contaminated soil, and other asbestos-containing materials.

2.8.3. **Asbestos disposal site** means a site specifically designated for the purpose of asbestos disposal in terms of the National Environmental Management: Waste Act 59 of 2008.

2.8.4. **Business waste** means waste that emanates from premises that are used wholly or mainly for commercial, retail, wholesale, entertainment, or government administration purposes.

2.8.5. **Building and demolition waste** means waste, excluding hazardous waste, produced during the construction, alteration, repair, or demolition of any structure, and includes rubble, earth, rock, and wood displaced during that construction, alteration, repair, or demolition.

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2.8.6. **Colour coding** means the use of colour on a container or bag or the label attached to such that serves to identify the category of waste that it contains.

2.8.7. **Contaminant** means any substance present in an environmental medium at concentrations in excess of natural background concentrations that has the potential to cause harm to human health or the environment.

2.8.8. **COVID-19-type waste** includes used tissues, disposable cleaning cloths, gloves, masks, etc.

2.8.9. **Disposal** means the burying, deposit, discharge, abandonment, dumping, placement, or release of any waste into, or onto, any land.

2.8.10. **Domestic waste** means waste, excluding hazardous waste, that emanates from premises that are used wholly or mainly for residential, educational, health care, sport, or recreational purposes.

2.8.11. **Environment** means the surroundings within which humans exist and that are made up of:

(i) the land, water, and atmosphere of the earth;
(ii) micro-organisms and plant and animal life;
(iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and
(iv) the physical, chemical, aesthetic, and cultural properties and conditions of the foregoing that influence human health and well-being.

2.8.12. **General waste** means waste that does not pose an immediate hazard or threat to health or to the environment and includes:

a) domestic waste;
b) building and demolition waste;
c) business waste;
d) inert waste; or
e) any waste classified as non-hazardous waste in terms of the regulations made under section 69 of the NEMWA and includes non-hazardous substances, materials, or objects within business, domestic, inert, building, and demolition wastes.

2.8.13. **General waste storage facility** means a storage facility that has the capacity to store in excess of 100 m^3 of general waste continuously.

2.8.14. **Hazardous waste** means any waste that contains organic or inorganic elements or

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compounds that may, owing to the inherent physical, chemical, or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials, or objects within business waste, residue deposits, and residue stockpiles.

2.8.15. Hazardous waste storage facility means a storage facility that has the capacity to store in excess of 80 m^3 of hazardous waste continuously.

2.8.16. Health care general waste means the non-hazardous portion of the waste generated at a health care facility. This is any waste that comprises uncontaminated plastics, paper, flowers, cardboard, or food residues.

2.8.17. Health care risk waste means the hazardous portion of the waste generated at a health care facility. This is any waste that poses a hazard to human health or the environment.

2.8.18. PCB-contaminated material means oil or articles with a polychlorinated biphenyl (PCB) concentration greater than 51 mg/kg, but less than 500 mg/kg.

2.8.19. PCB material means oil or articles with a PCB concentration greater than 500 mg/kg.

2.8.20. PCB waste means waste, as defined in the National Environmental Management: Waste Act 59 of 2008, that contains PCB materials or PCB-contaminated materials; and “SANS 290” means the latest edition of the South African National Standards for mineral insulating oils management of polychlorinated biphenyls (PCBs).

2.8.21. Recycling means a process where waste is reclaimed for further use, which process involves the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material.

2.8.22. Remediation means the management of a contaminated site to prevent, minimise, or mitigate harm to human health or the environment.

2.8.23. Reuse means the utilisation of the whole, a portion of, or a specific part of any substance, material, or object from the waste stream for a similar or different purpose without changing the form or properties of such substance, material, or object.

2.8.24. Safety data sheet is a detailed informational document prepared by the manufacturer or importer of a hazardous chemical. It describes the physical and chemical properties of the product. It also provides the physical, health, and environmental health hazards, protective measures, and safety precautions for handling, storing, and transporting the chemical.

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2.8.25. SANS 10234 means the latest edition of the South African National Standard: Globally Harmonised System of Classification and Labelling of Chemicals.

2.8.26. Temporary storage means the once-off storage of waste for a period not exceeding 90 days.

2.8.27. Waste means:

a) any substance, material, or object that is unwanted, rejected, abandoned, discarded, or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material, or object, whether or not such substance, material, or object can be reused, recycled, or recovered, and includes all wastes as defined in Schedule 3 to the Act (NEMWA, 2014); or

b) any other substance, material, or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette, but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste:

(i). once an application for its reuse, recycling, or recovery has been approved or, after such approval, once it is, or has been, reused, recycled, or recovered;

(ii). where approval is not required, once a waste is, or has been, reused, recycled, or recovered; or

(iii). where the Minister has, in terms of section 74 of the NEMWA, exempted any waste or a portion of waste generated by a particular process from the definition of waste or where the Minister has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste.

2.8.28. Waste-disposal facility means any site or premises used for the accumulation of waste with the purpose of disposing of that waste at that site or on those premises.

2.8.29. Waste facility means a commercial place, infrastructure, or containment of any kind, including associated structures or infrastructure, where there is sorting, shredding, grinding, crushing, screening, chipping, or baling of general waste.

2.8.30. Waste transfer facility means a facility that is used to accumulate and temporarily store waste before it is transported to a recycling, treatment, or waste-disposal facility.

2.8.31. Waste classification means establishing, in terms of SANS 10234:

a) whether a waste is hazardous based on the nature of its physical, health, and environmental hazardous properties (hazard classes); and

b) the degree or severity of the hazard posed (hazard categories).

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2.8.32. Waste generator means any person whose actions, production processes, or activities, including waste management activities, result in generation of waste.

2.8.33. Waste manager means any person who reuses, recycles, recovers, treats, or disposes of waste.

2.8.34. Waste transporter means any person who conveys or transfers waste between the waste generator and a waste management facility, or between waste management facilities.

2.8.35. Waste manifest system means a system of control documentation, which accompanies a load of hazardous waste transported from the point of generation to the waste management facility.

2.9 Abbreviations

Abbreviation	Explanation
ACM	Asbestos-containing material
ACW	Asbestos-containing waste
CCP	Coal combustion product
CFL	Compact fluorescent lamp
ESC	Environmental Steering Committee
FGD	Fluidised gas desulphurisation
GG	Government Gazette
GHG	Greenhouse gas
GN	Government notice
HCW	Health care waste
HCGW	Health care general waste
HCRW	Health care risk waste
ISO	International Organization for Standardization
ODS	Ozone-depleting substance
NEMWA	National Environmental Management: Waste Act (NEMWA) 59 of 2008
PCB	Polychlorinated biphenyl
POP	Persistent organic pollutant
SANS	South African National Standard

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Abbreviation	Explanation
SAWIS	South African Waste Information System
SOC	State-owned company

2.10 Roles and responsibilities

- Eskom Environmental Corporate Office: Waste Portfolio: waste monitoring results are consolidated by the Environmental Corporate Office for Sustainable Development reporting.
- The line divisions, business units (BUs), and operating units (OUs) are responsible for implementation of this standard.

Eskom Environmental Corporate Office: Waste Portfolio	The Eskom Environmental Corporate Office: Waste Portfolio is responsible for the development and provision of assurance on the implementation of this standard. The Environmental Corporate Office is also responsible for assisting in the review, interpretation, influencing, and communication of external governance documents or tools such as legislation, guidelines, and principles to both internal and external stakeholders. The Environmental Corporate Office ensures that internal waste management Level 1 governance documents are aligned with South African legislation and associated regulations, international treaties, and agreements.
Divisions	Ensure that waste generated within an operational area is managed in accordance with waste legislation and regulations. Ensure that the waste register is kept up to date and reviewed at the required intervals. Ensure that the personnel and contractors directly under their supervision are aware of the Eskom Waste Management Standard.
Department of Forestry, Fisheries, and the Environment (DFFE) Waste Directorate	Guide implementation of the waste legislation to ensure compliance. Perform waste characterisation to determine the correct landfill class.
Eskom Commercial Department	This department is responsible for all commercial matters and contract management.
Product Stewardship	Compile safety data sheets for hazardous waste. Be responsible for transportation requirements for the transportation of waste (locally and transboundary).
Engineering/Technology	Identify engineering options to ensure that the activities are compliant with all the requirements of the waste legislation.

2.11 Process for monitoring

The processes as set out in this standard shall be subjected to first level of assurance audits/assessments as undertaken by line divisions and business units, second-level assurance audits conducted by the Environmental Corporate Office: Waste Portfolio, and verification of data and adherence to standards and work instructions. The third level of assurance will be provided

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through internal audits according to processes employed by Assurance and Forensic and external audits as required for assurance purposes.

2.12 Related/Supporting documents

[1] Waste Reporting Template (240-47176064)
[2] PCB Inventory Template (240-51752992)
[3] Hydrocarbon Spill Assessment Table (240-47176039)

3. Document content

Waste management comprises the full range of activities that accompany custodianship and disposal of waste from the point of generation, through transportation, to the point of final disposal, as applicable. It embraces all aspects of the waste management hierarchy (waste avoidance, minimisation/reduction, reuse, recycling, recovery, storage, treatment, transportation, and disposal). The requirements below contain specific extracts from the NEMWA and other waste legal requirements as areas to which special attention needs to be given in Eskom divisions, business units or operating units, and subsidiaries. This does not, however, relieve the reader/implementer of this document from the legal obligations under the omitted sections and compliance with new legislation that comes into effect after the publication of this Waste Management Standard.

3.1 Waste management minimum requirements

Waste management in Eskom shall be managed according to this Waste Management Standard and other applicable documents. Waste management practices of waste streams that can pose a significant risk shall be at least according to the processes described in the appendices contained in this standard. Divisions must ensure that their waste is reused, recycled, recovered, treated, or disposed of within 18 months of generation. Personnel involved in waste management must be appropriately trained in all aspects of waste management. Only trained persons must be allowed to handle waste (general and hazardous).

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3.1.1 Waste generation

a) All employees, including visitors, contractors, and suppliers, doing work on behalf of the organisation on its premises (all Eskom sites, including offices and workshops) are considered to be generators of waste in terms of this standard. Therefore, it is the responsibility of each generator to identify any general or hazardous wastes that it might be producing and to ensure that the waste is handled in a manner consistent with the requirements listed in this Waste Management Standard.

b) Waste generators must have processes in place that are designed and operated to prevent or minimise the quantities of waste generated and hazards associated with the waste generated.

c) Waste generators must ensure that substitution of raw materials or inputs is done with less hazardous or toxic materials or with those where processing generates lower waste volumes.

d) Waste generators must institute good housekeeping and operating practices, including inventory control, to reduce the amount of waste resulting from materials that are out of date, off-specification, contaminated, damaged, or excess to plant needs.

e) Waste generators must institute procurement measures that recognise opportunities to return usable materials, such as containers, and that prevent the overordering of materials.

f) Waste generators must ensure minimisation of hazardous waste generation by implementing stringent waste segregation to prevent the mixing of non-hazardous and hazardous waste to be managed.

g) If the waste generator triggers the requirement for SANS classification, the user must ensure that its waste is classified within 180 days of generation. This classification is based on physical, health, and environmental hazards (SANS 10234, Globally Harmonised System of Classification and Labelling of Chemicals (GHS)).

3.1.2 Temporary storage of general and hazardous waste, excluding health care risk waste

Temporary waste storage is the storage of waste at Eskom sites while awaiting disposal. This section covers the minimum requirements for storage of general and hazardous waste, but excludes medical waste. Health care risk waste (HCRW) shall be managed in accordance with Appendix G of this standard. The following are the requirements for waste storage:

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a) A waste storage facility must be registered with the competent authority prior to the construction taking place if the registration thresholds are triggered.

b) These facilities are required to comply with the norms and standards without a need to conduct a basic assessment (BA) or to obtain a waste management licence as required by Government Notice No. 921 of 29 November 2013.

c) A waste storage facility must be located in such a manner that it can provide optimum handling and transportation of waste material.

d) All waste storage facilities must be located in areas accessible by emergency response personnel and equipment.

e) The waste storage facilities must be constructed and developed under the supervision of a registered professional engineer and must be in accordance with the approved civil engineering designs.

f) All the business/operating units must have a documented labelling or colour coding system to designate different types of waste.

g) Waste must be sorted into various categories at the source, and a documented procedure must be implemented to prevent any mixing of hazardous and general waste.

h) Every waste handler must comply with sections 16 and 17 of the National Environmental Management: Waste Act 59 of 2008 in terms of measures to be taken regarding general duty of care and waste minimisation, reduction, reuse, recycling, and recovery.

i) Nuisances such as odour, visual impacts, and breeding of vectors must be prevented from developing.

j) Training must be provided continuously, as determined by the business/operating units, to all employees working with waste and to all contract workers who might be exposed to the waste.

k) A waste storage facility must have effective access control to prevent unauthorised entry.

l) Each waste storage facility must be able to provide documentation verifying the number of waste storage containers or tanks within the facility, the date of collection, the authorised collector(s), and the proposed final point of treatment, recycling, or disposal.

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m) A general waste storage facility that has the capacity to store in excess of 100 m^3 of general waste must be registered with the authority in accordance with the National Norms and Standards for the Storage of Waste, Government Notice 926 of 29 November 2013.

n) A hazardous waste storage facility that has the capacity to store in excess of 80 m^3 of hazardous waste must be registered with the authority in accordance with the National Norms and Standards for the Storage of Waste, Government Notice 926 of 29 November 2013.

o) A new and existing facility for sorting, shredding, grinding, crushing, screening, or baling of general waste must be registered with the competent authority in accordance with the National Norms and Standards for the Sorting, Shredding, Grinding, Crushing, Screening, or Baling of General Waste, Government Notice 1093 of 11 October 2017.

p) A waste facility that is already registered in terms of the National Norms and Standards for the Storage of Waste and that sorts, shreds, grinds, crushes, screens, or bales general waste must not reregister, but must comply with the National Norms and Standards for the Sorting, Shredding, Grinding, Crushing, Screening, Chipping, or Baling of General Waste.

3.1.2.1 Waste containers

a) Any container or storage impoundment holding waste must be labelled, or where labelling is not possible, records must be kept reflecting the following:

- The date on which the waste was first placed in the container
- The date on which the waste was placed in the container for the last time when the container was filled, closed, sealed, or covered
- The date when waste was added and waste was removed from containers or the storage impoundment and the quantities of such waste, if relevant
- The specific category or categories of waste in the container or storage impoundment as identified in terms of the National Waste Information System, 2012 (within the National Waste Information Regulations: GNR 625, 13 August 2012)
- The classification of waste in terms of Regulation 4 of the NEW: WA Waste Classification and Management Regulations, once the process above has been completed.

b) The containers in which waste is stored must be intact and not corroded or in any other way rendered unfit for the safe storage of waste.

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c) Adequate measures must be in place to prevent accidental spillage or leakage, and in the case of an incident, adequate mitigation measures must be in place to mitigate and to prevent reoccurrence of the incident.

d) Skips/Bins must be closed to prevent the waste from being blown away or rain entering and increasing the volume of waste.

3.1.2.2 Liquid and hazardous waste – specific requirements

a) Liquid and hazardous waste storage areas must have firm, impermeable, and chemical-resistant floors and a roof or should be a container that is coated to prevent direct sunlight and rainwater from coming into contact with the waste.

b) A liquid waste storage facility must have an interception trench with a sump for intercepting and recovering potential spills.

c) The liquid waste storage area must have a secondary containment system (for example, a bund or drip tray) of sufficient capacity to contain at least 110% of the maximum content of the storage facility.

d) Access to the hazardous waste storage facility must be limited to employees who have been trained with respect to the operation of the hazardous waste storage facility.

e) Hazardous waste must be stored in covered containers that should only be opened when waste is added or emptied.

f) Fluorescent light bulbs must be stored in containers that prevent them from breaking, such as in their original boxes, boxes from replacement bulbs, or containers supplied by fluorescent light bulb recyclers.

g) Only persons who have been trained on precautionary measures that need to be taken, procedures that need to be applied where a particular type of work is being performed, procedures for dealing with spillages, appropriate use of protective clothing, and the risk to their health of hazardous substances to which they are likely to be exposed must be allowed to handle hazardous waste.

3.1.3 Waste collection/transportation

a) No person may import waste or transit waste through South Africa without complying with legislation or multilateral environmental agreements required for that transboundary movement of waste.

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b) The transportation of waste shall comply with all requirements as specified in the National Road Traffic Act 93 of 1996, including the associated SANS 10206, 10228, 10229, 10230, 10231, 10232, and 10406 Codes of Practice.

c) Waste contractors transporting hazardous waste will be required to provide Eskom with the necessary documents as mandated by the Department of Transport under the National Road Traffic Act 93 of 2006, NEMWA, regulations, and applicable by-laws to prove that they are permitted to handle and transport the waste and will be required to present a certificate of safe disposal.

d) Any person engaged in the transportation of waste must take all reasonable steps to prevent any spillage of waste or littering from a vehicle used to transport waste.

e) Vehicles used for the collection and transportation of waste must not be used for any other purpose while collecting and transporting waste.

f) Waste must be collected and transported in closed vehicles (covered to ensure that there is no windblown litter generation during transportation).

g) Waste transporters must be registered to do so with the national, provincial, or municipal governments, where applicable. A valid registration certificate must be provided as evidence.

h) The waste generator (Eskom or any person working on behalf of Eskom) must provide the transporter with the relevant transportation documentation (as mentioned under normative references) for the consignment.

i) The load must be properly loaded and secured on site prior to transportation.

j) The transport operator of hazardous waste must have hazchem placards on his/her vehicle and ensure that they are properly fitted to the vehicle.

k) The responsible person must ensure that, before the vehicle leaves the consignor’s premises, it is not overloaded or showing any obvious defect that will affect its safety.

l) The waste generator or his/her representative, that is, the transporter, must ensure that adequate steps are taken to minimise the effect an accident or incident may have on the public and on the environment.

m) Where waste is transported for the purpose of disposal, a person transporting waste must ensure that the facility to which waste is transported is authorised to accept such waste. The generator must have approved of that disposal facility prior to the waste being transported.

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n) The waste generator (Eskom or any person working on behalf of Eskom) must provide the transporter with accurate information about the nature and properties of the load. Where contractors are used, the onus lies on the waste generator to ensure that the required information is correctly filled in on the waste manifest.

o) All waste contractors transporting hazardous waste will be required to provide Eskom with a waste manifest detailing the type of waste disposed of, the quantities disposed of, and how and where the waste was disposed of, as well as a certificate of safe disposal.

p) A waste collection record for general waste must be created that identifies the type of waste disposed of and the waste facility where it is disposed of.

3.1.3.1 Waste manifest

All waste that is transported off site needs to be accompanied by a waste manifest document. This is a legal document that contains the waste generator's details, the waste transporter's details, and the waste manager's details. The manifest document will also detail how the waste stream is to be managed and will contain emergency contact details.

The generators of the waste are responsible for ensuring that all waste leaving the site is accompanied by a waste manifest document and, in the case of hazardous waste, a safety data sheet (SDS). Once the waste management facility has reused/recycled/treated/disposed of the waste, a safe disposal certificate will be issued to the generator of the waste.

The following documents must be retained by the generator of the hazardous waste for a minimum of five years and may be requested during any audits:

- Manifest
- Weighbridge ticket from the Eskom weighbridge (if available) and waste management facility
- Safe disposal certificate from the waste management facility
- Information specified in Item 2 of the Waste Classification and Management Regulations, Government Notice 634 of 23 August 2013, Annexure 2, must be reflected in the waste manifest document. All waste manifests must contain information supplied by the waste generator (consignor), information supplied by the waste transporter, and information to be supplied by the waste manager (consignee).

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3.1.4 Waste classification

a) In order to determine the prescribed requirements for the landfill disposal of industrial waste, all potentially hazardous industrial waste must be classified in accordance with the Waste Classification and Management Regulations, GNR 634 of 23 August 2013.

b) In terms of this section, all waste generators must ensure that the waste they generate is classified in accordance with SANS 10234 (except if the waste is listed in Annexure 1 of this these regulations). The waste must be classified within 180 days of generation. This section requires compliance with SANS 10234. Refer to Appendix O for waste classification and management.

3.1.5 Waste minimisation, recycling, reuse, and recovery

a) All Eskom businesses, including subsidiaries, must take all reasonable measures to ensure that the generation of waste is avoided and, where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated. Waste must be reduced, reused, recycled, and recovered. Refer to Appendix N on the waste management hierarchy and waste minimisation.

b) Waste must be managed in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts.

c) Any business/operating unit that sells a product that may be used by the public and that is likely to result in the generation of hazardous waste must take reasonable steps to inform the public of the impact of that waste on health and the environment.

d) Waste produced from solar photovoltaic (PV) products is similar to that of e-waste because the manufacturing of PV semiconductor materials is similar to, or based on, microelectronics. PV recycling can be done either at integrated e-waste recycling facilities or lead-acid battery recycling centres.

3.1.6 Waste disposal

a) Waste shall be disposed of at facilities authorised to accept such waste. This includes Eskom-owned waste facilities.

b) No burning of waste should occur at the general waste disposal facility or on any residential and business premises, except at an approved and permitted incinerator.

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c) All general waste must be disposed of at a designated, licensed landfill, waste disposal site, or allowed transfer station in the local council area or municipality.

d) Pollution of the environment and harm to health must be prevented by not:

- disposing of waste or permitting waste to be disposed of on any land, in any body of water, or at any unlicensed facility;
- throwing, dropping, depositing, spilling, or in any other way discarding any litter into or onto any public place, land, vacant erf, stream, watercourse, street or road, or any place to which the general public has access, except in a container or a place specifically provided for such disposal;
- disposing of waste in a manner that is likely to cause pollution of the environment or harm to health and well-being (for example, the burning or burying of waste);
- disposing of unclassified waste; and
- using unlicensed/unpermitted waste disposal facilities for Eskom waste.

e) Ensure that safe disposal certificates are retained for hazardous wastes that have been disposed of.

3.1.7 Waste disposal and restrictions

The disposal regulations govern the permissibility and disposal of a particular waste. These regulations are designed to protect the environment, and thus, there are certain waste streams for which landfill disposal is prohibited. The prohibition of some waste streams may only be identified through a characterisation analysis. The paragraphs below detail the list of prohibitions and the associated timelines.

Precautionary approach for waste disposal

In the event that a waste stream has been generated and identified for landfill disposal without having undergone characterisation analysis, the waste should be treated as a Type 1 waste to be disposed of at a Class A landfill facility. However, as stated in section 8 of the minimum requirements of the Department of Water Affairs and Forestry (DWAF), if there is existing analytical information (from the analysis of waste) this can be used to make a decision regarding the disposal of the waste, provided that the analysis was conducted at an accredited laboratory. Please contact the Environmental Department to ensure that the correct landfill is selected for the disposal of the waste while waiting for updated analytical information from the accredited laboratory.

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Waste streams are also to be treated as Type 1 wastes for disposal at a Class A landfill if the waste characterisation analysis was insufficient (for example, where the laboratory was unable to determine the chemical components in the waste, where only leach analysis was conducted, etc.) until verification work has been concluded and communicated through the Environmental Department or Environmental Engineering.

3.1.8 Waste reporting

a) At a minimum, a waste register, including the waste types, waste produced, quantities disposed of, quantities recycled, disposal destinations, safe disposal certificates, income, and cost for the handling, transportation, or disposal, must be kept.

b) Records of waste must be maintained for five years and in accordance with applicable legislation. (Refer to Appendix J.)

c) To ensure that waste management activities in Eskom are undertaken in a controlled manner, practices and resources shall be in place. Each business/operating unit is required to compile an industry waste management plan in accordance with the requirements stipulated in Appendix A.

d) Waste management activities will be reported on in the organisation on a six-monthly and annual basis. Business/operating units should do waste reporting in accordance with the Waste Reporting Template (240-47176064).

e) All waste management facilities, as well as hazardous waste generators (generating more than 20 kg/day), are required to register and must ensure that they are registered to produce a waste report in accordance with the South African Waste Information System (SAWIS).

f) These waste reports should be shared with the personnel responsible for waste reporting at the divisional level for ratification and should, furthermore, be shared with the Waste Portfolio of the Corporate Office for further ratification on a quarterly basis.

Health care risk waste storage

a) HCRW storage areas shall be clearly demarcated for the storage of HCRW and shall be clearly marked “Health care risk waste storage area”.

b) The storage area shall be large enough to accommodate the quantities of waste likely to be stored before collection.

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c) The storage area shall have a hard-standing surface and be easy to clean.

d) The floors of the storage facility must be cleaned and disinfected and a register kept.

e) The waste shall not be stored near patients or the food preparation area.

f) Sharps must be contained in rigid, puncture-proof, tamper-proof, and clearly marked containers.

g) A plastic bag used as a liner in a disposable container or a reusable container shall have a thickness of not less than 60 µm.

h) A waste generator must store HCRW other than pathological waste, sharps, and pharmaceutical waste for not more than 90 days from the date of generation.

4. Acceptance

This document has been seen and accepted by:

Name	**Designation**
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5. Revisions

Date	Rev.	Compiler	Remarks
August 2021	5	Zama Mkhize and Waste Management Forum	Review of content and update to new legislation and other requirements
July 2018	4	Humbulani Ndou	Review of content and update to new legislation and other requirements
July 2015	3	Beverley Monametsi	Review of content and update to new legislation and other requirements
September 2011	2	Beverley Monametsi and Waste Task Team	Review of content and update to new legislation and other requirements
April 2009	1	Iris Cloete	Review of content and update to new Eskom Document Control format
June 2006	0	Waste Management Forum	New document in terms of policy review process

6. Development team

The following people were involved in the development of this document:

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- Riana Bothma – Research, Testing, and Development
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7. Acknowledgements

Thank you to all Environmental Steering Committee (ESC), development team, and EDC staff members who worked relentlessly to ensure that the document would be adequately compiled and representative of the Eskom business.

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Appendix A: Industry waste management plans (IndWMPs)

A.1 Industry waste management plans shall be developed and implemented to meet the requirements for these general duties in respect of waste management:

a) Avoid the generation of waste. Where such generation cannot be avoided, minimise the toxicity and amounts of waste that are generated.
b) Identify all waste streams that arise from the activities of the business.
c) Reduce, reuse, recycle, and recover waste as a first priority before disposal.
d) Where waste must be disposed of, ensure that the waste is pre-treated and disposed of in an environmentally sound manner by the waste facility.
e) Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts.
f) Prevent any employee or person from contravening applicable environmental legislation.
g) Take reasonable measures to prevent the waste from being used for unauthorised purposes.

A.2 The industry waste management plans will, at a minimum, contain the following:

a) The amount of waste that is generated
b) Measures to prevent pollution or ecological degradation
c) Targets for waste minimisation through waste reduction, reuse, recycling, and recovery
d) Measures or programmes to minimise the generation of waste and the final disposal of waste
e) Measures or actions to be taken to manage waste
f) The phasing-out plans of the use of specified substances (for example, persistent organic pollutants, such as PCB, asbestos, and ozone-depleting substances (ODS))
g) Opportunities for the reduction of waste generation through changes to packaging, product design, or production processes
h) Mechanisms for informing the public about the impact of the waste-generating products or packaging on the environment
i) The extent of any financial contribution to be made to support consumer-based waste reduction programmes
j) The period that is required for implementation of the waste management plan
k) Methods for monitoring and reporting
l) The waste class and rating in order to determine the correct disposal method for the waste
m) Any other best practice that may be necessary to give effect to the requirements of the NEMWA and regulations passed under it

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Appendix B: Coal combustion products

"Coal combustion products" (CCPs) is the collective term for all residues arising from the combustion of fossil fuels. This includes products from the boiler itself as well as the air pollution abatement equipment installed. An array of such products, each with its unique characteristics, has evolved over the past 40 years, as power utilities adapted their technology to comply with legislation introduced to ameliorate the impact of coal combustion. Included among these are fly ash, bottom ash, various types of flue gas desulphurisation, products such as gypsum, ammoniated fly ash, high carbon fly ash from low NO_x burners, Hg capture, fluidised bed combustion residue, etc. Currently, Eskom CCPs are entirely fly ash, bottom ash, and gypsum. The flue gas desulphurisation technology to be employed at the new build power stations such as Kusile and Medupi will add gypsum to the list of CCPs.

B.1 Coal waste (coal discards)

Coal discards should be managed in accordance with the Position Paper on Management of Coal Waste at Power Stations (ENV18-004).

B.2 Ash

A modern coal-fired power station with a total output of 3 600 MW will consume approximately 50 000 tons of coal every day. Depending on the coal quality, the calorific value (heat content), and the ash content, stations can produce approximately 17 000 tons of ash per day. Almost 90% of the ash produced in the generation process is called fly ash or pulverised fuel ash. The reason for this is that the coal is pulverised into a very fine dust before being fed into the boilers to ensure efficient combustion. Larger particles of ash, called coarse ash, that make up the rest of the ash produced at the power station drop down from the furnace and collect at the bottom in the ash hopper of the boiler.

Approximately 3,1 million tons of ash is sold per year to, among others, the cement industry, where the ash is used as a cement extender. The ash consists of very fine, spherical particles and has almost zero carbon content, high pozzolanic activity (or reactivity), and unusually high consistency. In addition to its use as a cement extender during the manufacturing of cement, fly ash is successfully used to enhance the quality and economy of concrete. Uses of fly ash include brick making and dam building. Approximately 250 000 tons of ash from Lethabo Power Station, for instance, was exported to Lesotho for the Katse Dam project. The fly ash that Eskom does not sell on site is stored in ash dumps or dams that are controlled via the lining of trenches, monitoring of groundwater, and rehabilitation of topsoil, but there is a risk of pollution.

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B.3 Gypsum

The potential requirement to adhere to more stringent limits on the gaseous emissions necessitates the removal of SO_x (oxides of sulphur) from flue gases during coal combustion. Subsequently, all new stations will include flue gas desulphurisation technology. This technology requires the introduction of a sorbent (usually limestone or dolomite) to reduce the amount of SO_2 that is emitted. Calcium from the limestone reacts with the SO_2 to form calcium sulphite or calcium sulphate and CO_2. A by-product of the FGD process is gypsum. Gypsum has a commercial value and could be sold on the market. Demand for such a product is currently being determined by the supply chain operations (Commercial Department).

A study has been initiated to investigate the potential opportunities that will result in the use of this resource. Initial findings indicate that construction and agriculture are the most suitable sectors for gypsum commercialisation. It can be used for the manufacture of wallboard, plaster, and screeds, as a set retarder for Portland cement, and for soil stabilisation. However, the use depends on the nature, composition, and properties of the gypsum.

Eskom will continue to engage with industry to promote the use of CCPs and set internal targets to encourage additional uses. This will be done in conjunction with the current key role players in the market and will take Eskom's strategy around supplier development and localisation into consideration, with a specific focus on black-women-owned (BWO) companies.

B.4 Legislative requirements

The regulations under the Environment Conservation Act (ECA) 73 of 1989 as published in GN 1986 in GG 12703 of 24 August 1990 and as amended by GN 292 in GG 24938 of 28 February 2003 expressly exempted ash produced by, or resulting from, activities at an undertaking for the generation of electricity under the provisions of the Electricity Act 41 of 1987 from being classified as waste. There was, thus, no obligation for power stations to obtain a permit to dispose of ash or to operate a disposal site for ash. At the time of construction of the ash dams and dumps of the currently operational power stations, ash did not meet the legal definition of "waste" and did not require an ECA section 20(1) permit.

Ash from combustion and gasification processes is identified as a waste stream for beneficial use and is permitted for brick making, block making, production of cement, landfill capping, backfill in old mine workings, inorganic fertiliser, soil ameliorant and conditioner, asphalt and other bituminous mixtures, road construction, foundations, and bulking agent for compositing.

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The Department of Forestry, Fisheries, and the Environment (DFFE) promulgated regulations regarding the exclusion of a waste stream or a portion of a waste stream from the definition of waste in GNR 715 in July 2018. The purpose of these regulations is to prescribe the manner in which a person or a category of persons may apply to the Minister for the exclusion of a waste stream or a portion of a waste stream for beneficial use from the definition of waste and to exclude permitted uses of a waste stream or a portion of a waste stream from the definition of waste as well as to promote diversion of waste from landfill disposal to its beneficial use.

Eskom submitted an application to the DFFE in October 2018 and received approval for the fresh and weathered ash emanating from 17 Eskom power stations. This is based on the definition of waste as contained in the National Environmental Management: Waste Act 59 of 2008. Eskom fresh and weathered ash can only be utilised for beneficial uses of cement, geopolymers, filter applications, zeolite production, metal and mineral extraction, mineral fibre production, road construction, mine backfilling, treatment of acid mine drainage and soil amelioration, and brick and block making.

The NEMWA has subsequently included ash in the definition of waste. However, Government Notice 921 of 29 November 2013, 7(1), provides that “a person who lawfully conducts a waste management activity listed in this Schedule on the date of the coming into effect of this Notice may continue with the waste management activity until such time that the Minister by notice in a *Gazette* calls upon such a person to apply for a waste management licence”. Currently, existing lawful waste management activities do not have to undergo an environmental impact assessment (EIA) process or be licensed, until directed so by the Minister, in accordance with the transitional provisions in section 82 of the NEMWA.

Ash disposal facilities are seen as section 21(g) water use activities (“disposing of waste in a manner which may detrimentally impact on a water resource”); that is, they are regarded as an activity that has the potential to negatively affect water resources. All water use activities need to be licensed in terms of section 21(g) of the National Water Act. This will also apply to gypsum if some of it will be dumped at the power station.

Fly ash material solidifies while suspended in the exhaust gases and is collected by electrostatic precipitators or filter bags. The material consists mostly of silicon dioxide (SiO_2) (which is present in two forms: amorphous, which is rounded and smooth, and crystalline, which is sharp, pointed, and hazardous), aluminium oxide (Al_2O_3), and iron oxide (Fe_2O_3). Fly ash, like soil, contains trace concentrations of many heavy metals that are known to be detrimental to health in sufficient

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quantities. These can leach into the ground or surface water and cause contamination. These elements are, however, found in extremely low concentrations in fly ash.

Flue gas desulphurisation drastically removes sulphur dioxide from chimney emissions. Sulphur dioxide is a colourless gas produced when fossil fuels such as coal and oil are burnt. It is extremely harmful to the environment and one of the main chemicals that can cause acid rain. Sulphur dioxide is harmful to plants and can damage trees. If sulphur dioxide emissions are cut down through the use of technologies such as flue gas desulphurisation, we will come one step closer to a clean environment.

B.5 Management requirements

a) Effective measures must be implemented to prevent groundwater pollution by ensuring that no leachate pollutes groundwater.

b) Groundwater monitoring is to be done at and around the ash dams and dumps. Reviews of groundwater monitoring results shall be undertaken. Based on the outcome, the appropriate mitigation required shall be determined to ensure avoidance and control of groundwater contamination.

c) Operational procedures and work instructions have been developed and implemented to ensure correct management and operation of the dams/dumps. These will only need to be updated for alignment with all relevant legislative requirements.

d) Further research shall be undertaken to ensure that both ash and FGD waste will be analysed and classified to bring it under environmentally sound management practices.

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Appendix C: Hazardous waste: electrical and electronic equipment (WEEE) (including CFLs, etc.)

As of 23 August 2016, no hazardous WEEE lamps in any form may be accepted at landfills according to the National Norms and Standards for Disposal of Waste to Landfill, GNR 636 of 2013. Eskom supports government's strategy to divert waste from landfills. The ban on hazardous WEEE lamps from landfills includes all fluorescent tubes, compact fluorescent light bulbs (CFLs), and light-emitting diodes (LEDs). Mercury-containing lamps and devices contain small quantities of mercury, cadmium, and antimony, and proper disposal throughout Eskom is essential.

C.1 Environmental impacts

a) Fluorescent tubes, for example, CFLs, are considered extremely hazardous waste and contain an average of 2 mg/kg of mercury (Hg), which is a known carcinogen, per lamp as an essential ingredient for the generation of light. Other types may contain up to 15 mg of mercury.
b) Light bulbs contain dangerous metals such as mercury and cadmium that, if allowed to leach into the soil and groundwater, can pose serious concerns in terms of human health and ecosystems. The mercury vapour that is released into the environment when lamps are broken pollutes the air and poses a risk to people through inhalation. It is estimated that a single fluorescent tube contains enough mercury to pollute 30 000 litres of water.
c) Mercury compounds are chemically stable. Therefore, they do not readily break down over time or release the mercury into the water streams. All mercury-containing waste in Eskom will be pretreated to form such a compound when crushed and stored for final disposal.

C.2 Management requirements

a) All fluorescent lamps and tubes are considered hazardous waste when discarded because they contain mercury and must be collected and recycled at an authorised recycling facility.
b) Recycling of fluorescent tubes and lamps provides a total environmental solution because it allows for the recovery of all fractions of the lamps and tubes.
c) Recycled fractions of lamps and tubes include glass, ferrous and non-ferrous metals, plastic, mercury, and phosphor powder, which can all be recovered and used in suitable end processes and products.
d) Fluorescent lamps and tubes should not be crushed on site.
e) Waste generators must ensure that they obtain proof that the waste facility where their waste is recycled is authorised.
f) Package, store, and transport fluorescent light bulbs in containers that prevent them from

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breaking, such as in their original boxes, boxes from replacement bulbs, or containers supplied by fluorescent light bulb recyclers.

g) Store them in an area away from rain, so that, if they break, rainwater will not wash the mercury from broken lamps or tubes into waterways.

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Appendix D: Oil (hydrocarbon) management (normative)

Due to the strategic and diagnostic nature of oils in Eskom equipment, aspects such as the purchase, usage, handling, storage, transport, and general control of the commodity need to be managed carefully.

D.1 Environmental impacts

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 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 can rapidly penetrate certain soil types, which may lead to extensive environmental, as well as groundwater and surface water, contamination.

D.2 Management strategies

a) Management will follow the requirements as listed in the Eskom document entitled Standard for Mineral Insulating Oils (Uninhibited and Inhibited): Purchase, Management, Maintenance, Testing, and Disposal (240-775661431). Safe disposal of oils shall also consider the requirements as per SANS 290: Mineral Oils – Management and Handling of PCBs.

b) Eskom had to adapt to market trends and available product, thus allowing for the use of inhibited and uninhibited naphthenic insulating oil in electrical equipment. This type of oil is also referred to as a mineral oil. Eskom proceeded to embark on the use of “green oils”, also referred to as phosphate esters, which are derived from natural sustainable resources such as soya and rape seed oil. The roll-out of these oils has been phased, with all new pole-top transformers currently purchased by Eskom containing these oils. Some of the listed advantages of the green oils are that they are biodegradable, have higher fire resistance than mineral oils, and are becoming more popular internationally. The next phase on which Eskom embarked was to gain field experience on a 20 MVA distribution unit containing about 20 000 litres of green oil, with a planned project in the pipeline for a larger unit, such as a 400 MVA unit containing approximately 80 000 litres of these oils. Successful completion of these projects will most probably see local industry transition to these green oils within the next five to 10 years.

c) 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 PCBs, solvents, and synthetic oils, including electrical cleaner, silicone oil, and motor oils.

d) All oil (hydrocarbon) spill incidents within Eskom shall be reported electronically in line with the

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requirements of the Environmental Incident Management Procedure (240-133087117).

D.3 Management requirements

D.3.1 Spillages of oil, solvents, or hydrocarbons

Eskom is committed to Zero Harm to people and the environment as an Eskom value that forms an integral part of its operations. All hydrocarbon spills need to be assessed by completing the Hydrocarbon Spill Assessment Table (240-47176039). If the PCB levels of the oil are not known through prior testing, the spill shall be treated as a PCB spill, until such time that analysis proves otherwise. All hydrocarbon spill incidents within Eskom shall be reported electronically in line with the requirements of the Environmental Incident Management Procedure (240-133087117).

D.3.2 Spill at an Eskom site

D.3.2.1 Limiting the spillage

The need for immediate corrective action to limit the spillage cannot be overemphasised because this will minimise the environmental damage and reduce remediation costs. This can involve actions such as:

a) closing a valve;
b) repairing the leak with rags, plugs, or other appropriate material;
c) repositioning the container, so that the leaking area is at the highest level or lifting a fallen drum/container;
d) placing a leaking container or equipment in a collecting tray or bund area; and
e) collecting the spilt oil in a container located underneath the leak or channelling the leak into a container.

D.3.2.2 Containing the spillage

The containment of a spill will involve an action that will either prevent or stop a spill from spreading. It is vital to prevent any oil spill from entering bodies of water such as drains, storm water systems, dams, or rivers. Containment of the oil near the source will minimise pollution and will enable easy clean-up and/or remediation. This shall be done using one or more of the following:

a) Soil barriers
b) Sandbags
c) Bund walls
d) Absorbent materials

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D.3.2.3 Removal of oil

The free oil (puddles) shall be captured and put into a suitable container, such as a drum or tanker, for proper disposal. This oil shall not re-enter the Eskom insulating oil pool for regeneration and reuse in electrical equipment.

D.3.2.4 Final clean-up/remediation

After removal of excess oil, sawdust, suitable absorbents, or solvents shall be used to complete the clean-up of the spill. This might include the removal of leaking equipment, cleaning of pavements, removal of contaminated soil and vegetation, as well as disposal of clean-up equipment. The absorbing material shall be bagged and disposed of at a registered hazardous waste site.

D.3.2.5 Remediation of the land

The land must be remediated to its virgin state. This must be assessed first to determine contamination. The assessment must be done in accordance with the requirements as set out in the Norms and Standards for the Remediation of Contaminated Land and Soil Quality in the Republic of South Africa, Government Notice 331 of 2 May 2014, which stipulates a list of contaminants that need to be checked in order to confirm whether land is contaminated. The contaminants include, among others, chromium III and IV, lead, hydrocarbons, and sulphates. If the soil screening values of hydrocarbons, in this case, exceed the value stipulated in the norms and standards, it means that the land is contaminated and needs to be remediated. Remediation deals with the removal of pollution or contaminants from environmental media such as soil, groundwater, sediment, or surface water. If a site has to remediate the land, the method of remediation must be decided on site with assistance from the Risk and Sustainability Corporate Office (Waste Portfolio).

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Appendix E: Polychlorinated biphenyl (PCB) management

PCBs are synthetic liquids with exceptionally high chemical and thermal stability. PCBs were historically 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. PCBs can be found in dielectric fluid used in some electrical equipment such as transformers and capacitors for electrical insulation and thermal cooling.

E.1 Environmental impacts

As PCBs are not readily biologically degradable, they tend to be passed on through the food chain and have, thus, been classified as a POP. PCBs produce hazardous carcinogenic by-products under incomplete combustion.

E.2 Management strategies

a) Persons in possession of items must take samples from the items and have them tested for PCBs by an accredited laboratory in accordance with SANS 290. The results must be kept until 2023.
b) It is important to note that although oil and equipment at Level 3 (< 50 ppm) and below are considered non-PCB materials in accordance with the Stockholm Convention on POPs, the strategy in Eskom is to ultimately work towards achieving Level 0.
c) All PCB holders must label their articles in accordance with SANS 290.
d) The management, handling, and disposal of PCBs will be done in accordance with SANS 0290: 2008: Mineral Insulating Oils – Management and Handling of Polychlorinated Biphenyls (PCBs). Phase-out will be done in accordance with the PCB Phase-out Standard (EPC 32-1135).
e) In line with the Stockholm Convention and regulations to phase out the use of PCBs, Eskom is committed to the phasing out of PCBs.
f) Eskom will not:
   - use any PCB materials or PCB-contaminated materials after the year 2023; or
   - have any PCB materials, PCB-contaminated materials, or PCB waste in its possession after the year 2026, excluding disposed-of PCB waste.
g) Eskom has registered as a PCB holder in accordance with the PCB Regulations. The registration number is 14/11/11/PCB/021.

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h) All owners of PCBs within Eskom must develop and maintain a PCB Inventory Template (240-51752992) that has been accepted and signed by the employer.

i) A comprehensive PCB management and phase-out plan shall be developed by each Eskom division for PCBs over 50 ppm.

j) Progress on the PCB phase-out plans will be reported on a six-monthly basis as required by this procedure.

k) The PCB inventory and phase-out plan will be subject to internal or external audits in accordance with the business requirements.

l) This section on PCB management must be read in conjunction with the PCB Phase-out Standard (EPC 240-84908008 or 32-1135), March 2015.

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Appendix F: Asbestos management

The Eskom standard entitled Requirements for the Safe Processing, Handling, Storing, Disposal, and Phase-out of Asbestos (32-303), under the purpose, gives practical expression to Eskom's commitment to protecting people and the environment against the harmful effects of regulated asbestos fibres and expresses the requirements for asbestos phase-out programmes. Also included in this document are the roles and responsibilities for the management of asbestos.

An asbestos phase-out programme involves the removal of asbestos and asbestos-containing material (ACM) and/or replacement with non-asbestos material over a time period specified by the business unit in the asbestos phase-out plan/programme.

The OU/BU responsible manager concerned with the collection, transport, and disposal of asbestos waste is responsible for complying with the provisions of the OHS Act, Asbestos Regulations, ECA, NEMWA, Standard 32-303, and all applicable legislation. The OU/BU responsible manager has to ensure that steps are taken to prevent the release of asbestos. The OU/BU responsible manager shall ensure that all asbestos and ACM are identified and recorded in an inventory by a competent person, that is, competent in the identification and applicable techniques of asbestos and ACM as well as in the formulation of the relevant inventories and phase-out plans.

This appendix deals with the disposal of asbestos and ACMs, equipment, and articles. All asbestos waste shall be transported in accordance with SANS 10228 and SANS 10229. For more information on the general management of asbestos and the safe processing, storage, removal, and handling of ACMs, equipment, and articles, the Eskom standard entitled Requirements for Safe Processing, Handling, Storing, Disposal, and Phase-out of Asbestos (32-303) should be used.

F.1 Environmental impacts

ACMs were historically used for lagging and insulation purposes, especially at power stations. Being a POP, asbestos is listed under the Rotterdam Convention as an Appendix A chemical and has, therefore, been banned in South Africa for imports, exports, mining, and manufacturing. It, furthermore, has health effects because the inhalation of these regulated asbestos fibres causes serious lung diseases, including asbestosis, cancer of the lungs, and mesothelioma. These diseases usually become apparent only some years after exposure to asbestos and sometimes up to 40 or more years after the first exposure.

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F.2 Management strategies

All owners of ACMs and equipment are required to have a plan for the phasing out of asbestos as soon as possible, but not later than November 2033. Where there is immediate risk, asbestos should be removed and replaced with non-ACM or as part of normal maintenance.

F.3 Management requirements

F.3.1 Asbestos inventories

All owners of asbestos and ACM will develop and maintain an asbestos inventory and phase-out plan in order to meet the Eskom phase-out date of 2033. All asbestos and ACM shall be identified and recorded in an inventory by the employer, in line with the Asbestos Inventory Template (240-47175987). If such material does not belong to the employer, the owner must provide the inventory, but in such a case, the onus is on the employer to verify the correctness and applicability of the information in the inventory. The Asbestos Inventory Template should be consulted for refurbishment, and where significant changes to the initially identified risks are noted, the risk assessment should be updated to reflect the new risk status. The inventory shall be kept on record for a period of 40 years.

The purpose of an inventory is to establish exact locations for asbestos or ACMs on site, to provide an estimate of the quantity of asbestos or ACMs on site, to assess the condition of the material, and to provide supporting information for an asbestos phase-out plan.

Where there is uncertainty whether a particular material is, or contains, asbestos, it shall be handled as if it is an ACM until such time that it is confirmed as not containing asbestos. A swipe sample of dust collected on work surface areas, or in identified marked areas, should be collected and scanned under a phase-contrast microscope for recognition of the presence of asbestos fibres by an accredited laboratory.

F.3.2 Requirements for the handling and disposal of asbestos

- The management, handling, and disposal of asbestos and ACM will be done in accordance with the terms of the Environment Conservation Act 73 of 1989, the National Environmental Management: Waste Act 59 of 2008, the Asbestos Abatement Regulations of 2020, and the Eskom standard entitled Requirements for Safe Processing, Handling, Storing, Disposal, and Phase-out of Asbestos (32-303).
- All used air filters from vacuum cleaners, air conditioners, and ventilation equipment shall be

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placed in impermeable bags or similarly effective containers. These containers shall be sealable for disposal. (The outside of all containers shall be cleaned before leaving the workplace.)

- Waste shall be disposed of only at waste disposal sites specifically designated for this purpose in terms of the Environment Conservation Act (ECA) 73 of 1989 or the National Environmental Management: Waste Act 59 of 2008.
- Asbestos that has been disposed of will be reported on a six-monthly basis as required by this procedure using the Waste Reporting Template (240-47176064).
- In order to avoid the spread of asbestos dust, employers and self-employed persons must ensure that asbestos and asbestos-containing articles or substances are identified, packed, labelled, and handled in accordance with SANS 10228 and 10229.

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Appendix G: Health care risk waste

Health care waste (HCW) 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. HCW comprises health care general waste (HCGW), the non-hazardous component of HCW, and HCRW, posing a risk to human health and the environment. Eskom generates HCGW and HCRW at the various health care facilities it operates. HCRW must be managed in accordance with the Eskom Health Care Risk Waste Management Standard (240-115842952), National Health Act 61 of 2003 GN 1229, and other related documents.

G.1 Environmental impacts

Exposure to HCRW can result in health risks to the public, patients, health care workers, waste managers, and the environment. Waste management measures can reduce such risks substantially.

G.2 Management strategies

Segregation and minimisation are the most important steps to successively manage HCRW. The management strategies will be handled in accordance with the Eskom Health Care Waste Risk Management Standard (240-115842952) and SANS 102148 (1, 2, and 3).

G.3 Process for disposal and monitoring

- HCGW and HCRW shall not be disposed of by burning, dumping, or burying in pits or in trenches.
- HCRW shall not be treated by sterilisation and/or incineration as prescribed in SANS 102148 (1, 2, and 3).
- HCGW and HCRW shall be disposed of at authorised landfill sites/treatment facilities.
- Records for awareness and disposal must be kept at each clinic of all HCW management practices.
- All records must be accessible and must be kept for purposes of monitoring and measurement of HCRW practices.
- The health care facilities shall retain documented evidence from waste management practices/activities.

G.4 Handling COVID-19 waste

The COVID-19 Environmental Health Guidelines provide guidelines for the monitoring of the management of COVID-19 waste to avoid contamination and the possible spread of the COVID-19

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virus. In Eskom, COVID-type waste is COVID-19-contaminated waste generated from medical centres, individuals in isolation, or individuals in quarantine. Also, when a COVID-19 case is detected, the otherwise general waste must be treated as health care risk waste (HCRW) in terms of SANS 10248-1 and will need to be disposed of using medical waste disposal methods:

- All waste items that have been in contact with individuals who are confirmed or suspected cases of COVID-19 are disposed of securely in a black or red refuse plastic bag, separate from the rest of the general waste.
- All health care waste produced during patient care, regardless of whether that patient is a confirmed COVID case or not, is considered to be infectious (infectious, sharps, and pathological waste).
- Health care risk waste identification, segregation, storage, and disposal must be managed in accordance with SANS 10248-1.
- Health care risk waste should be properly packaged in sealed, leak-proof, and puncture-proof containers or boxes.
- Health care risk waste must be labelled with the relevant biohazard symbols or signs and marked “Coronavirus or COVID-19” and should be stored separately from other wastes generated.
- All bags, bins, and boxes must be sealed adequately, so as not to leak any fluids, and must be wiped down with 0,05% chlorine solution before being stored or removed.

<u>COVID-19-type waste generated from workspaces which do not have known COVID-19 infections</u>

COVID-19-type waste generated in workspaces (offices) and waiting areas of health care facilities can be classified as non-hazardous and should be disposed of in strong black bags and closed completely before collection and disposal by municipal waste services.

When full, the black or red refuse plastic bag should then be placed in a second black or red refuse plastic bag (double bag) and tied to prevent any waste from spilling from the bag.

Employees are requested to wash their hands with water and soap for 20 seconds before and after handling wheelie bins or black refuse plastic bags. This measure is aimed at protecting both the public and the essential refuse removal teams.

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Transport of hazardous COVID-19 waste

It is not anticipated that Eskom staff will be required to transport waste known to be COVID contaminated. Besides medical care professionals and employees authorised to do so, Eskom employees will refrain from transporting waste known to be COVID contaminated. Arrangements should either be made with the relevant medical centre or Department of Health office.

Employees are requested to refrain from approaching refuse removal personnel. Please keep a distance of 2 m at all times. The black refuse plastic bags or wheelie bins can be placed out for removal after the above-mentioned steps have been followed.

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Appendix H: Metals

Waste metal is an important industrial raw material. The melting of scrap metal saves resources and energy compared to the use of newly extracted ores. Metal waste that contains hazardous substances or electronic components should be treated separately during disposal.

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 environmental hazards of their own.

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 SHEQ Policy (EPL 32-727).

H.1 Environmental impacts

Eskom's plant and operating equipment (for example, transformers, electrical cable, substation equipment, etc.) consists largely of metal. Once equipment has been replaced or decommissioned, metal parts are reused, 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.

H.2 Management strategies

The sale of an Eskom asset should be performed in accordance with Eskom's Procurement and Supply Chain Management Procedure (32-1034).

H.3 Management requirements

In line with the principles of waste minimisation, scrap metal should first be reused or recycled before disposal to a 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. Ensure that these service providers are authorised to reuse/recycle scrap metals by producing a recycler's permit. The Investment Recovery Section is responsible for

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ensuring that contracts for the selling and the disposal of scrap metal address the matters outlined below.

H.3.1 Non-ferrous metals (copper, aluminium, etc.)

Disposals of all metals, including non-ferrous metals, must be done through the Investment Recovery Section. The following are sources of non-ferrous metal waste:

- Stores
- Substations and construction camps
- Dismantling of disused lines
- Reconducting projects

H.3.2 Ferrous metal (scrap steel, etc.)

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

- steel subgrade;
- steel heavy grade;
- current transformers (CTs), voltage transformers (VTs), and switchgear;
- plastic and polyvinyl chloride (PVC); and
- wood/general clean-up.

H.3.3 Metals coated with other hazardous substances

Metal equipment contaminated with PCB-contaminated oil may not be sold. Such metal equipment must be destroyed by thermal destruction.

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Appendix I: Disposal and safe handling of contaminated sulphur hexafluoride gas (SF_6) and its by-products

Sulphur hexafluoride (SF_6) is a colourless, odourless, non-flammable gas that is primarily used in the electrical and electronics industry as insulation in switchgear and in circuit breakers as an insulating and arc extinguishing (quenching) medium. SF_6 is a part of the greenhouse gas (GHG) emissions caused by the energy sector. SF_6 was listed as a greenhouse gas emission at the Paris Agreement in December 2015. The Paris Agreement goes beyond the Kyoto Protocol and aims at enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change. The Department of Forestry, Fisheries, and the Environment (DFFE) declared GHGs as priority air pollutants and, at the same time, published South Africa's National Greenhouse Gas Emissions Reporting Regulations for the mandatory reporting of GHG emissions. The purpose of these regulations is to introduce a single national reporting system for the reporting of GHG, which will be used to address the following objectives: (a) to inform policy formulation and (b) to contribute to South Africa meeting its obligations under the Kyoto Protocol.

I.1 Environmental impacts

The purpose of this section is to communicate and ensure the safe handling and disposal of SF_6 gas and its by-products. The gas is not hazardous in itself, but readily displaces oxygen, thus causing an asphyxiation risk. When discharged into the atmosphere, SF_6 may contribute to the greenhouse effect. The US Environmental Protection Agency identified SF_6 as a greenhouse gas, with a global warming potential 23 900 times the effect of an equal mass of carbon dioxide and an atmospheric lifetime of 3 200 years.

According to the Intergovernmental Panel on Climate Change, SF_6 is the most potent greenhouse gas that it has evaluated, with a global warming potential of 22 800 times that of CO_2 when compared over a 100-year period. SF_6 is one of the heaviest known gases: in normal conditions, it is about five times heavier than air. As mentioned above, South Africa's National Greenhouse Gas Emissions Reporting Regulations aim to introduce a single national reporting system for the transparent reporting of GHG emissions, which will be used predominantly to update and maintain the National Greenhouse Gas Inventory.

The Greenhouse Gas Emissions Reporting Regulations is one of the implementation tools that will be used to regulate the reporting of data and information from identified point, non-point, and mobile sources of atmospheric emissions to the National Atmospheric Emission Inventory System (NAEIS),

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with a view to compiling atmospheric emission inventories to inform the proposed carbon tax.

I.2 Management strategies

The Eskom Greenhouse Gas (GHG) Emission Reporting Procedure (240-125809509) was developed to provide technical guidance for establishing and updating the inventory of GHG emissions across Eskom and its subsidiaries. The emissions calculation guidelines and tools outlined are intended to assist Eskom data collators and users of GHG information. This procedure also functions as a key reference for future GHG inventory verification activities, either internal or external.

I.2.1 Actions in the event of an SF_6 leakage

- Evacuate the affected areas, and report any incident to the responsible 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 significant leaks have occurred. Remove leaking movable containers or cylinders outdoors to an open area with good ventilation. Record the amount of gas discharged.
- Defective cylinders must be tagged as defective and returned to the supplier as soon as possible.

I.2.2 Handling and storage

Storage and transportation of SF_6 shall be performed according to international and local regulations. The measures given on the material safety data sheet (MSDS) should be followed.

An empty SF_6 container can still contain a residual amount of SF_6. It shall be stored and transported in the same way as a filled container.

Containers should be handled carefully and stored in a cool, dry, well-ventilated area away from flammable or explosive material.

The owner of the electrical power equipment utilising SF_6 is responsible for the proper use, transportation, and disposal of the equipment and the gas.

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:

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- 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 (for example, spilling, burning through, and maintenance)
- The location of an emergency shower
- A notice stating that enclosed and lower-situated areas must be ventilated when emergencies occur
- All safety signs must comply with the requirements of SANS 0140, Parts 1 and 2, and the colours must comply with SANS 1091
- SF_6, a high-pressure liquefiable gas, is kept in Class 3 containers at a minimum (SANS 10019). Cylinders must be inspected, handled, stored, transported, and used in accordance with the requirements set out in SABS 019. A register of such inspections must be kept

I.3 Management requirements

I.3.1 Cylinder marking

SF_6 cylinders are supplied to Eskom by the gas suppliers with testing markings, volume and mass capacities, and serial numbers stamped on the cylinder shoulder to indicate quality testing. The identifying colour is “protea” pink.

I.3.2 Disposal of empty cylinders (B49 SABS 0140)

At a minimum, SF_6 cylinders are classified as Class 3 (metallic pressure receptacles of welded construction where the seams have been partially radiographed in accordance with an approved standard (SANS 10019)). Only refilling with SF_6 gas is allowed. The reuse 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 or leaking. Cylinders contaminated with by-products must be decontaminated by a licensed facility before reuse.

I.3.3 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. The disposal of containers must only be handled by the gas

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supplier.

I.3.4 Thermal destruction

Destruction of contaminated SF_6 and the decontamination of redundant SF_6 cylinders may be done using thermal desorption. Only DFFE-approved facilities may be used for this activity.

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Appendix J: Waste reporting for Eskom

Eskom supports government's commitment to waste management in order to protect health by ensuring that data is stored, verified, and analysed before submitting the information to SAWIS. Most Eskom business units are registered as hazardous waste generators. Generation landfill site ash disposal facilities are registered as facilities for the disposal of general waste to land covering an area in excess of 200 m^2.

SAWIS is the national waste information system established in terms of section 60 of the National Environmental Management: Waste Act 59 of 2008. SAWIS was established to record, collect, manage, and analyse the data and information, which must include data on the quantity and type or classification of waste generated, stored, transported, treated, transformed, reduced, reused, recycled, recovered, and disposed of.

The need to develop and maintain generic reporting guidelines was identified in order to assist with the identification of problem waste streams or waste streams occurring in large quantities that might require the development of specific strategies to manage the waste streams and/or their impacts and to support the diversion of waste from landfill, thereby promoting waste reuse, recycling, and waste exchange opportunities.

Waste reporting must be in accordance with the Eskom Indicator Reporting Standard (32-249) and other applicable legislative requirements.

Divisions and all other generators of wastes will classify their wastes and rank them according to legislative requirements. At a minimum, this should be based on the classification system in Tables 1 and 2 below.

Table 1: General waste classes according to SAWIS

LEVEL 1	LEVEL 2			LEVEL 3 – SPECIFIC WASTE TYPE
GENERAL WASTE	GW01	General: municipal waste		
	GW10	General: commercial and industrial waste		
	GW13	General: brine		
	GW14	Fly ash and dust from miscellaneous filter sources		
	GW15	General: bottom ash		
	GW16	Slag	GW1601	Slag: ferrous metal slag
			GW1602	Slag: non-ferrous metal slag
			GW1603	Slag: other
	GW17	Mineral waste	GW1701	Foundry sand

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			GW1702	Refractory waste
			GW1703	Mineral waste: other
	GW18	Waste of electrical and electronic equipment (WEEE)	GW1801	Large household appliances
			GW1802	Small household appliances
			GW1803	Office, information, and communication equipment
			GW1804	Entertainment and consumer electronics and toys, leisure, sports, and recreational equipment, and automatic issuing machines
			GW1805	Lighting equipment
			GW1806	Electrical and electronic tools
			GW1807	Security and health care equipment
			GW1808	Mixed WEEE
	GW20	Organic waste	GW2001	Organic waste: garden waste
			GW2002	Food waste
			GW2003	Wood waste
	GW21	Sewage sludge	GW2101	Sewage sludge
	GW30	Construction and demolition waste	GW3001	Construction and demolition waste
	GW50	Paper	GW5001	Newsprint and magazines
			GW5002	Brown grades
			GW5003	White grades
			GW5004	Mixed grades
	GW51	Plastic	GW5101	Polyethylene terephthalate
			GW5102	High-density polyethylene
			GW5103	Polyvinylchloride
			GW5104	Low-density polyethylene
			GW5105	Polypropylene
			GW5106	Plastic: polystyrene
			GW5107	Plastic: other
	GW52	Glass	GW5201	Glass
	GW53	Metals	GW5301	Ferrous metal
			GW5302	Non-ferrous metal
	GW54	Tyres	GW5401	Tyres
	GW99	Other	GW99	Other

Table 2: Hazardous waste classes according to SAWIS

LEVEL 1	LEVEL 2			LEVEL 3 – SPECIFIC WASTE TYPE
HAZARDOUS WASTE	HW01	Gaseous waste	HW0101	Gases (excluding greenhouse gases)
			HW0102	Obsolete ozone-depleting gases
	HW02	Mercury-containing waste	HW0201	Liquid waste containing mercury
			HW0202	Solid waste containing mercury
	HW03	Lead batteries	HW0301	Lead batteries
			HW0302	Mercury batteries
			HW0303	Ni/Cd batteries
			HW0304	Manganese dioxide and alkali batteries
			HW0305	Lithium and lithium-ion batteries

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			HW0306	Nickel-metal hydride batteries
			HW0307	Mixed batteries
	HW04	POP waste	HW0401	PCB-containing waste (> 50 mg/kg)
			HW0402	Other POP-containing waste
	HW05	Inorganic waste	HW0501	Liquid and sludge inorganic waste
			HW0502	Solid inorganic waste
			HW0503	Spent pot lining (inorganic)
	HW06	Asbestos-containing waste	HW0601	Asbestos-containing waste
	HW07	Waste oils	HW0701	Waste oil
	HW08	Organic halogenated and/or sulphur-containing solvents	HW0801	Solvents containing halogens and/or sulphur
	HW09	Organic halogenated and/or sulphur-containing solvents	HW0901	Liquids and sludges containing halogens and/or sulphur
			HW0902	Solids containing halogens and/or sulphur
	HW10	Organic solvents without halogens and sulphur	HW1001	Solvents without halogens and sulphur
	HW11	Other organic waste without halogens or sulphur	HW1101	Liquid and sludge organic waste
			HW1102	Solid organic waste
			HW1103	Spent pot lining (organic)
	HW12	Tarry and bituminous waste	HW1201	Tarry waste
			HW1202	Bituminous waste
	HW13	Brine	HW1301	Brine
	HW14	Fly ash and dust from miscellaneous filter sources: fly ash	HW1401	Fly ash
	HW15	Bottom ash	HW1501	Bottom ash
	HW16	Slag	HW1601	Ferrous metal slag
			HW1602	Non-ferrous metal slag
			HW1603	Other
	HW17	Mineral waste	HW1701	Foundry sand
			HW1702	Refractory waste
			HW1703	Other
	HW18	Waste of electrical and electronic equipment (WEEE)	HW1801	Large household appliances
			HW1802	Small household appliances
			HW1803	Office, information, and communication equipment
			HW1804	Entertainment and consumer electronics and toys, leisure, sports, and recreational equipment, and automatic issuing machines
			HW1805	Lighting equipment
			HW1806	Electrical and electronic tools
			HW1807	Security and health care equipment
			HW1808	Mixed WEEE
	HW19	Health care risk waste: pathological waste	HW1901	Pathological waste
			HW1902	Infectious waste and sharps
			HW1903	Health care risk waste: chemical waste
	HW20	Sewage sludge	HW2001	Sewage sludge
	HW99	Miscellaneous	HW9901	Miscellaneous

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J.1 Waste reporting guideline

GW01 – Municipal waste

Municipal waste can also be defined as domestic waste. The NEMWA, 2008, defines domestic waste as waste that emanates from premises that are used wholly or mainly for residential, educational, health care, sport, and recreational purposes. Such waste is composed of mainline recyclables (including paper, plastic, glass, metals, and tyres), organic waste (including garden and food waste), construction and demolition waste, and non-recyclables. Eskom can choose this option if the municipality is providing a service (for example, collection and disposal).

GW10 – Commercial and industrial waste

Commercial and industrial waste is not defined by the NEMWA, 2008. This waste stream emanates from premises that are used wholly or mainly for commercial, retail, wholesale, entertainment, or government administration purposes. The composition of commercial and industrial waste is related to the type and scale of industries prevalent in a specific region. A large portion of this waste stream is collected as part of the municipal waste stream and contains mainly mainline recyclables from offices as well as organic waste. It should, however, be noted, that pre-consumer recyclables from industrial sources are not collected as part of the municipal waste stream, but are typically collected by the recyclers themselves. Eskom must choose this option when reporting general waste.

GW13 – Brines

Saline or brine waste is a waste stream containing salts. It is actually a concentrated watery solution, typically containing 1% to 6% of dissolved low-value salts (NaCl), emanating from the reverse osmosis or wastewater treatment process from industries. The Waste Classification and Management Regulations of 2013 restricts the disposal of brine or waste with a high salt content (TDS ≥ 5%) and a leachable concentration for total dissolved solids (TDS) of more than 100 000 mg/ℓ to landfill by August 2021. Based on the classification reports, brine classified as non-hazardous must be reported here.

GW14 – Fly ash and dust from miscellaneous filter sources

Fly ash is a light form of coal ash that floats into the exhaust stacks. Fly ash is collected from the exhaust gases by electrostatic precipitators or bag filters. Based on the classification reports, fly ash classified as non-hazardous must be classified here.

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GW15 – Bottom ash

Bottom ash is the coarse, granular, incombustible by-product of coal combustion that is collected from the bottom of furnaces. Based on the classification reports, bottom ash classified as non-hazardous must be reported here.

GW16 – Slag

Slag includes ferrous metal slag from steel, manganese, chrome, vanadium, etc. processing and non-ferrous metal slag from aluminium, etc. processing. Based on the classification reports, slag waste classified as non-hazardous must be reported here.

GW17 – Mineral waste

The mineral waste included is limited to foundry sand and refractory waste. Based on the classification reports, mineral waste classified as non-hazardous must be reported here.

GW18 – Waste of electrical and electronic equipment (WEEE)

This waste stream refers to discarded electrical and electronic equipment, including computers, cell phones, televisions, radios, refrigerators, washing machines, etc. It is basically anything that operates using electricity or batteries that has reached the end of its useful life. It also includes lighting equipment, such as fluorescent tubes and lamps, sodium lamps, etc. Due to chemicals contained in some WEEE, Eskom must report all WEEE under HW18.

GW20 – Organic waste

Organic waste refers to garden, food, and wood waste only. The food waste component represents kitchen waste as well as pre-consumer condemned foods. Organic waste is generally reported as garden, green, putrescible, and, in some instances, notifiable waste. All garden and food waste is recyclable, provided that the most suitable treatment options are considered. All organic waste must be reported here.

GW21 – Sewage sludge

This waste stream includes the sludge resulting from sewage plant processes. This code can be used if sewage sludge is classified as non-hazardous waste.

GW30 – Construction and demolition waste

The Waste Act, 2008, defines building and demolition waste as “waste excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure and includes

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rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition". As such, construction and demolition waste includes, but is not limited to, concrete, bricks, masonry, ceramics, metals, plastic, paper, cardboard, gypsum drywall, timber, insulation, asphalt, glass, carpeting, roofing, site clearance, excavation material, and site sweepings. This code must be used for all construction and demolition waste not containing hazardous waste or hazardous chemicals.

GW50 – Paper

This waste stream includes all the different grades of paper: office paper to newspapers, magazines, telephone directories, boxes, cardboard, white and coloured office paper, newspaper, glossy paper (magazines), mixed grades, and non-recyclable paper.

GW51 – Plastic

Plastic waste consists primarily of six materials: all polymers mainly from petrochemical origin, including polyethylene terephthalate (PET); high-density polyethylene (HDPE); polyvinyl chloride (PVC) – rigid (PVC-U) and flexible (PVC-P); low and linear density polyethylene (PELD and PE-LLD); polypropylene (PP), including expanded polystyrene (PS-E); and polystyrene (PS). Many plastics are packaging materials, including bags, bottles, and a variety of other containers, but plastic is also present in the form of pipes, furniture, and textiles.

GW52 – Glass

Many different types of glass, including bottles, jars, flat/sheet glass, laboratory glass, mirrors, windshields and window glass, crystal and opaque drinking glasses, and heat-resistant ovenware (for example, Pyrex and Vision ware), constitute this waste stream.

GW53 – Metals

Metallic wastes are divided into two broad categories: (a) ferrous metals (steel and iron), accounting for 80% of metal waste; and (b) non-ferrous metals (aluminium, copper, zinc, lead, nickel, and others), and accounting for 20% of metal waste.

GW54 – Tyres

All new, used, rethreaded, or roadworthy tyres, not suitable to be rethreaded, repaired, or sold as part-worn tyres and not fit for their original intended use must be reported under this code.

GW99 – Other

The waste reported in this category is waste that is general, but does not fit into any of the above categories. It is typically the result of mixed hazardous waste that cannot be separated into for-

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treatment purposes.

HAZARDOUS WASTE

HW01 – Gaseous waste

Gaseous waste is the gas remaining in gas cylinders and aerosol cans at the end of their use. It includes speciality gases such as those that would be used by research laboratories as well as for gas stoves, heaters, camping gas, etc. Examples include HCl, NH_3, acetylene, powder extinguisher, N_2, Cl_2, etc. Gas waste cannot be disposed of in any other way than being destroyed, for example, by thermal means or chemical reaction. The empty cylinders are normally reused, but if they are damaged and cannot be reused, the cylinders become scrap metal. Empty aerosol cans are also recyclable. All gaseous waste, including obsolete ozone-depleting gases and other gases (excluding greenhouse gases), is reported here.

HW02 – Mercury-containing waste

All liquid and solid waste containing mercury, except CFLs (reported as WEEE [HW18]), is reported here. Examples of this waste stream include chemical oxygen demand (COD) test liquids and other mercury-containing test liquids, mercury-treated seed grain, small packages of chemicals, thermometers, etc.

HW03 – Batteries

This waste includes all batteries that end up in the waste stream, including lead batteries, mercury batteries, Ni/Cd batteries, manganese dioxide and alkali batteries, lithium and lithium-ion batteries, nickel-metal hydride batteries, and any other type of battery. All batteries must be reported here.

HW04 – POP waste

POP waste refers to “persistent organic pollutants” or chemical substances that persist in the environment, bio-accumulate through the food web, and pose a risk of having adverse effects on human health and the environment. It is normally associated with pesticides. PCB-containing waste (> 50 mg/kg), such as capacitors containing PCB, transformers containing PCB, transformer oil, etc., is included, and all other POP must be reported here.

HW05 – Inorganic waste

Inorganic waste refers to all solid, liquid, and sludge inorganic waste, including spent pot linings (inorganic). Examples are filter cakes, waste gypsum, hardening salts containing NaCN and $Ba(CN)_2$, inorganic salts, inorganic wood-preserving chemicals, inorganic waste catalysts, borates,

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etc. Oxidising waste includes perborates, bromates, perbromates, chlorates, perchlorates, chromates, dichromates, hypochlorite, iodates, periodates, manganates, permanganates, red lead, nitrite and nitrate salts, inorganic peroxides, aluminium chloride (water free), chlorosulphonic acid, ferric chloride (water free), phosphorus oxychloride, etc. Reactive waste is, for example, phosphorus pentoxide, alkali metals (for example, Na) and their alloys, aluminium (powder), metal amides, carbides, chlorosilanes, ferrosilicon hydrides, lithium aluminium hydride, phosphides, silicides, etc. Liquid acidic waste (pickling acids, chrome sulphur acids, chrome acids, ferrous and ferric chloride solutions, hydrofluoric acid, galvanic baths, H_3PO_4, HNO_3, HCl, and H_2SO_4), liquid basic inorganic waste without cyanide (hypochlorite solutions, metal hydroxide sludges, and NaOH), alkaline inorganic waste with cyanide (pH > 10), and reactive waste (such as hydrogen peroxide, thionyl chloride, silicon tetrachloride, sulphur dichloride, titanium tetrachloride, etc.) are also included.

HW06 – Asbestos-containing waste

All waste containing asbestos from insulation, buildings, etc. is included in this waste stream. Asbestos actinolite, asbestos grunerite (amosite), asbestos anthophyllite, chrysotile, crocidolite, asbestos tremolite, or any mixture containing these fibrous silicates must be reported here.

HW07 – Waste oils

Waste oils include diesel oil, fuel oil, heating oil, gas oil, hydraulic oil, lubricating oil, oil from oil and petrol traps, heat transmission oils (no PCBs), etc. Waste oil typically originates from the crankcase of internal combustion engines (mainly run on petrol or diesel). Used oil or waste oil is also produced and collected from other operating equipment and includes products such as hydraulic oils and gear and transmission oils. It is not recommended that used oils from transformers and switchgear be mixed with other waste oils. Waste oils are a complex mixture of paraffinic, naphthenic, and aromatic petroleum hydrocarbons that may contain one or more of the following: carbon deposits, sludge, aromatic and non-aromatic solvents, water (as a water-in-oil emulsion), glycols, wear metals and metallic salts, silicon-based antifoaming compounds, fuels, polycyclic aromatic hydrocarbons (PCAHs), and miscellaneous lubricating oil additive materials. In the unlikely event that used transformer oils are mixed with other waste oil, polychlorinated biphenyls and terphenyls (PCBs/PCTs) may also be present. Oil generated from the kitchen must be reported under “other waste”.

HW08 – Organic halogenated and/or sulphur-containing solvents

Solvents containing halogens and/or sulphur are included in this waste stream. Examples include chloroform, CS_2, chloromethane, freon, methylene chloride, perchloromethane, tetrachloromethane,

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trichloromethane, trichloroethylene, cutting oil and drilling oil containing more than 1% halogen and sulphur, halogen-containing glue waste, waste from dry-cleaning companies, etc.

HW09 – Organic halogenated and/or sulphur-containing waste

This waste stream comprises solids, liquids, and sludges containing halogens and/or sulphur.

HW10 – Organic solvents without halogens and sulphur

This waste stream refers to solvents without halogens and sulphur. Examples include acetone, alcohols, oil from animals, benzene, petrol, butyl acetate, ether, ethyl acetate, thinner, hexane, methyl ethyl ketone, methyl isobutyl ketone, oil emulsions, petroleum ether, styrene, synthetic oils, turpentine, toluene, vegetable oil, xylene, and oxidising solvents, such as acetone peroxide, acetylacetone peroxide, cyclohexanone peroxide, dibenzoyl peroxide, methyl ethyl ketone peroxide, etc.

HW11 – Other organic waste without halogens or sulphur

This waste stream includes spent pot linings (organic) and liquid, solid, and sludge organic waste. Examples include waste water, acetic acids, organic acids, amines, degreasing baths, cutting oil and drilling oil, brake wash waters, ethylene glycol, formalin, paint, alkaline bath from acid washing, oil emulsions, phenols, polyols, synthetic oils, soap, tectyl corrosion prevention, printing ink, epoxy compounds, fixing baths, developers, etc. Filters, cup grease, lubricants, latex, glue, organic salts, organic wood-preserving chemicals, reactive waste such as fertiliser (NH_4NO_3), fireworks, methylene diphenyl diisocyanate (MDI), toluene diisocyanate (TDI), laboratory waste, spray cans, empty containers, leaded antiknock compound sludges, waste leather dust, etc., as well as spent pot liner containing organic fractions, for example, mixed with organic carbon, are also included.

HW12 – Tarry and bituminous waste

This is waste from coal-based generated tar and petroleum-based manufactured bitumen (including asphalt).

HW13 – Brines

Saline or brine waste is a waste stream containing salts. It is actually a concentrated watery solution, typically containing 1% to 6% of dissolved low-value salts (NaCl), emanating from the reverse osmosis or waste water treatment process from industries. The Waste Classification and Management Regulations of 2013 restricts the disposal of brine or waste with a high salt content (TDS ≥ 5%) and a leachable concentration for TDS of more than 100 000 mg/ℓ to landfill by August

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2021. All hazardous brines must be reported here.

HW14 – Fly ash and dust from miscellaneous filter sources

Fly ash is a light form of coal ash that floats into the exhaust stacks. Fly ash is collected from the exhaust gases by electrostatic precipitators or bag filters. Based on the classification reports, fly ash classified as hazardous must be reported here.

HW15 – Bottom ash

Bottom ash is the coarse, granular, incombustible by-product of coal combustion that is collected from the bottom of furnaces. Based on the classification reports, bottom ash classified as hazardous must be classified here.

HW16 – Slag

Slag includes ferrous metal slag from the processing of steel, manganese, chrome, vanadium, etc. and non-ferrous metal slag from the processing of aluminium, etc.

HW17 and GW17 – Mineral waste

The mineral waste included is limited to foundry sand and refractory waste.

HW18 – Waste of electrical and electronic equipment (WEEE)

This waste stream refers to discarded electrical and electronic equipment, including computers, cell phones, televisions, radios, refrigerators, washing machines, etc. It is basically anything that operates using electricity or batteries that has reached the end of its useful life. It also includes lighting equipment, such as fluorescent tubes and lamps, sodium lamps, etc. All WEEE must be reported here.

HW19 – Health care risk waste (HCRW)

This waste stream includes pathological waste, infectious waste, sharps, and chemicals, for example, pharmaceuticals.

HW20 – Sewage sludge

This waste stream includes the sludge resulting from sewage treatment processes. All sewage waste classified as hazardous waste must be reported here.

HW99 – Miscellaneous

The waste reported in this category is waste that is hazardous, but does not fit into any of the above

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categories. It is typically the result of mixed hazardous waste that cannot be separated into for-treatment purposes.

J.2 Priority waste reporting

- Accurate and frequent reporting by each activity in the organisation is, thus, required to ensure that a proper account is kept of the quantities of wastes, the types of wastes, and the processes from which waste is produced.
- Priority wastes and waste management activities will be reported on within the organisation on a six-monthly and annual basis as listed below:
  - Priority wastes identified for reporting such as ash produced, disposed of, and recycled, radioactive waste, PCB, and asbestos waste generated and disposed of
  - Progress on the development and implementation of the divisional waste management plan (WMP)
  - Updating of PCB inventories and the phase-out plan and progress in completing the phase-out plan
  - Updating of ODS inventories and the phase-out plan and progress in completing the phase-out plan
  - Information on Eskom-owned waste sites, including all waste disposed of at Eskom waste disposal facilities
  - Information on waste stored at waste transfer facilities, including Eskom-owned facilities

J.3 Reporting of other wastes

a) Reporting of the following wastes and waste activities will also take place. The report will include information on:
   - general waste that was generated and disposed of;
   - hazardous waste (not on the priority list) that was generated, stored, treated, or disposed of;
   - waste that was reused or recycled; and
   - new waste streams generated within the business.

b) Reporting frequency:
   - Waste reports are required by the Waste Portfolio of the Environmental Corporate Office on a quarterly and annual basis, but the divisions are encouraged to maintain their records on a monthly basis.

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c) Reporting format:

The Eskom Waste Reporting Template (240-47176064) must be used and, at a minimum, have the following information as sign-off:

- Date of submission
- Reporting period – period to which the report applies
- Business area covered by the report, including any exclusion
- Name of the person submitting the report
- Name of the responsible manager (that is, power station manager, regional engineering manager, or grid manager)

d) Waste densities for conversions are tabled in Table 3 below.

J.4 Reporting on SAWIS

a) The business/operating units, via the Waste Portfolio of the Environmental Corporate Office, are required to register with SAWIS in accordance with the National Waste Information Regulations, GNR 625 of 13 August 2012. If an activity listed in the Waste Information Regulations is undertaken in a province that has an established waste information system, the person undertaking that activity must submit the information to the provincial waste information system.

b) Gauteng and the Western Cape have their own established waste information systems: the Gauteng Waste Information System and the Integrated Pollutant and Waste Information System (iPWIS) in the Western Cape.

c) Business/operating units conducting the following activities must register on SAWIS:
   - Disposal of general waste to land covering an area in excess of 200 m^2
   - Disposal of any quantity of hazardous waste to land
   - Generators of hazardous waste in excess of 20 kg per day
   - Recovery or recycling of general waste at a facility that has an operational area in excess of 500 m^2
   - Recycling of hazardous waste in excess of 500 kg per day calculated as a monthly average
   - Treatment of general waste using any form of treatment at a facility that has the capacity to process in excess of 10 tons of general waste or 500 kg of hazardous waste per day, excluding the treatment of effluent, waste water, or sewage

d) Registration of waste management activities allows the Department of Environmental Affairs (DEA) to issue a unique identification number to be used when providing data to SAWIS.

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Table 3: Densities used in calculating the mass based on volume according to SAWIS

Waste type	**Typical contents/containerisations**	**Typical density kg/m^3**
Domestic waste, non-compacted	Mixed domestic waste	200
Domestic waste, compacted	Mixed domestic waste in compactor vehicles	500
Mixed domestic waste	Contents of closed wheelie bins (190 to 660 litres)	108
	Contents of bags (e.g., 160 to 240 litres)	95
Organic waste (garden waste and food waste)	In closed plastic containers (190 litres)	250
	In ventilated containers/bags	205
	Contents of compactor vehicles	450
	Organic waste from kitchens for animal fodder	840
Mixed biodegradable domestic waste	Contents of closed wheelie bins (190 to 660 litres)	60
	Contents of compactor vehicles	400
	Bulky waste in skips	90
Paper and cardboard	Corrugated cardboard	88
	Newspapers and magazines	200
	Office paper (compacted)	475
Other waste	Glass from glass containers	325
	Electronic waste	235
	Batteries	1 375
Inert waste	Sand, concrete, bricks, and fibreglass	1 500
Mixed non-compacted industrial waste	Paper and plastic	150
	Cardboard, gypsum boards, sawdust, textiles, and leather	400
	Timber and demolition waste	600
	Casting sand, slag, and ashes	1 500
Commercial waste, non-compacted	Mixed waste from shops, offices, hospitals, restaurants, and parks as well as garden waste	200
Other waste	Non-specified	1 000

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J.5 Conversion from volume to mass

The following conversions and calculations for asbestos-containing waste and ash are used when reporting waste.

1. Asbestos-containing waste

1.1 To convert volume to mass, the following calculation must be used:

Mass = density x volume
= $kg.m^{-3}$ x m^3
= kg

1.2 To convert 210 ℓ drums to mass, the following calculation must be used:

1 m^3 = 1 000 ℓ
X = 210 ℓ drum
X = 210 ℓ x 1 m^3/1 000 ℓ
= 210 m^3/1 000 ℓ
= 0,21 m^3

From here, the calculation in 1.1 above must be followed.

NB: density for asbestos-containing waste is 400 kg/m^3.

J.6 Ash produced

The total ash produced is calculated based on the ash content percentage and the coal burnt tonnage.

Mass of ash produced = total coal burnt multiplied by percentage ash content

J.7 Ash disposed of

The ash disposed of is calculated based on the following calculation:

Ash disposed of = ash produced - ash recycled - ash emitted

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Appendix K: Solvents

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, are resulting in the stricter control of these solvents and cleaners, many of which are classified as toxic.

K.1 Environmental impacts

The purpose of this procedure is to prescribe methods for managing solvents throughout the organisation. It covers Eskom's requirements for the storage, handling, disposal, and reporting of all solvents. 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.

K.2 Management strategies

Storage of solvents must be in accordance with the specific minimum requirements of the safety data sheet (SDS). 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 SANS 10108.

K.3 Management requirements

K.3.1 Storage

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

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g) Store solvents away from oxidisers.
h) Check storage containers regularly to make sure that the spout, cap, and container are in good working order and not leaking.
i) Immediately replace damaged container parts such as flame arrester screens.
j) Smoking and eating in solvent storage areas or around dispensing containers are prohibited.
k) The location of spill control stations and materials, eyewash stations, and safety showers must be clearly indicated/demarcated.
l) The prescribed personal protective equipment (PPE) and other protection measures must be used when working with solvents, unless otherwise stated in the occupational health and safety risk assessment.
m) All solvents must be used in conjunction with safe working procedures.
n) All lighters, matches, or sparking devices are to be removed before a worker handles solvents.

K.3.2 Disposal

Every solvent manufacturer has its own disposal procedures, and these must be reflected on the SDS.

Additional requirements are as follows:

a) Solvent waste must be removed from the work area and disposed of only at permitted/licensed waste disposal sites and by using appropriate removal contractors, in accordance with the relevant regulations.
b) 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.
c) Records must be kept of the quantities disposed of.
d) Flammable solvents must be disposed of in approved containers, never directly into sewers, storm water drains, and garbage dumps or onto the ground.

K.3.3 Training

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

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Appendix L: Ozone-depleting substances

Ozone-depleting substances (ODSs) are compounds that contribute to the depletion of stratospheric ozone. 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. The ODSs are split into two groups: chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs). The most common HCFC in use today is HCFC-22 or R-22, a refrigerant still used in existing air conditioners and refrigeration equipment.

The following controlled substances are most frequently utilised commercially:

Annexure A:

- CFC11 trichlorofluoromethane – air conditioning, insulation materials, aerosols, solvents
- CFC12 dichlorodifluoromethane – refrigeration, air conditioning, insulation materials, aerosols
- CFC113 trichlorotrifluoroethane – insulation materials, aerosols, solvents, air conditioning
- CFC114 dichlorotetrafluoroethane – insulation materials, aerosols
- CFC115 monochloropentafluoroethane – refrigeration
- BCF (halon 1301) bromotrifluoromethane – firefighting, fixed installations
- BTM (halon 1211) bromochlorodifluoromethane – firefighting, fire extinguishers
- halon 2402 – dibromotetrafluoroethane – portable fire extinguishers

Annexure B:

- CCL_4 – carbon tetrachloride – solvents, pharmaceuticals, feedstock
- 1,1,1 trichloroethane (methyl chloroform) – insulation materials, solvents, adhesives

Annexure C:

- HCFCs (40 substances) – refrigeration, air conditioning, insulation materials, solvents, aerosols
- HBFC-22B1

Annexure D:

List of products containing controlled substances specified in Annexure A

Annexure E:

Methyl bromide – bromomethane – pesticides

Annexure F:

HCFC (40 substances)

The Montreal Protocol on Substances that Deplete the Ozone Layer has been very successful in

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phasing out the production and consumption of some 100 ODSs, which include chlorofluorocarbons (CFCs), HCFCs, halons, methyl bromide, carbon tetrachloride, and methyl chloroform. The Montreal Protocol controls the phasing out of 100 substances grouped into five annexures (A, B, C, E, and F) according to their ozone-depleting potential and phase-out dates. The controlled substances are from the following groups of chemicals:

- Chlorofluorocarbons (CFCs)
- Bromofluorocarbons (BCFs)
- Bromochlorofluorocarbons
- Hydrochlorofluorocarbons (HCFCs)
- Methyl bromide
- Carbon tetrachloride
- Trichloroethane

HCFCs, such as HCFC-22, which is widely used in the refrigeration and air conditioning sector, are, thus, in the process of being phased out in developing countries by 2030, with a small allowance for servicing after that. As a party to the Montreal Protocol and its amendments, it is expected that Eskom Holdings SOC Limited has phased out ODSs according to South Africa's national commitment to the Montreal Protocol and its amendments. Due to a change in staff and procurement processes, this appendix will, however, be left in for one more review cycle to ensure that these requirements are entrenched in the procurement processes and that no further purchasing of ODSs occurs. South Africa is obliged to follow, and is committed to following, the agreed phase-out as follows:

- Freeze consumption and production in 2013 at the baseline consumption (2009 to 2010).
- Reduce by 10% by 2015.
- Reduce by 35% by 2020.
- Reduce by 67,5% by 2025.
- Allow 2,5% annual consumption during 2030 to 2040.

L.1 Environmental impacts

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

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L.2 Management strategies

Under the United States Clean Air Act and the Montreal Protocol on Substances that Deplete the Ozone Layer, the United States is phasing out the production and import of HCFCs in order to protect the stratospheric ozone layer. By phasing out the production of ODSs such as HCFCs, the risk of skin cancer caused by exposure to ultraviolet (UV) radiation is reduced. In addition, many of these ODSs, as well as their substitutes, are greenhouse gases that contribute to climate change.

Eskom must phase out 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 final person in the disposal chain (such as a scrap metal recycler or landfill owner) is responsible for ensuring that refrigerant is recovered from equipment before its final disposal.

L.3 Reclassification restrictions

- South Africa has to commit itself to honouring 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.

L.4 Management requirements

L.4.1 Phase-out dates for controlled ODSs in South Africa

The following phase-out schedule has been accepted:

Annexure/Group	Substances	Phase-out dates in South Africa
Annexure C Group 1	**HCFC**	By 1 January 2040, consumption will be restricted to zero.

L.4.2 Eskom ODS management

- Business units are required to compile an ODS inventory indicating ODS types, their location, and their application, as well as quantities in storage and use. The inventory must be maintained,

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audited, and reported annually. This must be reflected through business division performance indicators.

- All precautionary measures practicable must be taken to prevent and minimise leakage of controlled substances.
- A phase-out plan, programme, and budget must be developed and approved by the relevant divisional executives.
- Suitable storage facilities must be provided for the transition phase-out programme. The stockpiling of the ODSs, listed in Appendix A to the GN 351 Regulations Regarding the Phasing Out and Management of ODSs, is prohibited.
- Business units in possession of a stockpile of ODSs listed in Appendix A to the Regulations regarding the phasing out and management of ozone-depleting substances on the date of coming into effect of these Regulations must, within 12 months of the coming into effect of these Regulations, submit a stockpile abatement plan to the Director-General.
- Contaminated fluids must be stored separately from new fluids for controlled destruction or reclamation.
- No purchases of the new ODS fluids (controlled under Annexures A, B, and C Groups 2 and 3) of the protocol may be permitted. From 1 January 2040, no person is allowed to import, place on the market, or use HCFCs.
- Used ODSs and products containing ODSs are collected and moved efficiently to facilities using approved destruction technologies.
- No trading with ODSs may be allowed. Used ODSs products containing ODSs must be sent to the registered ODS bank holder for recovery and recycling.
- The Department of Labour has mandated the South African Qualification and Certification Committee (SAQCC) with the responsibility to register and maintain a database of “authorised persons” for handling and working with gases under pressure.
- To ensure that ODSs and products containing ODSs do not constitute an unnecessary risk, they must be properly packaged and labelled.
- Awareness and technology training programmes on the handling of controlled fluids must be implemented.
- Purchases of new equipment, materials, or processes that utilise ODSs during manufacture or operation may not be permitted where suitable alternatives exist.
- Portable fire extinguishers containing halon must be replaced and the contents disposed of through the Halon Bank of South Africa.

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- Conservation of the CFC and HCFC refrigerants, that is, recovery and recycling, and leak protection of the equipment and storage facilities must be standard practice.
- A person who imports or exports ODSs listed in Appendix A must, annually, at the end of January every year, report to the department the total quantities imported or exported for the previous year.
- ODS materials should be stored in specially designated areas, subject to the regulations of the relevant local authorities.
- Discharge or release of ODSs into the atmosphere is prohibited.
- A person who reclaims or destroys any ODSs must ensure that the substances are not released into the environment.

Reporting on ODSs must be in line with Appendix J on waste-reporting requirements as contained in this standard.

L.4.3 Accountability and responsibility

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

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Appendix M: Silica gel management

Silica gel is used to dry the air as it flows through a bed of silica gel beads in a breather connected to a transformer. The insulating oil of the transformer heats up during operation, and it expands into the conservator tank and, subsequently, pushes the dry air out of the conservator tank through the breather, which is filled with silica gel. When the oil cools down, it retracts and sucks fresh air from the atmosphere through the breather, and from this point, the silica gel acts as a dryer for the air that goes back into the conservator tank. Dehydrated silica gel is colourless. When a visible indication of the moisture content of the silica gel is required, cobalt chloride is most commonly added. This will cause the gel to be blue when dry and pink when hydrated.

According to the European Commission Directive 98/98/EC (amendment to 67/548/EEC), cobalt chloride has been reclassified as a carcinogen by inhalation. This change is also reflected in South African legislation, where cobalt chloride is now classified as a Hazard Group 2 carcinogen. Due to the widespread utilisation of cobalt chloride as a moisture indicator in silica gel desiccant used in transformer breathers, the concern is that this might have an impact on the health of workers and ground- and surface water quality. There are also more economically based concerns, such as the use, packaging, and disposal of the gel. Silica gel shall be managed in accordance with the Standard for Silica Gel used in Breathers on Electrical Equipment (240-99072885).

Some of the Eskom sites use Envirogel. Both Envirogel™ and Trockenperlen™ are non-hazardous in terms of any carcinogenic effects, do not contain any cobalt, and are believed to be environmentally acceptable, provided that certain precautionary measures are applied. As their physical properties are similar to the traditional blue silica gel now in use within Eskom, no transformer breather modifications will be necessary to change to the alternative product. Their colour change from dry to saturated is orange to green.

Envirogel™ and Trockenperlen™ are, thus, orange when dry (green when wet) and suitable alternatives to the blue cobalt chloride silica gel currently used in Eskom transformer breathers; they are, therefore, recommended as appropriate products. Eskom will continue to utilise the blue cobalt chloride product for top-up interventions only until stocks purchased and available in the Eskom stores have been depleted. There will be no instruction and approval for further purchase of cobalt chloride. The new products will be purchased and stocked in the stores.

M.1 Environmental impacts

Silica gel is non-toxic, non-flammable, and non-reactive and stable with ordinary usage, but will react

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with halogens, strong acids, strong bases, and oxidisers. The storage requirements on the SDS must, therefore, be strictly adhered to.

The silica gel containing either blue cobalt chloride or copper chloride has some noxious consequences for lungs, but generally does not cause illness or have a toxic effect if exposure is limited to an occupational level. Exposure may, however, aggravate pre-existing diseases, such as asthma and bronchitis. Crystalline silica dust can cause silicosis. Therefore, staff working with silica gel must have this task highlighted in their man-job specifications.

When disposed of to land or water, the used silica gel containing copper chloride is toxic to aquatic life.

M.2 Management strategies

To preserve the integrity of the silica gels used, the following strategies shall be followed:

- Only silica gel approved by Eskom and managed in accordance with the Standard for Silica Gel used in Breathers on Electrical Equipment (240-99072885) shall be used.
- Recycling of silica gel is not recommended due to the risk of reducing its effectiveness.
- Silica gel should not be reconditioned.
- Used silica gel shall be disposed of at a hazardous waste disposal site.

M.3 Management requirements

In order to eliminate the safety and environmental risks when any silica gel is handled, the following precautions must be applied:

a) Wear personal protective equipment when handling the silica gel.
b) Use gloves to prevent skin contact.
c) Wear safety glasses with side shields.
d) Use an approved dust respirator for respiratory protection, since dust from the gel may be harmful to the lungs.
e) Avoid breathing in dust or vapour.
f) Avoid contact with the eyes, skin, and clothing.
g) Keep containers tightly closed.
h) Store in a cool, dry place. Store in a well-ventilated place.
i) Sieve the silica gel to remove any “powder” that could clog the breather or impair free airflow.
j) Silica gel contaminated with oil shall be disposed of because it will no longer adsorb moisture. Discoloured gel (brown, grey, black, etc.) indicates contamination and shall be disposed of.

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k) The used silica gel shall be held in a suitable container labelled as used silica gel until a sufficient quantity has accumulated to be collected by an approved hazardous disposal contractor.

l) Prevent further leakage or spillage if it is safe to do so. Avoid discharge into drains, into watercourses, or onto the ground.

m) Incorrect disposal, spillage on land and in pathways of surface water run-off, or the misuse of the waste material is prohibited and shall be reported as a spill incident under the Environmental Incident Management Procedure (240-133087117) should accidental spillage of the silica gel occur.

n) Used silica gel should be managed in an appropriate manner and disposed of at approved hazardous waste disposal facilities.

o) Disposal of used containers, including molecular sieves and desiccants, must be done in accordance with legislative requirements for hazardous waste.

p) Processing, use, or contamination of this product may change the recommended waste management options. The generator of the waste must ensure that the contaminated waste is reclassified before disposal to determine the correct waste management and disposal options for the contaminated waste.

q) If large quantities of used silica gel are generated or need to accumulate before disposal, use plastic collection containers for storing the used material until it is collected. The large original silica gel containers can be used for storage of such material.

r) When using these or any other large containers for storage, please adhere to the following procedure:

- The waste is stored in such a manner that no pollution of the environment occurs at any time.
- The date on which accumulation begins is clearly marked and visible for inspection on each container.
- While being stored on site, each container and tank are labelled or marked clearly with the words “Hazardous waste”.
- The waste generator fences off the storage area to prevent unauthorised access and erects a weatherproof, durable, and clearly legible noticeboard in the official languages at every entrance of the storage area with the words “Hazardous waste: unauthorised entry prohibited”.
- The drum is labelled with a yellow hazardous waste sticker as soon as it begins to be used.
- The drum is not filled to more than three-quarters of its capacity.
- The three-quarters full drum is disposed of with the regular hazardous waste pickup.

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Appendix N: Waste hierarchy

The NEMWA is structured around the waste management hierarchy. The hierarchy consists of options for waste management during the life cycle of waste, arranged in descending order of priority, namely, waste avoidance and reduction, reuse and recycling, and recovery and treatment, with disposal as the last resort (Figure 1). All divisions must apply the waste management hierarchy in making decisions on how to manage waste.

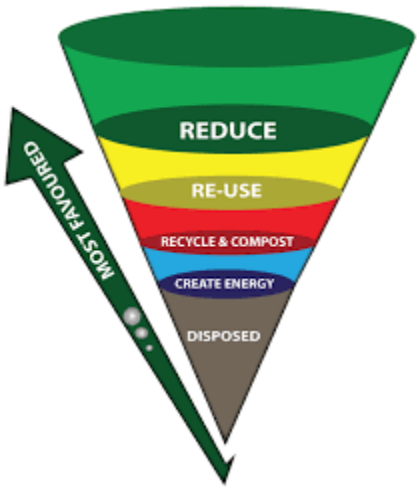

Figure 1: Waste management hierarchy

The foundation of the hierarchy, and the first choice of measures in waste management, is avoidance and reduction. This step aims for goods to be designed in a manner that minimises their waste components. Also, the reduction of the quantity and toxicity of waste generated during the production process is important. The next stage of the hierarchy is reusing waste. Reusing an article removes it from the waste stream for use for a similar or different purpose without changing its form or properties. After reuse comes the recycling of waste, which involves separating articles from the waste stream and processing them as products or raw materials. These first four stages of the waste management hierarchy are the foundation of cradle-to-cradle waste management. This approach seeks to reuse or recycle a product when it reaches the end of its lifespan. In this way, it becomes an input for new products and materials. This cycle repeats itself until as small a portion as possible of the original product eventually enters the next level of the waste management hierarchy: recovery. Recovery involves reclaiming particular components or materials or using the waste as a fuel. As a last resort, waste enters the lowest level of the hierarchy to be treated or disposed of, depending on the safest manner for its final disposal.

Where the quantity of waste cannot be reduced during production, the purpose of implementing the

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waste management hierarchy is to use waste as a resource and to divert these potential resources from landfills. Although the use of landfills is widely considered the most affordable way to manage waste, this view does not take into account factors such as the environmental impacts of landfills, the costs of developing and maintaining additional landfill capacity to accommodate the increasing rate of waste disposal, and the cost of closing and remediating the landfill.

N.1 Benefits of recycling

Recycling of waste has the following benefits:

- It reduces the waste stream going to landfill sites, thus saving landfill airspace.
- It creates opportunities for income generation and alleviation of poverty through job creation.
- It helps reduce pollution and conserve natural resources.
- It conserves energy and reduces manufacturing costs.
- It can reduce informal salvaging from landfill sites.
- It contributes to a cleaner, greener, and healthier South Africa.
- It builds pride in our environment.
- It reduces costs to local authorities.

N.2 What can be recycled?

The recycling of waste in Eskom is not only limited to the waste streams below. Eskom sites must investigate opportunities to recycle other wastes that they are generating.

CCPs (ash and gypsum), metals, and oil mentioned above can also be recycled.

- Tins (cold drink and beer cans, food tins, aluminium foil, paint tins, and aerosol cans can all be recycled)
- Glass
- Paper
- Plastics
- Tetra Pak (fruit juice and milk containers)
- Electronic waste (e-waste) (computers, cell phones, iPods, iPads and other tablets, gaming consoles)
- Cartridge recycling

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Appendix O: Waste classification and management

- The Waste Classification and Management Regulations, GNR 634 of 23 August 2013, requires that waste be classified in accordance with the SANS 10234 globally harmonised system (GHS) within 180 days of generation.
- Classification has to identify whether waste is hazardous or not. If found to be hazardous, a safety data sheet must be created for that waste stream and will need to be provided to the transporter of the waste prior to dispatching the waste.
- Waste listed in Annexure 1 of the Waste Classification and Management Regulations, GNR 634, does not require classification.
- Divisions must familiarise themselves with Annexure 1 of these regulations and check which waste that they generate needs to be classified.
- BUs must ensure that the mixing of waste does not happen prior to classification if classification will be performed.
- Waste must be reclassified every five years or within 30 days of modifications to the process or activity that generated the waste, changes in raw materials or other inputs, or any other variation of relevant factors.
- If waste was subjected to any form of treatment, it must be classified.
- Divisions must ensure that the SDSs for waste classification are prepared in accordance with SANS 10234.
- Divisions do not have to prepare the SDSs for pre-classified hazardous waste, provided that they reflect the product from which the waste originates and, for mixed waste, the details of the specific hazardous waste(s) or hazardous chemical(s) in the waste.
- SDSs are not required for medical waste and general waste, unless it (general waste) was contaminated with hazardous waste.
- All the divisions generating hazardous waste, except HCRW (medical waste), must be in possession of the SDSs.
- Waste transporters and waste managers are not allowed to accept waste that has not been classified or pre-classified.
- Divisions are not allowed store waste for more than 18 months from generation without it being reused, recycled, recovered, treated, and/or disposed of.
- Eskom sites that have waste disposal sites are not allowed to store waste for more than 18 months from the date of receipt from the waste generator.
- Waste must not be mixed or treated where this would reduce the potential for reuse,

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recycling, or recovery or result in treatment that is not controlled and not permanent.

- Waste may be blended or pre-treated to improve the potential for reuse, recycling, recovery, or treatment or reduce the risk associated with the management of waste.
- If the divisions/BUs have classified waste in terms of minimum requirements, or waste for which an alternative classification was approved by the DFFE or the Department of Water and Sanitation (DWS) prior to these regulations taking effect, the waste must be reclassified using SANS 10234 and assessed in terms of whether the waste is to be disposed of to a landfill within three years.
- Waste not classified at all must be classified using SANS 10234 and assessed within 18 months.

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Appendix P: Contaminated land provisions

P.1 Identification and notification of investigation areas

- The contaminated land provisions have a notification duty. They require a landowner who suspects that he/she owns land that is significantly contaminated (with respect to different receptors and land use scenarios) or a person who undertakes an activity that causes the land to be significantly contaminated to notify the Minister and the member of the executive council (MEC) of the contamination as soon as that person becomes aware of that contamination. Failure to comply will result in a specific offence in terms of the NEMWA, and a person convicted is liable to a fine not exceeding R10 million or to imprisonment for no more than 10 years, or to both such fine and imprisonment, plus any other penalty or award under the National Environmental Management Act 107 of 1998.

- The Minister may issue a written notice to a particular person identifying specific land as an investigation area if he/she, on reasonable grounds, believes that the land is, or is likely to be, contaminated. An investigation area is a piece of land that is believed to be contaminated or land on which high-risk activities have been, or are, taking place that are likely to result in land contamination. Once the Minister or the MEC has identified such areas, or the owner of the land or the person who undertook the activity has notified the Minister and the MEC of significant contamination, a site assessment may be required and must be submitted to the Minister or the MEC. The findings of the site assessment report will determine whether the investigation area is contaminated or not. The investigation area may be regarded as contaminated, even if the findings of a site assessment report do not indicate potential harm to the environment. The legislation does not distinguish between sites that have been decommissioned and sites that are still operational.

- Should a site assessment be required, such an assessment must be conducted in accordance with the requirements of the Norms and Standards for the Remediation of Contaminated Land. These provide for a uniform national approach to determine the contamination status of an investigation area, limit uncertainties about the most appropriate criteria, provide for a method to apply in the assessment of contaminated land, and provide minimum standards for assessing necessary environmental protection measures for remediation activities.

P.2 Consideration of site assessment reports

On receipt of a site assessment report, the Minister or the MEC may decide whether an investigation area is contaminated or not, whether remediation is required or not, or whether the risk must be monitored and managed. In cases where the site must be remediated, the landowner or person must appoint an independent person to compile a remediation plan that provides remediation objectives and future land use. Furthermore, the Minister or the MEC may declare a contaminated area to be a remediation site and issue a remediation order. A

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remediation order may impose limitations on the use of the land, and provisions may, therefore, significantly affect the value of land and future land use planning. Should the investigation area not present an immediate risk, measures must be taken to address the monitoring and management of that risk.

P.3 Transfer of remediation sites

- The contaminated land provisions have an effect on the alienation of land, as no person may transfer contaminated land without informing the person to whom that land is to be transferred that the land is contaminated. In case the site is in the process of remediation, the Minister or the MEC must be notified, and conditions that are specified by them must be complied with before such transfer takes place. Liability can be traced back. The Minister must notify the Registrar of Deeds of any land declared to be contaminated.

P.4 Contaminated land register

- The Minister will keep a National Contaminated Land Register. The register will include details of the landowner or person, site location, types of contaminants, and status of contamination. Once the contaminated land has been remediated, and the findings demonstrate that the remediation order has been complied with, the competent authority must inform the Minister, who will change the status of the remediation and notify the Registrar of Deeds.

- The remediation of contaminated land was removed as a listed activity from Category A of the Waste Management Activities List. This means that a waste management licence is no longer needed for this activity.

P.5 Implementation strategy

- In order to determine the presence of contaminated land, Eskom must conduct due diligence investigations prior to any property acquisition. The due diligence investigations should determine the condition of the land and the current liabilities and alert a purchaser to possible future obligations.

- Implementation of the provision will be in a phased approach:
  - Phase 1 will be a desktop study of all Eskom divisions operating high-risk activities, initial investigations, and a preliminary risk assessment.
  - Phase 2 will be a detailed investigation, testing for site characterisation (doing the soil screening tests to check contaminants in the soil), and risk quantification for certain identified sites.

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- Phase 3 will be an evaluation of remediation objectives and a proposed remediation plan, supported by control and monitoring measures for the activities.

- Divisions must identify high-risk activities (for example, underground fuel storage facilities, pollution control dams, waste disposal sites, oil storage areas, and transformer storage yards) at their sites.

- The Waste Portfolio of the Corporate Office will update a standardised template for the sourcing of the above information.

- Based on the above information regarding the sites, Eskom will compile an Eskom contaminated land register, possibly including a preliminary site assessment report for certain sites. The register will be submitted to the authorities.

- The assessment will be done in accordance with the requirements as stipulated in the Norms and Standards for the Remediation of Contaminated Land. The soil screening values will be determined to confirm whether the land is contaminated.

- Should any Eskom site qualify as contaminated, a remedial order will be issued, and the land will be recorded in the National Contaminated Land Register by the Minister.

- Eskom will be required to develop a remedial plan to remediate the contaminated land.

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Annexure A – Principles and norms regarding waste management

The following principles and norms on waste management are internationally recognised and have been agreed on at the Basel Convention. These principles and norms must be applied and considered by any person engaged in the handling, storage, collection, recycling, disposal, and transportation of waste. Eskom Holdings SOC Limited has adopted seven environmental management principles in line with the NEMA (Act 107 of 1998).

a) **Duty of care** – any generator of waste is responsible for ensuring that the waste is handled, stored, collected, disposed of, and transported in an environmentally sound manner. Waste must be avoided, minimised, reused, recycled, or otherwise disposed of in a responsible manner. The generator of waste is responsible for the fate of the generated waste under all circumstances. The generator remains legally liable for any harm to humans, for damage to property, or for deterioration of the environment.

b) **Cradle to grave** – any generator of waste is legally responsible for its disposal from point of generation to final disposal. Responsibility for the waste and the considerations of the waste exists throughout its life cycle.

c) **Polluter pays principle** – any person causing pollution is responsible for any costs incurred in the cleaning and rehabilitation of the impact on the environment.

d) **Precautionary principle** – prevention of harm is the best method of environmental protection and, when knowledge is limited, applies as the precautionary approach. Always assume that waste is hazardous until it has been shown to be safe. Take action to avoid the possibility of irreversible environmental harm.

e) **Preventive principle** – reduce risk by ensuring that collection, treatment, and disposal take place as close as possible to the point of generation as is technically and environmentally feasible.

f) **Proximity principle** – the treatment and disposal of general and hazardous waste should take place as close as possible to the point of production in order to minimise transportation and environmental risks. Waste should be managed and disposed of as close to the point of generation as possible. The objective is to minimise transport distances and cost, exposure, and risk associated with waste.

g) **Promotion of the minimisation, reuse, recycling, and recovery of waste principle** – focus on implementing the waste management hierarchy, with the ultimate aim of diverting waste from landfill sites.

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