

HAZARDOUS WASTE MANAGEMENT PLAN (HWMP)

Indorama Eleme Fertilizer Complex, Eleme, Rivers State, Nigeria

Existing Operations (Lines 1, 2 & 3) and Line 4 Fertilizer Plant (IFF Line 2 Project)

Document Number	IEFCL-HSEF-HWMP-001
Revision	Rev. 01
Date	October 2026
Project Proponent	Indorama Fertilizer FZE (IFF)
Applicable Standards	AfDB Integrated Safeguards System (ISS, 2023); Nigerian environmental legislation; WBG EHS Guidelines and Good International Industry Practice (GIIP)
Supporting Procedure	Procedure for Waste Management, IEFCL-HSEF-2.403, Rev. 02 (retained as supporting operational procedure)

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DOCUMENT CONTROL

Table No. 01: Document Information

Document Title	Hazardous Waste Management Plan (HWMP)
Document Number	IEFCL-HSEF-HWMP-001
Facility	Indorama Eleme Fertilizer Complex – IEFCL Lines 1, 2 and 3 and the Line 4 Fertilizer Plant (IFF Line 2 Project), including ancillary utilities, effluent treatment plant (ETP), incinerator, laboratories, warehouses, workshops and medical centre
Owner	HSEF Department (Environment Section)

Table No. 02: Revision History

Rev No.	Date	Details of Changes
00	October 2026	First issue of standalone HWMP
01	October 2026	Revised to address AfDB SNSC review comments on the HWMP (comments dated 17–19 October 2026)

Table No. 03: Approval

Approvals	Name	Title	Signature / Date
Prepared / Revised by	Environment Department	Environment Section, HSEF	01st October 6, 2026
Reviewed and Approved by	Dr. Mahendra Jain	Head of Section (HOS), HSEF	04th October 6, 2026

Disclosure Note

This HWMP is an Environmental and Social (E&S) instrument to be disclosed in accordance with the AfDB Integrated Safeguards System (ISS, 2023) and the AfDB Disclosure and Access to Information Policy. In line with the Bank's request of 4 August 2026, this version excludes confidential and security-sensitive information without compromising the technical content required for assessment.

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ABBREVIATIONS

Abbreviation	Meaning
AfDB	African Development Bank
CAP	Corrective Action Plan
EHS	Environmental, Health and Safety
EPC	Engineering, Procurement and Construction (Contractor)
EPRP / ERP	Emergency Preparedness and Response Plan / Emergency Response Plan
ESMMP	Environmental and Social Management and Monitoring Plan
ESMS	Environmental and Social Management System
ETP	Effluent Treatment Plant
FMEnv	Federal Ministry of Environment
GIIP	Good International Industry Practice
GRM	Grievance Redress Mechanism
HSEF	Health, Safety, Environment and Fire
HTS / LTS	High / Low Temperature Shift (converter)

Abbreviation	Meaning
HW	Hazardous Waste
HWSA	Hazardous Waste Storage Area
IBC	Intermediate Bulk Container
IEFCL	Indorama Eleme Fertilizer & Chemicals Limited
IFF	Indorama Fertilizer FZE
ISS	AfDB Integrated Safeguards System (2023)
KPI	Key Performance Indicator
MMD	Material Management Department
NESREA	National Environmental Standards and Regulations Enforcement Agency
NMDPRA	Nigerian Midstream and Downstream Petroleum Regulatory Authority
OS	Operational Safeguard (AfDB ISS)
PIC	Prior Informed Consent (Basel Convention)
PPE	Personal Protective Equipment
SDS / MSDS	(Material) Safety Data Sheet
SNSC	AfDB Environmental and Social Safeguards and Compliance Department
TAM	Turnaround Maintenance
TCLP	Toxicity Characteristic Leaching Procedure
UF	Urea-formaldehyde
WBG	World Bank Group

1.0 PURPOSE

The purpose of this Hazardous Waste Management Plan (HWMP) is to establish a dedicated, auditable framework for the management of all hazardous waste generated at the Indorama Eleme Fertilizer Complex throughout the waste lifecycle – from generation to final treatment, recovery or disposal (“cradle to grave”). The HWMP specifically:

- identifies, characterizes and classifies the hazardous waste streams associated with fertilizer manufacturing, maintenance, laboratory, utility, Effluent Treatment Plant (ETP), warehouse and ancillary activities;
- sets out the measures for waste minimization, segregation and compatibility, storage, handling, internal transfer, transportation, treatment, recovery and final disposal;
- defines hazardous waste emergency preparedness and spill response arrangements;
- establishes due diligence and monitoring of hazardous waste contractors and downstream receiving facilities;
- establishes cradle-to-grave tracking, monitoring, key performance indicators, reporting and record keeping; and
- demonstrates alignment with the AfDB Integrated Safeguards System (ISS, 2023), applicable Nigerian legal requirements and Good International Industry Practice (GIIP).

The existing Procedure for Waste Management (IEFCL-HSEF-2.403, Rev. 02) is retained as the supporting operational procedure for day-to-day handling, evacuation and documentation of waste and is cross-referenced throughout this HWMP. Where this HWMP sets a more stringent requirement than IEFCL-HSEF-2.403, the HWMP prevails and IEFCL-HSEF-2.403 shall be aligned at its next revision (see Section 21.0).

2.0 SCOPE AND APPLICABILITY

2.1 Facilities and Project Phases Covered

The HWMP applies to all hazardous waste generated, stored, treated or dispatched within the Indorama Eleme Fertilizer Complex by Indorama personnel, contractors and sub-contractors, as summarized below.

Table No. 04: Facilities and Phases Covered by the HWMP

Facility / Unit	Phase	Remarks
IEFCL Line 1, Line 2 and Line 3 (ammonia, urea, granulation, bagging)	Operation and maintenance, including turnaround maintenance (TAM)	Existing operations; previously covered by IEFCL-HSEF-2.403
Line 4 Fertilizer Plant (IFF Line 2 Project) – ammonia, urea, granulation and associated utilities	Construction, pre-commissioning, commissioning, operation and maintenance	Scope extended to Line 4. Construction-phase hazardous waste is managed by the EPC Contractor under this HWMP (Section 13.10)
Common utilities and off sites: DM plant, cooling towers, gas receiving station, steam/power systems, tank farms	Operation and maintenance	Shared by all lines
Effluent Treatment Plant (ETP) and on-site incinerator	Operation and maintenance	Generator of ETP sludge and incinerator ash; on-site treatment facility (Section 12.3)

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Facility / Unit	Phase	Remarks
Quality control laboratories, warehouses, workshops, central scrap yard, canteen and offices	Operation	Ancillary activities
Medical center	Operation	Generator of biomedical (healthcare) waste (Section 13.5)

Table No. 04A: Accountability for Hazardous Waste Activities by Facility and Project Phase

Facility / Phase	Classification & segregation	Storage & inventory reporting	Approval of route / vendor	Transport & dispatch	Incident notification	Final disposal & verification
IEFCL Lines 1–3 – operation, maintenance, TAM	Manager (generating unit)	Environment Section (HWSA custodian); MMD for scrap-yard HW bays	HOD, HSEF	MMD (dispatch); Environment Section (manifest check)	Shift In-charge → HOD, HSEF	Environment Section
Line 4 (IFF Line 2) – construction and pre-commissioning	EPC Contractor HSE Manager	EPC Contractor HSE Manager (laydown HWSA)	HOD, HSEF (IFF approves EPC vendors)	EPC Contractor, using IFF-approved transporters only	EPC Contractor → IFF Project HSE Lead → HOD, HSEF	IFF Project HSE Lead (EPC close-out, Section 13.10)
Line 4 – commissioning (until handover)	EPC Contractor with Line 4 Operations	EPC Contractor; transfers to IFF HWSA under transfer note	HOD, HSEF	MMD (IFF consignments); EPC (EPC consignments)	Incident Controller per ERP → HOD, HSEF	Environment Section
Line 4 – operation and maintenance (after handover)	Line 4 Plant Manager	Environment Section	HOD, HSEF	MMD	Shift In-charge → HOD, HSEF	Environment Section
Common utilities and off-sites (DM plant, cooling towers, gas receiving, steam/power, tank farms)	Utilities Manager	Environment Section	HOD, HSEF	MMD	Shift In-charge → HOD, HSEF	Environment Section
ETP, Sludge Incinerator and Polymer Incinerator	ETP / Incinerator In-charge	ETP / Incinerator In-charge (ETP waste store)	HOD, HSEF	MMD (off-site residues)	ETP In-charge → HOD, HSEF	Environment Section (ash TCLP and block release)
Laboratories, warehouses, workshops, central scrap yard, offices	Head of the respective department	Environment Section (scrap-yard HW bays: MMD)	HOD, HSEF	MMD	Department Head → HOD, HSEF	Environment Section
Medical centre	Chief Medical Officer	Medical centre (biomedical store)	HOD, HSEF	Internal transfer to incinerator by trained handler	Chief Medical Officer → HOD, HSEF	Environment Section

Allocation and reporting of waste from shared facilities. Waste is recorded in the HW Register at the point of generation against the generating unit code (Line 1, Line 2, Line 3, Line 4, Utilities, ETP, Laboratory, Medical, EPC). Where a waste arises in a shared facility, it is allocated to the contributing lines on the following basis and reported both complex-wide and by line:

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- ETP sludge and incinerator ash – pro-rata to the metered effluent volume received from each line in the reporting month (sludge) and to the recorded mass of feed from each line (ash);
- common utilities wastes (e.g. spent ion-exchange resin, cooling-tower and boiler chemical residues) – pro-rata to the urea production of each line in the reporting month;
- maintenance and laboratory wastes – to the line stated on the work order or sample request; where not attributable, pro-rata to urea production;
- Line 4 waste is reported separately in all lender reports too.

2.2 Wastes Covered

This HWMP covers all waste exhibiting one or more hazardous properties (Section 6.1), wastes classified as hazardous under Nigerian law, wastes of uncertain classification pending characterization, and non-hazardous waste that has been contaminated by hazardous waste (which is managed as hazardous unless characterization demonstrates otherwise). General non-hazardous wastes (metal, wood, glass, plastic, paper, food and office waste) are managed under ESMMP Section 7.5.1 and IEFCL-HSEF-2.403. Treated effluent discharge and air emissions are addressed by the ESMMP and the environmental monitoring procedure (IEFCL-HSEF-2.402) and are outside the scope of this plan except where they relate to hazardous waste treatment (e.g. incinerator operation).

Release from hazardous waste controls (reclassification). A waste managed as hazardous on a precautionary basis may only be reclassified as non-hazardous when all of the following conditions are met:

- **Evidence:** a documented process description and SDS review (Section 6.3), and analytical results from at least three representative samples (or the sampling plan in Section 6.4.1) analysed by an ISO/IEC 17025-accredited, FMEnv/NESREA-recognised laboratory using the methods in Table No. 11A;
- **Thresholds:** every result is below the hazardous-property thresholds in Table No. 10A (including TCLP leachate limits, flash point, pH, PCB and GHS concentration limits), and the 90% upper confidence limit of the mean is below the threshold where four or more samples are available;
- **Regulatory status:** the waste is not listed as hazardous under Nigerian law or the Basel Convention irrespective of test results; listed wastes cannot be reclassified without written concurrence of the competent authority;
- **Approval:** the Environment Section prepares a Reclassification Record with the evidence and recommendation; Technical Services confirms the process basis; the HOD, HSEF approves. No reclassification takes effect before HOD, HSEF approval;
- **Validity and records:** the reclassification is valid until a re-characterisation trigger occurs (Section 6.5) and is re-verified at least annually. The Reclassification Record, laboratory reports and chain-of-custody forms are retained for 10 years (Table No. 27) and the HW Register entry is updated with the new classification version.

2.3 Relationship with Other E&S Instruments

Table No. 05: Relationship of the HWMP with Other Instruments and Procedures

Instrument / Document	Interface with this HWMP
ESIA and ESMMP – Line 4 Fertilizer Plant (incl. Section 7.5.1 Integrated Waste Management Plan)	ESMMP sets project-level waste commitments; Section 7.5.1 covers general waste and refers to this HWMP for all hazardous waste.

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Instrument / Document	Interface with this HWMP
Procedure for Waste Management, IEFCL-HSEF-2.403, Rev. 02	Supporting operational procedure: bin system, evacuation schedule, evacuation slip (IEFCL-HSEF/E-4.409) and waste manifest (IEFCL-HSEF/E-4.410).
Emergency Preparedness and Response Plan (EPRP) / site ERP	Site-wide emergency organization, alarm and evacuation. Section 16.0 of this HWMP sets out waste-specific spill and incident response.
Stakeholder Engagement Plan (SEP) and Grievance Redress Mechanism (GRM)	Receipt and resolution of community concerns about waste transport, odor, smoke or disposal (Section 20.0).
Consolidated ESMS (HSEF management system)	Policy, legal register, competence, document control, audit, management review and corrective action processes applied to this HWMP.
Procedure for Environmental Performance Monitoring and Measurement, IEFCL-HSEF-2.402	Effluent, stack and ambient monitoring including incinerator emissions.

Table No. 05A: Cross-Reference Matrix – HWMP and Related Instruments

Instrument	Controlling document / number	Responsible owner	Corresponding HWMP sections	Shared procedures / reporting requirements
ESIA and ESMMP – Line 4 (IFF Line 2) Fertilizer Plant	ESMMP Ref. 0802778 (Section 7.5.1 Integrated Waste Management Plan)	HOD, HSEF	2.1, 7.0, 13.10, 18.3	ESMMP waste KPIs reported through the AMR; ESMMP 7.5.1 refers to this HWMP for all hazardous waste
Procedure for Waste Management	IEFCL-HSEF-2.403, Rev. 02	Environment Section	9.0, 10.0, 11.1, 15.0, 19.0	Evacuation record E-4.409; manifest E-4.410; to be aligned with this HWMP at next revision (Section 21.0)
Emergency Preparedness and Response Plan / site ERP	IEPL-HSEF-2.111	Fire & Safety Section	16.0	Incident command, alarm, evacuation, external coordination; HW scenarios drilled annually (Table No. 24)
Stakeholder Engagement Plan (SEP) and GRM	0802778_IFF Line 2 SEP, Rev. 04	Head, Community Relations & Development	20.0	Waste-related grievances logged and closed per SEP Section 9; community notification of off-site incidents within 24 hours
Procedure for Environmental Performance Monitoring and Measurement	IEFCL-HSEF-2.402	Environment Section	10.3.2, 12.3, 18.0	Effluent, stormwater and incinerator stack monitoring and reporting
Hazardous Materials Management Plan	IEFCL-HS-PC-20	HOD, HSEF	6.3, 8.0, 9.0	SDS register, chemical storage and procurement controls (FIFO, returnable packaging)
Legal and Permit Register	Table No. 07A (summary); full register held by HSEF	HOD, HSEF	3.2, 12.3, 14.1	Quarterly review of permit validity and conditions
EPC Construction Waste Management Procedure	IEFCL-HSEF-2.403	EPC Contractor HSE Manager; IFF Project HSE Lead	5.0, 13.10, 14.0	Monthly HW register, manifests and certificates to IFF by the 5th working day

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3.0 LEGAL, POLICY AND STANDARDS FRAMEWORK

3.1 AfDB Integrated Safeguards System (ISS, 2023)

The HWMP is designed to meet the requirements of the AfDB ISS (2023). The table below shows how the relevant Operational Safeguards (OS) are addressed.

Table No. 06: Alignment with AfDB ISS (2023) Operational Safeguards

Operational Safeguard	Relevant Requirement (summary)	Where Addressed in the HWMP
OS1 – Assessment and Management of E&S Risks and Impacts	Management programmes, roles, competence, contractor management, monitoring, reporting and continuous improvement within the ESMS.	Sections 5.0, 14.0, 17.0, 18.0, 19.0, 21.0
OS2 – Labour and Working Conditions	Safe and healthy working conditions for workers who handle hazardous materials, including PPE, training and health surveillance; labour standards in the supply chain.	Sections 10.3, 13.0, 14.1, 16.0, 17.0
OS3 – Resource Efficiency and Pollution Prevention and Management	Avoid hazardous waste generation; where unavoidable reduce, reuse, recycle and recover; treat, destroy or dispose in an environmentally sound manner; comply with national and international requirements on hazardous waste including transboundary movement; use licensed, reputable contractors and obtain chain-of-custody documentation to final destination.	Sections 6.0 – 15.0
OS4 – Community Health, Safety and Security	Prevent community exposure to hazardous materials and waste, including during transport; emergency preparedness and response coordinated with communities and authorities.	Sections 11.2, 12.5, 16.0, 20.0
OS10 – Stakeholder Engagement and Information Disclosure	Disclosure of E&S instruments; grievance mechanism accessible to affected communities.	Disclosure Note; Section 20.0

Table No. 06A: AfDB ISS (2023) Compliance Matrix for the HWMP

OS / requirement	HWMP provision	Implementation evidence required	Responsible party	Outstanding action / status
OS1 – E&S management programme with defined roles and accountability	5.0; Tables 04A, 09, 09A	Approved HWMP; signed responsibility matrix; job descriptions of accountable owners	HOD, HSEF	None – in place on HWMP approval.
OS1 – Contractor management	5.0 (Table 09A); 13.10; 14.0	EPC contract EHS clauses; approved EPC Construction WMP;	IFF Project HSE Lead; Environment Section	None
OS1 – Monitoring, reporting and continuous improvement	18.0; 21.0	Monthly Environment Reports; KPI dashboard; AMR; management review minutes	Environment Section	None
OS3 – Identification and characterisation of hazardous waste	6.0; Tables 10A, 10B, 11A, 11B	Accredited laboratory reports; classification and reclassification records	Environment Section	None
OS3 – Environmentally sound storage, treatment and disposal	10.0; 12.0; 13.0	HWSA inspection checklists; incinerator operating logs; stack test reports; ash TCLP results	Environment Section; ETP In-charge	None

OS / requirement	HWMP provision	Implementation evidence required	Responsible party	Outstanding action / status
OS3 – Use of licensed, reputable contractors and chain-of-custody documentation	14.0; 15.0	Vendor permit files; signed manifests; certificates of disposal/recovery; monthly reconciliation	Environment Section; MMD	None
OS3 – Transboundary movement in line with international requirements	11.3	Basel notifications, PIC consents, movement documents, certificates of recovery (spent catalyst exported to Europe for recycling)	Environment Section	None
OS2 – Safe working conditions for waste handlers	10.3; 13.0; 16.0; 17.0	Training records; PPE issue records; vaccination records (biomedical handlers); incident statistics	HSEF	None
OS2 – Labour standards in the waste supply chain	14.1	Vendor due diligence records confirming no child or forced labour	Environment Section; Commercial	None
OS4 – Community exposure, including transport	11.2.1; 12.5; 16.0	Route risk assessments; transporter licences; incident reports	MMD; Environment Section	Route risk assessment for each approved transporter
OS4 – Emergency preparedness and response	16.0	ERP; annual HW drill reports; equipment inspection records	Fire & Safety Section	None
OS10 – Disclosure and grievance mechanism	Disclosure Note; 20.0	Disclosure record; GRM register entries for waste-related grievances	Head, Community Relations & Development	Disclosure of HWMP after Bank clearance

3.2 Nigerian Legal and Regulatory Requirements

Table No. 07: Principal Nigerian Legal Requirements Applicable to Hazardous Waste

Instrument	Relevance to Hazardous Waste Management
Harmful Waste (Special Criminal Provisions, etc.) Act, Cap H1, LFN 2004	Prohibits the unlawful dumping, deposit or transport of harmful waste in Nigeria.
National Environmental Standards and Regulations Enforcement Agency (Establishment) Act, 2007	Establishes NESREA and its enforcement role for environmental regulations, permits and audits.
National Environmental Protection (Management of Solid and Hazardous Wastes) Regulations, S.I. 15 of 1991	Identification, tracking, storage, treatment and disposal of solid and hazardous waste; record keeping and notification.
National Environmental (Sanitation and Wastes Control) Regulations, 2009 (S.I. 28)	Waste handling, collection, transport and disposal; licensing of waste operators; prohibition of open burning and dumping.
National Environmental (Electrical/Electronic Sector) Regulations, 2011	Management of waste electrical and electronic equipment (e-waste) through registered recyclers and extended producer responsibility.
National Environmental (Hazardous Chemicals and Pesticides) Regulations, 2014	Storage, handling and disposal of hazardous chemicals, including expired and off-specification chemicals.

Instrument	Relevance to Hazardous Waste Management
National Environmental (Surface and Groundwater Quality Control) Regulations, 2011	Protection of water resources from contamination by waste and leachate.
Petroleum Industry Act, 2021; Midstream and Downstream Petroleum Operations Regulations, 2022; and applicable NMDPRA environmental and waste-management requirements	Licensing and control of used lubricating oil collection and recycling, where applicable.
National Oil Spill Detection and Response Agency (NOSDRA) Act, 2006	Notification of oil spills, where applicable.
National Environmental (Healthcare Waste Control) Regulations, 2021 (S.I. No. 44 of 2021); National Healthcare Waste Management Policy, 2013; and applicable National Guidelines for Healthcare Waste Management	Segregation, colour coding, storage and treatment of biomedical (healthcare) waste.
Rivers State Waste Management Agency (RIWAMA) Law No. 2 of 2014 and applicable Oil and Gas Free Zones Authority (OGFZA) environmental requirements and permit conditions	State permits for waste operators and disposal sites; OGFZA environmental requirements and permit conditions applicable to IFF as a Free Zone Enterprise.

3.2.1 Legal and Permit Register for Hazardous Waste

Table No. 07 lists the principal instruments. The waste-specific legal and permit obligations are managed through the HSEF Legal and Permit Register which is reviewed quarterly by the Environment Section and whenever a permit is renewed, amended or a new route is introduced. Following the reorganisation completed on 31 December 2025, all applicable permits, licences and approvals have been re-issued in the name of Indorama Eleme Fertilizer & Chemicals FZE. The hazardous waste entries of the register are summarised below; the full register is available to the Bank on request.

Table No. 07A: Legal and Permit Register – Hazardous Waste Entries (Summary)

Permit / approval	Competent authority	Permit holder	Waste streams, routes and key waste-specific conditions	Validity / renewal date	Reporting obligation	Evidence of compliance
Waste treatment facility registration	Federal Ministry of Environment	Indorama Eleme Petrochemicals Limited	On-site thermal treatment (Sludge and Polymer Incinerators);	Valid to 19 May 2027	Quarterly ECM Reports	Incinerator logs; stack test reports
Certificate of Registration – ETP,	Federal Ministry of Environment	Indorama Eleme Fertilizer & Chemicals FZE	Registration of treatment units	Valid to 19 May 2027	Quarterly ECM Reports	Certificate on file
Waste and Toxic Substances Permit	NESREA	Indorama Eleme Fertilizer & Chemicals FZE	Generation, storage and handling of hazardous waste and toxic substances	Valid to 11 Oct 2026 (Renewal under process)	Quarterly ECM Reports	HW register; inspection records
Air Quality Permit	NESREA	Indorama Eleme Fertilizer & Chemicals FZE	Point-source emissions	Valid to 11 Oct 2026 (Renewal under process)	Quarterly ECM Reports	Stack monitoring reports
NESREA permits for IFF operations	NESREA	Indorama Fertilizer FZE	Operational environmental compliance, including waste	Valid to 17 September 2027	Quarterly ECM Reports	Permit on file; compliance returns

Permit / approval	Competent authority	Permit holder	Waste streams, routes and key waste-specific conditions	Validity / renewal date	Reporting obligation	Evidence of compliance
FMEv approval for solidification of incinerator ash (paver blocks)	Federal Ministry of Environment	Indorama Eleme Fertilizer & Chemicals FZE	Ash fixation subject to TCLP compliance (Section 12.4)	Life time validity	Monthly TCLP results	TCLP laboratory reports; block production records
Chemical Storage Permit	Rivers State Ministry of Environment	Indorama Eleme Fertilizer & Chemicals FZE	Storage of chemicals, including expired/off-specification stock pending disposal	Valid to 31 December 2026	Quarterly ECM Reports	Chemical inventory
Basel Convention consent for each export of spent catalyst	Federal Ministry of Environment (Competent Authority) and importing-state authority	Indorama Eleme Fertilizer & Chemicals FZE (exporter)	Transboundary movement for metal recovery (Section 11.3)	Per consignment	Movement document; certificate of recovery	Notification, consent and movement documents
Licences of waste transporters and receiving facilities	FMEv / NESREA / RIWAMA / NMDPRA (used oil)	Third-party vendor	Waste types and activities as stated on each licence (verified per consignment, Section 11.2.1)	Tracked in approved vendor list	Certificates of disposal / recovery	Vendor permit file; audit reports

3.3 International Conventions

- **Basel Convention** on the Control of Transboundary Movements of Hazardous Wastes and their Disposal – governs any export of hazardous waste (e.g. spent catalyst for metal recovery), including Prior Informed Consent (PIC) and movement documents.
- **Stockholm Convention** on Persistent Organic Pollutants and **Minamata Convention** on Mercury – relevant to any PCB-containing equipment or mercury-containing lamps and instruments, if encountered.

3.4 Good International Industry Practice (GIIP)

- WBG General EHS Guidelines (2007), Section 1.5 Hazardous Materials Management and Section 1.6 Waste Management;
- WBG EHS Guidelines for Nitrogenous Fertilizer Manufacturing (2007);
- WBG EHS Guidelines for Waste Management Facilities (2007) – applied to the on-site incinerator and to the selection of receiving facilities;
- IFC Performance Standard 3 (Resource Efficiency and Pollution Prevention), applicable to lenders co-financing the complex; and
- WHO guidance on safe management of wastes from health-care activities (biomedical waste).

3.5 Internal Policies and Procedures

Table No. 08: Associated Indorama Controlled Documents

Document	Number	Application
Procedure for Waste Management	IEFCL-HSEF-2.403, Rev. 02	Supporting operational procedure, retained and cross-referenced
Procedure for Environmental Performance Monitoring and Measurement	IEFCL-HSEF-2.402	Effluent, emission and ambient monitoring

Document	Number	Application
Environment & Climate Change Policy	IEFCL-MGT-0.001A	Policy commitment to pollution prevention and waste minimization
Waste / Scrap Evacuation Record	IEFCL-HSEF/E-4.409	Internal transfer record
Waste Manifest (Waste Consignment Note)	IEFCL-HSEF/E-4.410	Off-site hazardous waste tracking
Environment Monthly Report	IEPL-HSEF/E-4.015	Monthly waste data reporting

4.0 DEFINITIONS

Term	Definition
Hazardous waste	Any waste that exhibits one or more of the hazardous properties listed in Table No. 10, or is classified as hazardous under Nigerian law, or is contaminated with such waste.
Generator	The plant, department or contractor whose activity produces the waste.
Satellite accumulation point	A temporary, labelled collection point at or near the point of generation, under the control of the generator.
Hazardous Waste Storage Area (HWSA)	A designated, engineered and access-controlled area for the interim storage of hazardous waste prior to treatment or dispatch.
Characterization	The process of determining the physical, chemical and hazardous properties of waste, by process knowledge, SDS review and/or laboratory analysis.
Recovery / recycling	Any operation whose principal result is that waste serves a useful purpose by replacing other materials (e.g. re-refining of used oil, metal reclamation from spent catalyst, lead recovery from batteries).
Disposal	Final destruction or placement of waste (e.g. incineration without energy recovery, engineered landfill) where recovery is not practicable.
Waste manifest	The multi-copy consignment notes (IEFCL-HSEF/E-4.410) that accompanies each off-site hazardous waste movement and is signed by generator, transporter and receiving facility.
Certificate of disposal / recovery	Written confirmation from the receiving facility that the consignment has been treated, recovered or disposed of, stating method, date and quantity.
Cradle-to-grave	The principle that the generator remains responsible for hazardous waste from generation until verified final treatment, recovery or disposal.

5.0 ROLES AND RESPONSIBILITIES

IFF, as Project Proponent, and IEFCL, as operator of the existing lines, retain overall accountability for hazardous waste management. Responsibilities are allocated as follows.

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Table No. 09: Roles and Responsibilities for Hazardous Waste Management

Sr. No.	Function / Party	Responsibilities
1	Senior Management	Approve the HWMP; provide resources (storage infrastructure, budget for licensed disposal); review performance at management review; ensure reporting to regulators and lenders.
2	Head of Department, HSEF	Owner of the HWMP; approve classification of new waste streams, disposal routes and approved vendor list; approve investigation reports for significant HW incidents; lender and regulatory reporting.
3	Environment Section (HSEF)	Maintain the HW inventory and register; coordinate characterization and laboratory analysis; inspect HWSAs; verify vendor permits and conduct facility audits; complete manifest follow-up and monthly reconciliation; compile KPIs and reports; deliver training; maintain records.
4	Plant Managers / Generating Departments	Identify and segregate HW at source; use correct containers and labels; maintain satellite accumulation points; record quantities; request evacuation; implement waste minimization measures; report spills immediately.
5	Technical Services / Laboratory	Provide SDS and process information; carry out or arrange sampling and analysis through accredited laboratories; advise on compatibility and catalyst change-out planning.
6	Material Management Department (MMD)	Control central scrap yard and HW bays; complete and retain manifests for off-site HW movements; weighbridge records; ensure dispatch only to approved vendors.
7	Commercial / Procurement Department	Procure waste services only from vendors on the HSEF-approved list; include HWMP requirements in contracts; promote supplier take-back and returnable packaging.
8	Fire & Safety Section (HSEF)	Fire protection of HWSAs; spill response support; emergency drills including HW scenarios; PPE standards.
9	Medical Centre	Segregate, package and store biomedical waste; maintain biomedical waste records; manage sharp and needle-stick exposure.
10	ETP / Incinerator In-charge	Operate the incinerator within its authorization and the waste acceptance criteria; maintain operating logs; manage ETP sludge and incinerator ash.
11	EPC Contractor and Sub-contractors (Line 4 construction)	Implement this HWMP for construction and pre-commissioning HW; provide HWSA at laydown areas; use only IFF-approved transporters and facilities; submit monthly HW data and manifests.
12	Licensed Waste Contractors and Receiving Facilities	Hold valid permits; transport and treat waste as contracted; return signed manifests and certificates of disposal/recovery; permit audits; report incidents.
13	All Employees and Contractor Workers	Follow segregation and labelling rules; never mix, dump or burn waste; report spills, leaks and damaged containers.

Table No. 09A: Decision Authority and Single-Point Accountability

Decision / activity	Single accountable owner	Supporting functions (consulted)	Record
Approval of the HWMP and major revisions	Plant Head	HOD, HSEF (document owner)	Approved HWMP; revision log
Classification of new streams and reclassification (Section 2.2)	HOD, HSEF	Environment Section; Technical Services	Classification / Reclassification Record
Approval of treatment/disposal routes and approved vendor list	HOD, HSEF	Environment Section; Commercial	Approved vendor list; route approval
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Decision / activity	Single accountable owner	Supporting functions (consulted)	Record
Exceptions to storage period or quantity limits (Sections 10.1, 10.3.1)	HOD, HSEF (maximum one extension of 30 days; further extension by Plant Head)	Environment Section; MMD	Exception approval form
Emergency decisions during a hazardous waste incident	Incident Controller as defined in the ERP (Shift In-charge until relieved by the Site Main Controller)	Fire & Safety; Environment Section	Incident log
Closure of corrective actions	Minor: Environment Section Head; Major/critical: HOD, HSEF; actions linked to regulatory or lender notification: Plant Head	Action owner implements; Environment Section verifies effectiveness	Corrective action tracker
Regulatory and lender notification	HOD, HSEF	Plant Head; Legal; Lender Relations	Notification letters / emails
Authorisation to dispatch a hazardous waste consignment	Head, MMD	Environment Section (manifest and vendor check)	Signed manifest; gate pass
Construction and pre-commissioning hazardous waste (Line 4)	EPC Contractor HSE Manager	IFF Project HSE Lead (oversight and approval)	EPC HW register; monthly report

EPC Contractor and sub-contractor obligations. The EPC Contractor is responsible for, and shall flow down to all sub-contractors, the following requirements:

- submit a Construction Waste Management Procedure consistent with this HWMP for IFF approval before mobilisation; no hazardous waste-generating activity starts before approval;
- appoint a competent environmental officer for each work front; perform daily inspections of satellite points and laydown HWSAs and a weekly joint inspection with the IFF Project HSE Lead;
- use only IFF-approved transporters and receiving facilities and IFF manifests; maintain a HW register in the Annexure-1 format;
- report any hazardous waste spill, fire or exposure to the IFF Project HSE Lead within one hour and in writing within 24 hours;
- submit by the 5th working day of each month the HW register, quantities by stream, manifests, certificates of disposal/recovery and open actions;
- retain all records for the duration of the contract and hand them over to IFF at close-out (Section 13.10).

Consequences of non-compliance: issue of a non-conformance report with a time-bound corrective action; stop-work for critical non-conformances (e.g. dumping, burning, unauthorised dispatch); recovery of clean-up and disposal costs; withholding of payment or retention as provided in the contract; and removal of the responsible sub-contractor or personnel from site for repeated or wilful breaches.

6.0 HAZARDOUS WASTE IDENTIFICATION, CLASSIFICATION AND CHARACTERISATION

A systematic approach is applied to every waste stream so that hazardous properties, classification and the appropriate management and disposal route are determined before the waste is stored or dispatched.

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6.1 Criteria for Determining Hazardous Properties

Table No. 10: Hazardous Property Criteria

Hazardous Property	Criterion / Indicator	Typical Complex Examples
Flammable / combustible	Liquid flash point < 60 °C, or solid readily combustible; SDS hazard statements H224–H228	Solvent residues, oily rags, paint waste
Oxidizing / reactive	Reacts violently with water or air, releases toxic gas, or is an oxidizer; SDS H240–H272	Laboratory reagents, nitrite/oxidizing chemicals
Corrosive	pH ≤ 2 or ≥ 12.5, or corrodes steel; SDS H290, H314	Acid/alkali residues, battery electrolyte, regeneration chemicals
Toxic / carcinogenic / mutagenic / reprotoxic	Contains listed substances above threshold concentrations; TCLP leachate exceeding regulatory limits for metals or organics	Spent catalyst (Ni, Co, Mo, Cu, Zn, Cr), ETP sludge, incinerator ash
Ecotoxic	Hazardous to the aquatic environment; SDS H400–H413	Waste oil, spent catalyst, certain treatment chemicals
Infectious	Contains viable micro-organisms or their toxins known to cause disease	Biomedical waste from the medical center
Pyrophoric / self-heating	Self-heats or ignites on contact with air	Reduced (un-passivated) spent catalysts
Contaminated	Non-hazardous material contaminated with any of the above	Contaminated PPE, empty chemical bags, spill clean-up material

6.1.1 Classification Thresholds

Table No. 10A: Thresholds Applied for Hazardous Classification

Hazardous property	Test / basis	Threshold – waste is hazardous if	Reference
Ignitability	Flash point – ASTM D93 (Pensky-Martens closed cup)	Liquid flash point < 60 °C; solids readily combustible or spontaneously combustible	GHS; USEPA 40 CFR 261.21
Corrosivity	pH – USEPA 9040C (liquids) / 9045D (solids)	pH ≤ 2.0 or ≥ 12.5	USEPA 40 CFR 261.22
Reactivity / pyrophoricity	SDS; process knowledge; UN Test N.4 (self-heating) where required	Reacts violently with water or air, generates toxic gas, or self-heats	GHS; UN Manual of Tests and Criteria
Leachable toxicity	TCLP – USEPA 1311 with metals by USEPA 6010D/6020B and Hg by 7470A	Leachate exceeds: As 5.0; Ba 100.0; Cd 1.0; Cr 5.0; Pb 5.0; Hg 0.2; Se 1.0; Ag 5.0 mg/L (or more stringent Nigerian/permit limits)	USEPA 40 CFR 261.24; FMEnv ash fixation approval
Toxic / carcinogenic constituents	Total composition (acid digestion USEPA 3050B/3051A) and SDS	Contains a Category 1A/1B carcinogen, mutagen or reprotoxicant (e.g. nickel compounds) at ≥ 0.1% w/w, or acute toxicants above GHS mixture limits	GHS (UN Rev. 10) mixture rules
Ecotoxicity	SDS classification of components	Sum of components classified Aquatic Acute 1 / Chronic 1 (with M-factors) ≥ 25%	GHS summation method
Persistent organic pollutants	PCB – USEPA 8082A	PCB ≥ 50 mg/kg	Stockholm and Basel Conventions

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Hazardous property	Test / basis	Threshold – waste is hazardous if	Reference
Infectious	Source (medical centre) – process knowledge	Contains or is likely to contain pathogens; all sharps	S.I. No. 44 of 2021; WHO

Table No. 10B: Waste Codes and Hazardous Properties by Stream

Waste stream (Table No. 12 ref.)	Site code	Basel code	Hazard characteristics (Basel Annex III)	Primary classification basis
Spent catalysts (1)	HW-CAT	A2030	H6.1, H11, H12; H4.2 if un-passivated	Process knowledge + laboratory
ETP sludge (2)	HW-ETP	Y18 (provisional)	H11, H12 (to be confirmed)	Laboratory
Incinerator ash and residues (3)	HW-ASH	Y18 / A4100	H11, H13	Laboratory (TCLP)
Waste oil and oily sludge (4)	HW-OIL	A3020 (A3180 if PCB $\geq$ 50 mg/kg)	H3, H12	Process knowledge + laboratory
Oil-contaminated materials (5)	HW-OCM	A3020 / Y9	H4.1, H12	Process knowledge
Urea polymer / granulation waste (6)	HW-POL	–	H11 (precautionary – UF residues)	Laboratory
Biomedical waste (7)	HW-BIO	A4020 / Y1	H6.2	Process knowledge
E-waste (8)	HW-EEE	A1180	H11, H12	Process knowledge
Lead-acid batteries (9)	HW-BAT	A1160	H8, H11	Process knowledge
Contaminated packaging (10)	HW-PKG	A4130	As per residual chemical	SDS
Laboratory and expired chemicals (11)	HW-LAB	A4140	As per SDS	SDS
Mercury lamps (12)	HW-HG	A1030	H6.1, H11	Process knowledge
Paint, solvent and adhesive residues (13)	HW-PNT	A4070	H3, H6.1	SDS
Spill clean-up residues (14)	HW-SPL	As per spilled material	As per spilled material	Laboratory where required

Use of process knowledge, SDS and laboratory results. Process knowledge establishes the expected composition and variability; SDS of the input materials identify hazardous constituents and their classification; laboratory analysis confirms properties that cannot be reliably predicted or that determine the route (e.g. TCLP for ash, metal content for catalyst recovery). Where any line of evidence indicates a hazardous property, the waste is classified as hazardous.

Decision process for conflicting evidence, new or unknown wastes and process changes:

- **Conflicting evidence:** the Environment Section records the conflict in the Classification Record and arranges confirmatory sampling (minimum three samples). If the conflict remains, the more protective classification is applied and the HOD, HSEF decides, with external specialist advice where needed.
- **New or unknown waste:** labelled “UNKNOWN – PENDING CHARACTERISATION”, stored as hazardous in a HWSA, segregated from all other groups, and characterised within 30 days; it may not be dispatched until classified.
- **Changes in feedstock, chemicals, catalysts or process conditions:** the Management of Change (MOC) process requires Technical Services to notify the Environment Section before

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implementation; the affected streams are re-characterised during the first campaign or within 30 days of the change and the inventory updated (Section 7.1).

6.2 Classification and Waste Coding

Each waste stream is assigned: (i) a classification – Hazardous, Non-hazardous, or Controlled (requires characterization before routing and (ii) a reference to the applicable Nigerian regulatory category and, for wastes moved across borders, the Basel Convention Annex I/VIII code. Codes are recorded on container labels, the HW Register (Annexure-1) and the waste manifest.

6.3 Characterization Procedure

- Process knowledge and SDS review** – the generating department and Technical Services identify the source process, input materials and SDS of chemicals involved.
- Preliminary classification** – the Environment Section compares the information against the criteria in Table No. 10 and the regulatory lists. Where the waste is clearly hazardous, it is managed as hazardous without further delay.
- Sampling and laboratory analysis** – required where classification is uncertain, where a recovery or reuse route depends on composition (e.g. ash in paver blocks, catalyst metal recovery), or where a receiving facility's acceptance criteria require it. Samples are taken by trained personnel and analyzed by an FMEnv/NESREA-accredited laboratory using recognized methods (Table No. 11).
- Determination of management route** – based on the results, the Environment Section selects the management route according to the waste hierarchy (Section 8.0) and the route summary (Table No. 17), and records the decision and supporting data in the HW Register.
- Approval** – classification of a new stream and its disposal route are approved by the HOD, HSEF before first dispatch.
- Precautionary principle** – pending characterization, uncertain wastes are stored and handled as hazardous.

6.4 Laboratory Analysis Requirements

Table No. 11: Characterization Parameters and Frequency for Principal Streams

Waste Stream	Key Parameters	Frequency
Spent catalysts (each catalyst type), if required.	Metal content (Ni, Co, Mo, Cu, Zn, Cr, Fe), carbon /sulphur, moisture, pyrophoricity; TCLP where landfill is considered	Each change-out campaign (TAM)
ETP sludge	Moisture/dry solids, pH, oil & grease, ammonia, phosphate, total nitrogen, and TCLP heavy metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn).	Initially, then after any process change
Incinerator ash and residues	TCLP heavy metals, loss on ignition, pH	Quarterly, and before each use in paver blocks
Waste oil and oily sludge	Water content, flash point, PCB screen (transformer oil), chlorine content	Annually
Urea polymer / granulation waste	Formaldehyde content, nitrogen, moisture, calorific value	Initially, then annually

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Waste Stream	Key Parameters	Frequency
Spent molecular sieve, ceramic balls, ion-exchange resin	Hydrocarbon/oil content, leachable metals – to confirm non-hazardous status	Each change-out
Unlisted or new waste	As determined by the Environment Section based on process knowledge	Before first dispatch

6.4.1 Sampling, Analytical Methods and Quality Assurance

Table No. 11A: Minimum Analytical Methods and Standards

Parameter	Method / standard (or equivalent accredited method)	Required reporting limit
TCLP extraction	USEPA SW-846 Method 1311	–
Metals (total and leachate)	Digestion USEPA 3050B/3051A; analysis USEPA 6010D (ICP-OES) or 6020B (ICP-MS)	≤ 10% of the applicable limit
Mercury	USEPA 7470A (liquids/leachate) / 7471B (solids)	≤ 0.02 mg/L in leachate
pH	USEPA 9040C / 9045D; APHA 4500-H+	0.1 pH unit
Flash point	ASTM D93	1 °C
Oil and grease / TPH	USEPA 1664B; APHA 5520	≤ 10% of acceptance criterion
Moisture / dry solids; loss on ignition	APHA 2540 G / 2540 E; ASTM D7348	0.1%
PCB	USEPA 8082A (GC-ECD); screening ASTM D4059	≤ 2 mg/kg
Water and chlorine in used oil	ASTM D6304 (Karl Fischer); ASTM D808	0.01% / 50 mg/kg
Ammonia and total nitrogen	APHA 4500-NH ₃ / 4500-N	1 mg/L
Formaldehyde (urea polymer waste)	USEPA 8315A	≤ 10% of GHS limit
Self-heating (catalyst)	UN Manual of Tests and Criteria, Test N.4	–
Calorific value	ASTM D240 (liquids) / ASTM D5865 (solids)	–

Sampling strategy. Sampling follows USEPA SW-846 Chapter 9 and ISO 5667-13 (sludges). For each batch or campaign, a composite is prepared from at least four increments taken across the container, heap or discharge point; catalyst is sampled from each bed during unloading; ash is sampled daily at the discharge point and composited monthly per incinerator. Samples are collected by trained Environment Section or laboratory personnel using clean, compatible equipment.

Preservation and holding times. Samples are placed in containers specified by the method, cooled to ≤ 6 °C and delivered within the method holding times (e.g. metals 180 days, mercury 28 days, organics 14 days).

Chain of custody. Each sample carries a unique Sample ID linked to the Stream ID and batch in the HW Register; a chain-of-custody form records collection, transfer and receipt signatures, date and time, and sample condition on arrival.

Laboratory competence. Analysis is performed by laboratories accredited to ISO/IEC 17025 for the methods used and recognised by FMEnv/NESREA. Accreditation certificates and scopes are verified annually by the Environment Section.

Quality control and acceptance criteria. Each batch includes a field duplicate (≥ 10% of samples), a method blank and a matrix spike. Results are accepted where duplicate relative percent difference is ≤ 30%, spike

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recovery is 75–125% and blanks are below the reporting limit; otherwise the analysis is repeated. Results between 80% and 100% of a threshold trigger resampling before a route decision is made.

Table No. 11B: Basis of Management and Testing Triggers by Stream

Stream	Basis of management	Events triggering additional testing
Spent catalysts	Routine testing – each change-out campaign	New catalyst type or supplier; refiner acceptance query; landfill being considered
ETP sludge	Routine testing – semi-annual	Change in ETP chemicals or influent; result > 80% of a threshold; complaint or incident
Incinerator ash	Routine testing – monthly composite and each block batch	Any TCLP exceedance; change in incinerator feed or operating conditions
Waste oil	Process knowledge + annual testing; transformer oil tested for PCB per batch	Mixed or unknown oils; recycler query
Urea polymer / granulation waste	Routine testing – annual	Change in UF additive or granulation conditions
Spent molecular sieve, ceramic balls, ion-exchange resin	Routine testing – each change-out (to confirm non-hazardous status)	Visible contamination; oil or hydrocarbon odour
Biomedical waste, batteries, e-waste, lamps, laboratory and expired chemicals, contaminated packaging	Reliable process knowledge and SDS (no routine testing)	Unknown or unlabelled items; mixed waste
Spill residues and unknown wastes	Event-based testing	Every event

How results determine the route. Results are compared with Table No. 10A and the receiving facility's acceptance criteria: (i) any exceedance – hazardous route per Table No. 17; (ii) all results below thresholds – eligible for reclassification under Section 2.2; (iii) recovery routes (e.g. catalyst metal reclamation, used-oil re-refining) additionally require compliance with the recycler's acceptance specification. The decision and the supporting Lab Report ID are recorded in the HW Register before dispatch.

6.5 Re-characterization Triggers

Re-characterization is required when a process, raw material, catalyst type or chemical supplier changes; when a receiving facility rejects or queries a consignment; when monitoring results change significantly; or at the frequencies in Table No. 11.

7.0 HAZARDOUS WASTE INVENTORY

The inventory below covers production, maintenance, laboratory, utility, ETP, warehouse and ancillary activities. Quantities for existing operations are based on current generation records for Lines 1 to 3; quantities for Line 4 operation will be estimated from design data before commissioning and verified during the first 12 months of operation, after which the inventory will be updated.

Table No. 12: Operational Hazardous Waste Inventory (Lines 1 to 3 current; Line 4 to be added)

No.	Waste Stream	Source	Hazard Characteristics / Classification	Indicative Quantity & Frequency	Storage	Treatment / Recovery and Final Disposal Route
1	Spent catalysts	Reformers, HTS, LTS, hydrotreater, desulphurization and synthesis converters	Toxic, ecotoxic, potentially pyrophoric; Hazardous	150–200 MT per TAM campaign	Sealed steel drums / bags on pallets, covered HW shed with containment	Metal reclamation by authorized refiner (recovery); export under Basel PIC where applicable; licensed landfill only if recovery not feasible

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No.	Waste Stream	Source	Hazard Characteristics / Classification	Indicative Quantity & Frequency	Storage	Treatment / Recovery and Final Disposal Route
2	ETP sludge	ETP clarifier and sludge handling	Potentially toxic (metals), oily; Hazardous (precautionary, Section 13.2)	9–10 MT/year	Closed plastic containers / jumbo bags in covered shed at ETP	On-site incineration (Section 12.3); ash managed as Stream 3
3	Incinerator ash and residues	On-site incinerator	Potentially toxic (leachable metals); Hazardous until TCLP compliant	0.8–1.0 MT/year	Closed containers / jumbo bags in covered shed	Solidification in concrete paver blocks where TCLP compliant; otherwise, licensed hazardous waste facility
4	Waste oil and oily sludge	Pumps, compressors, gearboxes, engines, turbines, transformers	Ecotoxic, combustible; Hazardous	40–60 KL/year	Closed drums on paved, roofed and bunded shed	Re-refining / recovery by NMDPRA/FMEnv-licensed recycler
5	Oil-contaminated materials (rags, cotton waste, absorbents, filters, contaminated PPE)	Maintenance and cleaning	Combustible, ecotoxic; Hazardous	To be quantified in HW Register (monthly)	Closed, labelled drums	On-site incineration
6	Urea polymer / granulation waste	Urea granulator units (UF additive residues)	Controlled – Hazardous on precautionary basis	90–100 MT/year	Segregated, labelled, designated shed	Incineration at approved external facility (on-site only if within incinerator authorization)
7	Biomedical (healthcare) waste	Medical center	Infectious, sharps, pharmaceutical; Hazardous	To be quantified in HW Register (daily log)	Colour-coded bins; sharps containers; locked store	On-site incineration (Section 13.5); pharmaceuticals returned to supplier or licensed facility
8	E-waste	Electrical and electronic maintenance, IT equipment	Toxic components (metals, flame retardants); Hazardous	3–4 MT/year	Secure, roofed store	Recycling by NESREA-registered e-waste recycler
9	Lead-acid and other batteries	Vehicles, forklifts, UPS, substations	Corrosive, toxic (lead); Hazardous	3–5 MT/year	Upright on acid-resistant pallets in secure, roofed store	Lead recovery by licensed battery recycler / supplier take-back
10	Contaminated empty chemical bags, drums and IBCs (not decontaminated)	Chemical use in process, utilities and ETP	As per residual chemical; Hazardous	To be quantified in HW Register	Designated area, closed and labelled	Decontamination then reuse/recycling; bags to on-site incineration
11	Laboratory chemical waste and expired chemicals	QC laboratories, warehouses	Various (corrosive, toxic, flammable, reactive); Hazardous	To be quantified in HW Register	Segregated by compatibility in laboratory waste cabinet	Neutralization where permitted; otherwise, licensed hazardous waste facility; return of expired stock to supplier
12	Fluorescent / mercury lamps	Building and plant lighting maintenance	Toxic (mercury); Hazardous	To be quantified in HW Register	Intact in original boxes in secure store	Recycling by licensed facility
13	Paint, solvent and adhesive residues	Maintenance painting	Flammable, toxic; Hazardous	To be quantified in HW Register	Closed metal containers in flammable store	Licensed hazardous waste facility (incineration)
14	Spill clean-up residues and contaminated soil	Emergency response (Section 16.7)	As per spilled material; Hazardous	Event-based	Closed containers / lined skips	Per characterization – on-site incineration or licensed facility

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No.	Waste Stream	Source	Hazard Characteristics / Classification	Indicative Quantity & Frequency	Storage	Treatment / Recovery and Final Disposal Route
15	Spent molecular sieve, ceramic balls and ion-exchange resins	Process driers, catalyst beds, DM plant	Controlled – non-hazardous subject to characterization (Table No. 11)	100–150 MT per change-out	Jumbo bags at designated area	Reuse/sale to authorized users if non-hazardous; otherwise, licensed facility

Table No. 12A: Quantity Basis, Status and Verification

Waste stream (Table No. 12 ref.)	Quantity, unit and period	Status	Basis	Responsible	Verification deadline
Spent catalysts (1)	150–200 t per TAM campaign (Lines 1–3)	Estimate	Historical TAM change-out records and catalyst loading inventory	Technical Services	Measured (weighbridge) at next TAM
ETP sludge (2)	9–10 t/year (dewatered)	Estimate	Historical sludge generation log	ETP In-charge	Measured monthly from HWMP approval
Incinerator ash (3)	0.8–1.0 t/year	Estimate	Historical ash collection records	ETP In-charge	Measured monthly from HWMP approval
Waste oil and oily sludge (4)	40–60 kL/year	Estimate (Q3 2026 AMR: 58 kL hazardous waste generated and 58 kL recycled, Lines 1 & 2)	Dispatch records to recycler	Environment Section	Measured per consignment
Urea polymer / granulation waste (6)	90–100 t/year	Estimate	Historical generation records	Urea Plant Managers	Measured monthly from HWMP approval
Biomedical waste (7)	100 kg/month	Estimate	Historical generation records	Chief Medical Officer	Within 3 months of HWMP clearance
E-waste (8)	3–4 t/year	Estimate	Historical dispatch records	Environment Section	Measured per consignment
Lead-acid and other batteries (9)	3–5 t/year	Estimate	Historical dispatch records	Environment Section	Measured per consignment
Spill residues (14)	Event-based (t per event)	Measured per event	Incident records	Environment Section	Per event
Spent molecular sieve, ceramic balls, resins (15)	100–150 t per change-out	Estimate	Historical change-out records	Technical Services	Measured at next change-out

Units, reporting period and reconciliation. Solids are reported in tonnes (t) and liquids in kilolitres (kL), converted to tonnes for the mass balance using measured or SDS density. The reporting period is the calendar month, aggregated quarterly and annually. Each register entry is flagged “Measured” (weighbridge, metered or counted) or “Estimated” (with the basis stated). The monthly mass balance reconciles, for each stream: opening stock + generated – treated on site – transferred to other HWSAs – dispatched off site = closing stock; differences greater than 5% are investigated and explained in the monthly Environment Report (Section 15.1).

Note: Where “sale” is recorded in IEFCL-HSEF-2.403 for a hazardous stream, this HWMP clarifies the actual operation (reuse, recycling or recovery) and requires that the buyer is a licensed and audited facility (Section 12.2 and Section 14.0).

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Construction and pre-commissioning hazardous waste for Line 4 is inventoried in Section 13.10.

7.1 Updating the Inventory

The inventory is a live document maintained in the HW Register. It is updated (i) monthly with actual quantities; (ii) whenever a new waste stream is generated; (iii) before and after each TAM; (iv) at Line 4 commissioning; and (v) during the annual HWMP review.

Approval of inventory changes. Any change to a stream's classification, waste code, storage arrangement or management route is raised by the Environment Section on an Inventory Change Request stating the reason and the basis (laboratory report, SDS, MOC reference or vendor change). Changes are approved by the HOD, HSEF before implementation; the inventory carries a version number and the superseded version and its basis are retained for 10 years.

Linkage to manifests, analytical results and certificates. Every inventory entry is identified by a Stream ID (Table No. 10B) and every consignment by a Consignment ID. The HW Register (Annexure-1) records against each consignment the Lab Report ID supporting the classification, the classification version, the Manifest No., the receiving facility, and the Certificate of Disposal/Recovery No. and date, so that each tonne in the inventory can be traced to its analytical basis and final destination (Section 15.0).

8.0 WASTE MINIMISATION AND THE WASTE HIERARCHY

The waste hierarchy specifies the following order of preference for dealing with hazardous waste. Disposal is selected only where higher options are not technically or economically practicable, and the justification is recorded.



Table No. 13: Hazardous Waste Minimization Measures

Area	Minimization Measure	Responsibility
Catalysts	Optimize operating conditions and feed purification to extend catalyst life; plan changeouts with suppliers offering reclamation/take-back.	Technical Services / Plant Managers
Lubricants	Condition-based oil monitoring to extend drain intervals; filtration and reconditioning of turbine and hydraulic oils; leak prevention.	Maintenance / Plant Managers
Chemicals	Purchase in returnable bulk containers/IBCs; first-in-first-out stock control to avoid expiry; substitution with less hazardous products where available; minimum inventory.	Commercial / Warehouse / Laboratory
Segregation	Strict source segregation so that non-hazardous waste is not contaminated and does not become hazardous.	Generating Departments
ETP sludge	Optimize chemical dosing and dewatering to reduce sludge volume and moisture.	ETP In-charge
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Area	Minimization Measure	Responsibility
Housekeeping	Drip trays, spill prevention and controlled maintenance areas to reduce oily waste and contaminated absorbents.	All Departments
Procurement	Suppliers take-back clauses for batteries, lamps, e-waste and catalysts; environmental criteria in purchasing.	Commercial
Review	Generating departments review generation records monthly; Environment Section reports trends and opportunities at quarterly HSEF review.	Environment Section

Table No. 13A: Waste Minimisation Objectives and Targets for Priority Streams

Priority stream	Objective / KPI	Baseline (2026)	Target	Reporting period	Owner	Completion date
All hazardous waste	HW generated per tonne of urea (kg/t)	100% (sent to accredited waste management facility for incineration)	5% reduction against 2026 baseline	Quarterly	HOD, HSEF	31 Dec 2028
Spent catalysts	Achieved catalyst service life vs. vendor design life (%)	100% (sent to Europe for recycling)	≥ 100% of design life where technically feasible	Per TAM	Technical Services	Each TAM
Spent catalysts	% of spent catalyst sent to verified metal recovery	100% (sent to Europe for recycling)	Maintain 100%	Per campaign	Environment Section	Continuous
Waste oil	% of waste oil re-refined/recovered with certificate	100% (58 kL recycled, Q3 2026 AMR)	≥ 95%	Quarterly	Environment Section	Continuous
Contaminated non-hazardous waste	Mass of non-hazardous waste managed as HW due to cross-contamination (t)	100% incinerated within the Complex	50% reduction against baseline	Quarterly	Plant Managers	31 Dec 2027
ETP sludge	Sludge generated per 1,000 m ³ effluent treated (t)	100% incinerated within the Complex	10% reduction against baseline	Quarterly	ETP In-charge	31 Dec 2028
Laboratory and warehouse chemicals	Quantity of chemicals expired before use (kg)	100% treated within the Complex	Zero expired stock written off	Annual	Warehouse / Laboratory Head	31 Dec 2027

Table No. 13B: Justification Where Treatment or Disposal is Selected Instead of a Higher-Order Option

Stream and selected route	Reason higher-order options are not practicable	Review
ETP sludge – on-site incineration	Oily organic matrix with variable composition; no licensed in-country recycling route; incineration reduces volume by > 90% and the ash is recovered into paver blocks where TCLP compliant	Annually, with sludge characterisation
Oil-contaminated rags, absorbents, contaminated PPE – on-site incineration	Mixed, contaminated material with no recognised recovery market; laundering of reusable rags is evaluated annually	Annually
Biomedical waste – on-site incineration	Destruction of infectious material is required by S.I. No. 44 of 2021; reuse or recovery is prohibited	On regulatory change

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Stream and selected route	Reason higher-order options are not practicable	Review
Urea polymer / granulation waste – incineration	Re-dissolution and recovery in the process is under evaluation by Technical Services; until feasibility is demonstrated, incineration is used	Annually
Paint, solvent and laboratory wastes – licensed incineration	Small, mixed quantities; no in-country solvent recovery facility; return to supplier used where possible	Annually
Spent catalyst – landfill (contingency only)	Used only if no refiner accepts the material, with HOD, HSEF approval and documented refusals	Per campaign

9.0 SEGREGATION, COMPATIBILITY, CONTAINERS AND LABELLING

9.1 Segregation Principles

- Hazardous waste shall be segregated from non-hazardous waste at the point of generation.
- Different hazardous waste shall not be mixed unless confirmed compatible and approved by the Environment Section.
- Liquids and solids shall be collected separately.
- If hazardous waste is mixed with non-hazardous waste, the entire mixture shall be managed as hazardous.
- Dilution of hazardous waste to change its classification is prohibited.

9.2 Compatibility

Hazardous waste is stored in compatibility groups. Incompatible groups are physically separated by separate bunded bays or fire-rated walls, or by separation distances determined through a documented risk assessment (Section 9.2.1). No two incompatible groups may share the same secondary containment.

Table No. 14: Waste Compatibility Matrix (X = must be separated)

Group	Acids	Alkalis	Flammables / oils	Oxidizers	Toxic / metal-bearing	Infectious
Acids (e.g. acidic residues, battery electrolyte)	–	X	X	X		X
Alkalis (e.g. caustic residues)	X	–		X		X
Flammables / oils (waste oil, solvents, oily rags)	X		–	X		X
Oxidizers (laboratory oxidizing reagents)	X	X	X	–	X	X
Toxic / metal-bearing (spent catalyst, sludge, ash)				X	–	X
Infectious (biomedical waste)	X	X	X	X	X	–

Additional requirements: un-passivated spent catalysts shall be kept under nitrogen or water/inert cover and away from flammables; ammonia-bearing wastes shall be kept away from acids, oxidizers and halogenated chemicals; water-reactive laboratory chemicals shall be kept dry.

Table No. 14A: Specific Compatibility Requirements

Waste group	Incompatible with / reaction pathway	Storage requirement
Oxidisers (laboratory nitrites, nitrates, peroxides, hypochlorite)	Flammables, oils, organics, reducing agents and ammonia-bearing waste – fire, explosion, formation of chloramines/NCI3 (hypochlorite + ammonia)	Dedicated bunded cabinet or bay with impervious wall; never in the same containment as organics or ammonia-bearing waste
Flammables (waste oil, solvents, paint residues, oily rags)	Oxidisers; ignition sources; acids (heat)	Closed metal containers; earthing for transfer; flammable store or bay with no ignition sources; foam/CO2 extinguishers
Acids (battery electrolyte, acidic residues)	Alkalis (heat), sulphides/cyanides (toxic gas), metals (hydrogen), ammonia-bearing waste (heat)	Acid-resistant bund or tray; separate from alkalis and ammonia-bearing waste
Alkalis (caustic residues)	Acids; ammonium salts (ammonia release); aluminium/zinc (hydrogen)	Separate bund from acids and ammonium-bearing waste
Reactive catalyst residues (reduced Ni, Cu, Fe catalysts)	Air (self-heating), flammables, combustible packaging, oxidisers	Passivated or under nitrogen/water cover (Section 13.1.1); separate covered bay; no combustible materials within the bay
Ammonia-bearing waste (ammoniacal sludge, ammonia/urea-contaminated absorbents)	Acids, oxidisers, hypochlorite and halogens, mercury and silver compounds	Closed containers; ventilated bay separate from oxidisers and acids; ammonia detector in enclosed stores
Infectious (biomedical) waste	All other groups (cross-contamination)	Locked dedicated store at the medical centre

9.2.1 Technical Basis for Separation

The minimum 3 m separation between incompatible groups in the absence of a physical barrier is taken from good practice for packaged dangerous substances (UK HSE HSG71 Chemical Warehousing; NFPA 400). It applies only to closed containers of up to 205 L. For larger containers (IBCs), flammable liquids or quantities above 1 m³ per group, segregation is by separate bunds and a fire-rated wall (minimum 60 minutes) or by a distance determined in a documented HWSA risk assessment that considers: container size and inventory; the credible fire scenario (pool fire from the largest container and radiant heat on adjacent groups); secondary containment, so that a spill from one group cannot flow into another; and the credible reaction pathways in Table No. 14A. The risk assessment is prepared by the Environment Section, reviewed by the Fire & Safety Section, approved by the HOD, HSEF, and repeated when the layout or inventory changes.

9.3 Containers and Labelling

- Containers shall be compatible with the waste, in good condition, closed except when adding or removing waste, and sized to the quantity generated.
- Every hazardous waste container shall carry a label stating: **“HAZARDOUS WASTE”**, waste name and site waste code, generating department, hazard pictogram(s) (GHS), accumulation start date and approximate quantity.
- Biomedical waste colour coding: **yellow** – infectious, pathological and sharps (sharps in puncture-proof containers); **brown** – chemical and pharmaceutical waste; **black** – non-clinical waste.
- Damaged or leaking containers shall be overpacked immediately and reported to the Environment Section.
- Empty containers that hold hazardous substances remain hazardous waste until decontaminated; decontamination is recorded before release as non-hazardous.

10.0 HAZARDOUS WASTE STORAGE

10.1 Satellite Accumulation Points

Generating departments may accumulate hazardous waste at labelled satellite points near the point of generation, provided containers are closed, labelled, placed on drip trays or within containment, and managed within the following limits:

Table No. 14B: Satellite Accumulation Point Limits

Control	Requirement	Additional requirement for higher-hazard wastes
Maximum quantity	One container of up to 205 L (or 200 kg) per waste type per satellite point	Acutely hazardous or reactive wastes (e.g. laboratory oxidisers, mercury items): maximum 1 L / 1 kg
Maximum accumulation period / transfer trigger	7 days, or when the container is 75% full, whichever is earlier	Flammable wastes: transfer at the end of each shift where > 25 L; reactive catalyst residues: not accumulated – transferred directly to the HWSA during the same shift
Location	Away from vehicle routes (or protected by barriers), at least 5 m from drains or with drain covers/bund, on impermeable surface	Flammables at least 10 m from ignition sources; incompatible wastes on separate drip trays
Inspection	Daily by the generating department (Section 18.2); weekly by the Environment Section	Twice per shift for reactive or flammable wastes
Records	Satellite accumulation log (waste, quantity, start date, transfer date)	–

10.2 Designated Hazardous Waste Storage Areas

Interim storage is provided at the designated HWSAs listed below. Line 4 HWSAs will be constructed to the same standard before commissioning.

Table No. 15: Designated Hazardous Waste Storage Areas

Storage Area	Wastes Stored
Plant HW sheds within each process unit battery limit (Lines 1–3; Line 4 to be provided)	Spent catalyst (campaign), waste oil drums, urea polymer waste
Central scrap yard – hazardous waste bays	E-waste, batteries, lamps, contaminated containers awaiting decontamination or dispatch
ETP / incinerator waste store	ETP sludge, incinerator feed (oily rags, contaminated bags, biomedical waste), incinerator ash
Medical center biomedical waste store	Biomedical waste prior to transfer to the incinerator
Laboratory hazardous waste cabinet	Laboratory chemical waste and expired reagents
EPC Contractor HWSA(s) at Line 4 construction laydown	Construction and pre-commissioning hazardous waste (Section 13.10)

10.2.1 Storage Capacity Assessment

The capacity of each HWSA is assessed against normal and peak generation, in particular TAM catalyst change-outs (150–200 t per campaign, equivalent to approximately 160–200 one-tonne bulk bags or 600–

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800 drums, requiring about 200 m² of covered, bunded floor area with bags stacked two high and access aisles). The assessment is repeated before each TAM and before Line 4 commissioning.

Table No. 15A: HWSA Capacity Assessment

HWSA	Available capacity (m ² / containers)	Normal maximum inventory	Peak demand (TAM / event)	Adequacy and contingency
Plant HW sheds – Lines 1–3	Approx 20 m2 shed area in each Line	10 tonnes	150–200 t spent catalyst per TAM	Adequate
Plant HW sheds – Line 4	[To be designed: _____]	–	Line 4 catalyst loading: 500 tonnes	To be confirmed in design before commissioning
Central scrap yard – HW bays	Approx 250 m2 shed area	30 tonnes	E-waste and battery batches	Adequate
ETP / incinerator waste store	30 m2 shed area	5 tonnes	Incinerator outage (up to 30 days of feed)	Adequate
EPC laydown HWSA(s) – Line 4	20 m2 area	3 tonnes	Pre-commissioning flushing and chemical cleaning	Adequate

Peak-event contingency. At least 60 days before each TAM, Technical Services and the Environment Section prepare a TAM Waste Plan confirming expected quantities, the refiner booking for direct dispatch, the export consents (where applicable) and, if the assessment shows a shortfall, a temporary covered and bunded storage area inspected and approved by the HOD, HSEF before use.

10.3 Design and Operating Requirements

Table No. 16: Minimum Design and Operating Requirements for HWSAs

Element	Requirement
Surface	Impermeable, chemically resistant concrete floor (sealed/epoxy-coated where corrosive or oily wastes are stored), free of cracks, sloped to a blind sump.
Secondary containment	Bund, kerb or containment pallet with capacity of at least 110% of the largest container or 25% of the total volume stored, whichever is greater (GIIP). This supersedes the 10% total-volume criterion in IEFCL-HSEF-2.403 Clause 5.1(j).
Weather protection	Roofed and side-protected to prevent rainwater ingress and direct sunlight on containers.
Drainage control	No open connection to storm drains. Collected liquids from sumps are tested and routed to the ETP or managed as hazardous waste.
Segregation	Separate marked bays or bunds for incompatible groups (Table No. 14).
Access restriction and signage	Fenced and locked; access limited to authorized personnel; signs stating, “Hazardous Waste Storage – Authorized Personnel Only”, hazard symbols and no-smoking.
Fire protection	Portable fire extinguishers suitable for stored waste; within hydrant coverage; no ignition sources; flammable wastes stored separately.
Spill response equipment	Spill kit (absorbents, booms, drain covers, shovels, empty over-pack drums, PPE) at each HWSA; eyewash where corrosives are stored.
Ventilation and lighting	Adequate natural or mechanical ventilation; adequate lighting for inspections.
Inventory	Up-to-date log of containers in store (waste code, quantity, date received) displayed or available at the HWSA.

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10.3.1 Maximum Storage Periods and Escalation

Table No. 16A: Maximum On-site Storage Periods and Escalation Actions

Waste	Maximum on-site storage	Escalation trigger and action	Approval for exception
Biomedical waste	24 hours (48 hours absolute maximum)	At 24 h: Chief Medical Officer informs ETP In-charge and Environment Section; incinerator unavailable → dispatch to licensed health-care waste facility within 48 h	None – limit may not be exceeded
Unknown waste pending characterisation	30 days	At 20 days: Environment Section expedites analysis; at 30 days: HOD, HSEF informed and waste managed as hazardous	HOD, HSEF
Incinerator ash pending TCLP results	30 days after month end	Results overdue → laboratory escalation; ash remains in hazardous storage	HOD, HSEF
General hazardous waste in HWSA	90 days	Day 60: Environment Section notifies MMD/Commercial to schedule dispatch; Day 90: HOD, HSEF informed, inspection frequency doubled, alternative approved vendor engaged; Day 120: Plant Head informed and item reported in the next lender report	HOD, HSEF – one extension of 30 days; further extension by Plant Head
Spent catalyst after TAM	6 months	Month 4: export/recovery consent status reviewed; Month 6: HOD, HSEF informed and alternative refiner sought; beyond 12 months: reported to the competent authority and lenders	HOD, HSEF with documented justification (e.g. pending Basel consent)

All extensions are recorded on the exception approval form, and storage beyond the planned retention period is reported as a KPI (Table No. 25).

10.3.2 Stormwater from Uncovered or External Storage Areas

Where hazardous waste is stored temporarily in bunded areas that are not fully roofed (e.g. scrap-yard HW bays or temporary TAM laydown areas), the following controls apply:

- bund drain valves are kept normally closed and locked; rainwater collected within the bund is not released until inspected and tested;
- after initial rainfall event the Environment Section inspects the accumulated water for odour, discolouration or debris and samples it for pH, oil and grease, ammoniacal nitrogen and suspended solids
- water meeting the discharge limits of the complex effluent discharge permit is released to the storm drain under a signed Stormwater Release Log entry; water not meeting the limits, or not tested, is pumped to the ETP or managed as hazardous waste;
- site stormwater outfalls are monitored in accordance with IEFCL-HSEF-2.402; any exceedance downstream of a storage area triggers an investigation under Section 16.6.

10.4 Inspections

HWSAs are inspected weekly by the Environment Section (or EPC Contractor HSE for construction HWSAs) using the checklist at Annexure-2, and before each dispatch. Deficiencies are recorded and closed through the corrective action tracker (Section 18.4).

Taking a storage bay out of service. A HWSA or bay is immediately tagged “OUT OF SERVICE – NO NEW WASTE” by the inspector where any of the following is found:

- a leaking, bulging or damaged container whose release is not fully contained;
- damaged secondary containment (cracks, failed coating, open or defective drain valve, or bund capacity reduced below the requirement in Table No. 16);
- incompatible wastes stored within the same containment or without the required separation;
- loss of drainage protection (sump full, blocked or bypassed; stormwater able to leave the bund);
- failure of the roof or weather protection, or fire protection or spill equipment not available;
- inventory exceeding the assessed capacity (Table No. 15A).

Wastes at risk are relocated to a compliant HWSA within 24 hours under Environment Section supervision. The bay is returned to service only after repair, re-inspection and written approval of the HOD, HSEF; the event is recorded in the corrective action tracker.

11.0 INTERNAL TRANSFER AND OFF-SITE TRANSPORTATION

11.1 Internal Transfer

- a) Hazardous waste is moved from generation points to HWSAs on the schedule in IEFCL-HSEF-2.403 (Table-03) or on an on-call basis for intermittent wastes.
- b) Each transfer is recorded on the Waste / Scrap Evacuation Record (IEFCL-HSEF/E-4.409) signed by generator, evacuating contractor and receiving section.
- c) Liquid containers are confirmed closed and leak-tight before movement; vehicles carry a spill kit; only one waste type or compatible type are moved per trip.

11.2 Off-site Transportation

- a) Hazardous waste leaves the complex only with a licensed transporter on the approved vendor list (Section 14.0) and a completed waste manifest (Section 15.0).
- b) Vehicles shall be roadworthy, suitable for the waste type and quantity, covered or enclosed, placarded for the hazard class, and equipped with a spill kit, fire extinguisher and emergency contact information.
- c) Drivers shall be trained in the hazards of the load, safe driving and spill/emergency response, and carry the manifest and SDS or waste information sheet.
- d) Loads are inspected by MMD/Environment Section before release (container integrity, labels, securing, weighbridge ticket).
- e) Routes avoid, as far as practicable, densely populated areas, school zones and peak hours; transporters report any incident immediately to IFF (Section 16.5).

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11.2.1 Pre-dispatch and Transport Controls

Table No. 16B: Pre-dispatch and Transport Controls

Control	Requirement	Responsible
Transporter authorisation	Before each consignment, verify that the transporter's licence is valid and that its schedule covers the specific waste type, hazard class and activity (collection, transport, transboundary); consignments not covered are refused	Environment Section
Vehicle suitability	Pre-loading inspection checklist: roadworthiness certificate, tyres and brakes, leak-proof body or tanker, cover/tarpaulin, hazard placards, fire extinguisher, spill kit, communication device; GPS tracking for off-site hazardous consignments	MMD
Container integrity and labelling	Containers closed, undamaged, labelled (Section 9.3) and compatible; liquids with secondary containment or drip trays where drummed	Environment Section
Load securing	Drums palletised and strapped; bulk bags restrained; maximum one tier for unpalletised drums; incompatible wastes not carried together	MMD; driver
Transport documentation	Signed waste manifest, waste information sheet or SDS, emergency response card, approved route plan	MMD; Environment Section
Route risk assessment	Prepared for each transporter and route: populated areas, schools and markets, water crossings, road condition, timing restrictions; approved by MMD and Environment Section; reviewed annually or after an incident	MMD; Environment Section
Emergency contacts	24-hour IFF control room, transporter control and emergency services numbers carried in the vehicle (contact list held in the confidential ERP)	Transporter
Spill response	Spill kit suitable for the load; driver trained in initial containment	Transporter
Incident notification	Any accident, spill, breakdown or delay reported immediately to the IFF control room; IFF notifies authorities and lenders per Section 16.5	Driver; HOD, HSEF

Exceptions during transport:

- **Rejected loads:** a load rejected by the receiving facility is returned to the IFF HWSA under the original manifest annotated with the reason, quarantined, re-characterised if required and re-routed with HOD, HSEF approval; the event is recorded and the vendor informed.
- **Vehicle breakdown:** the driver secures the vehicle, displays hazard warnings and notifies the IFF control room; the transporter provides a replacement vehicle, and transfer of the load takes place only under supervision and with spill precautions, away from public areas where practicable.
- **Delayed consignments:** if a consignment is not confirmed as received within 24 hours of the expected arrival, or the GPS track deviates from the approved route, the Environment Section escalates to the transporter and HOD, HSEF and the consignment is treated as a potential loss until located.
- **Spills outside the facility:** the driver initiates containment; IFF mobilises its spill response team and the transporter's resources; the Incident Controller coordinates with the Federal Fire Service, the State Emergency Management Agency and NOSDRA (oil) as applicable; affected communities are informed through Community Relations; clean-up residues are managed as hazardous waste and costs are recovered from the transporter as provided in the contract.

11.3 Transboundary Movements

Any export of hazardous waste (e.g. spent catalyst for metal reclamation) shall comply with the Basel Convention, including notification and Prior Informed Consent through the Nigerian competent authority,

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movement documents, insurance and confirmation of receipt and recovery by the importing facility. No export shall take place before all consent is obtained.

12.0 TREATMENT, RECOVERY AND FINAL DISPOSAL

12.1 Selection of Management Route

The management route for each stream is selected according to the waste hierarchy (Section 8.0), the results of characterization (Section 6.0), regulatory requirements and the availability of licensed and audited facilities (Section 14.0). The selected route and its justification are recorded in the HW Register and approved by the HOD, HSEF.

12.2 Summary of Management Routes and Clarification of “Sale”

Table No. 17: Management Route Summary for Hazardous Streams

Waste Stream	Actual Operation	Receiving Facility Requirement
Waste oil	Recovery – re-refining or reprocessing of used oil	NMDPRA/FMEnv-licensed used-oil recycler; audited
Lead-acid batteries	Recycling – lead and plastic recovery	Licensed battery recycler or supplier take-back; audited
Spent catalyst	Recovery – metal reclamation	Licensed refiner (domestic or overseas under Basel PIC);
E-waste	Recycling – dismantling and material recovery	FMEnv or NESREA-registered e-waste recycler
Maintenance scrap (cables, gaskets, mixed)	Decontamination and segregation, then metal recycling; oil mixed residues as HW	Licensed scrap vendor / recycler; contaminated fraction to licensed facility for incineration
Oily rags, contaminated bags, biomedical waste, ETP sludge	Thermal treatment (destruction) in on-site incinerator	On-site incinerator within its authorization (Section 12.3)
Urea polymer waste	Thermal treatment at approved external facility	Licensed hazardous waste incineration facility
Incinerator ash	Solidification/stabilization in concrete paver blocks (if TCLP compliant)	On-site; otherwise, licensed hazardous waste landfill/facility

Sale of hazardous waste to traders, scavengers or any party that is not licensed for the specific waste and not on the approved vendor list is prohibited.

12.3 On-site Incineration

The complex operates two incinerators (one each Sludge and Polymer incinerator) at ETP for the thermal treatment of ETP sludge, oil-contaminated materials, contaminated plastic bags and biomedical waste. The following requirements apply:

- Authorization:** the incinerator is operated under the environmental permit for the complex issued by the competent authority. Only waste streams covered by the authorization and listed in the incinerator Waste Acceptance Criteria (WAC) are fed. A copy of the current permit is retained by the HSEF Department and is available to the Bank on request.

- b) **Technical suitability:** the incinerator shall meet GIIP for waste incineration (WBG EHS Guidelines for Waste Management Facilities), including a combustion temperature of at least 850 °C with a gas residence time of at least 2 seconds (at least 1,100 °C for waste with more than 1% halogenated organic substances, expressed as chlorine), controlled waste feeding, interlocks preventing feeding below the minimum temperature, and appropriate flue gas cleaning. The incinerator design and current performance are verified by the HSEF Department against these criteria and the verification is recorded; any gap is entered in the corrective action tracker with a time-bound action.
- c) **Operation:** a trained operator maintains an operating log recording waste type, quantity fed, temperatures, operating hours and abnormal events. Waste is not fed during start-up, shutdown or temperature excursions.
- d) **Monitoring:** stack emissions are monitored in accordance with the permit and IEFCL-HSEF-2.402; results are reported in the monthly environment report.
- e) **Contingency:** if the incinerator is unavailable, waste is held in the HWSA, or dispatched to a licensed external facility.

Table No. 17A: Incinerator Operating Envelope

Element	Sludge Incinerator	Polymer Incinerator
Regulatory authorisation	Certificate of Registration (ETP, Polymer Incinerator and Sludge Incinerator) and FMEnv waste treatment facility permit – Ref. No. 000232/ validity: 17 th May 2027	As for Sludge Incinerator – Ref. No. 000233/ validity: 17 th May 2027
Authorised waste types	ETP sludge; coke and hydrocarbon sludge,	Urea polymer / granulation waste / polymer waste / oil contaminated cotton rags and absorbents; contaminated plastic bags; biomedical waste
Wastes not permitted	Halogenated wastes > 1% Cl unless operated at ≥ 1,100 °C; PCB-containing waste; mercury-bearing waste; batteries and e-waste; explosive or pressurised containers; radioactive material	As for Sludge Incinerator; any waste other than the authorised feed
Design capacity	360L/hr	100kg per batch
Operating conditions	Secondary chamber ≥ 750 °C with ≥ 10 s gas residence time (≥ 1,100 °C for biomedical or halogenated waste); flue-gas O ₂ ≥ 6%; feed interlocked with temperature; auxiliary burner to maintain temperature; no feeding during start-up/shutdown.	Secondary chamber ≥ 900 °C with; flue-gas O ₂ ≥ 6%; feed interlocked with temperature; auxiliary burner to maintain temperature; no feeding during start-up/shutdown. Feeding is in batches.
Emission controls	Air pollution control configuration (e.g. cyclone)	Air pollution control configuration (e.g. cyclone)
Monitoring	Continuous recording of chamber temperatures (and CO/O ₂ where fitted); stack testing for PM, CO, SO ₂ , NO _x , HCl quarterly and for HF, metals (Hg, Cd+Pb, Sb+V sum) and PCDD/F annually by an accredited laboratory	As for Sludge Incinerator
Emission benchmarks	Permit limits or, if more stringent, WBG EHS Guidelines for Waste Management Facilities (e.g. PM 10, HCl 10, SO ₂ 50, CO 50, NO _x 200–400 mg/Nm ³ ; Hg 0.05 mg/Nm ³ ; PCDD/F 0.1 ng TEQ/Nm ³)	As for Sludge Incinerator
Ash and residues	Managed under Section 12.4 (TCLP, paver blocks or licensed facility); flue-gas cleaning residues as hazardous waste	As for Sludge Incinerator

Response to abnormal operation and emission exceedances:

- temperature below the minimum: waste feed is stopped automatically and the auxiliary burner restores temperature; if not restored within 30 minutes, the unit is shut down and waste held in storage (Section 10.3.1);
- visible smoke, combustion upset or interlock failure: feed is stopped, the cause investigated and the event recorded in the operating log before restart is authorised by the ETP In-charge;
- stack test result above a limit: the HOD, HSEF is informed within 24 hours, feed rate is reduced or feeding suspended, the cause is corrected and a repeat test is carried out within 30 days; the exceedance is reported to the competent authority as required by the permit and in the next tender report;
- two consecutive exceedances or a PCDD/F exceedance: the incinerator is taken out of service for the affected waste and waste is diverted to a licensed external facility until compliance is demonstrated.

12.4 Incinerator Ash and Other Treatment Residues

- Ash is cooled, collected in closed containers, labelled and stored in the ETP waste store as hazardous waste until test results are available.
- Ash is tested (TCLP heavy metals) monthly and before each production batch of paver blocks.
- Where results are below the applicable leachate limits, ash may be solidified in concrete paver blocks for internal non-food-contact use (e.g. walkways, yards). The proportion of ash, curing and a leach test of finished blocks are recorded.
- Where results exceed the limits, the ash is managed as hazardous waste and dispatched to a licensed hazardous waste facility.
- Flue gas cleaning residues (if any) are managed as hazardous waste.

Ash testing protocol:

- **Sampling plan:** a grab sample (about 0.5 kg) is taken from each incinerator ash discharge on each operating day and composited monthly per incinerator; the composite is mixed and reduced by coning and quartering to a laboratory sample of at least 2 kg. For each production batch of paver blocks, three blocks are crushed and tested.
- **Test method:** TCLP extraction by USEPA 1311 with metals by USEPA 6010D/6020B and mercury by USEPA 7470A, by an ISO/IEC 17025-accredited laboratory.
- **Acceptance limits:** TCLP leachate below the limits in Table No. 10A (As 5.0; Ba 100.0; Cd 1.0; Cr 5.0; Pb 5.0; Hg 0.2; Se 1.0; Ag 5.0 mg/L) or the limits in the FMEEnv ash-fixation approval Approval Ref.: FMEEnv/PCEH/PAWM/SWM/407/IV/64 dated 18th June 2019, whichever is more stringent.
- **Frequency:** monthly for ash; each paver-block batch; additional test after any change in incinerator feed or operating conditions.
- **Approval authority:** the Environment Section reviews results; the HOD, HSEF approves release of ash for block making and of each block batch for use. Batches failing the criteria are managed as hazardous waste.

12.5 Prohibited Practices

- Open burning of any waste, and incineration of waste outside the authorized incinerator.
- Burial, dumping or depositing hazardous waste on land, in drains or water bodies, or in the complex green belt.

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- Mixing or dilution of hazardous waste to avoid classification or reduce treatment cost.
- Transfer to any unlicensed transporter or facility, or export without Basel Convention consent.
- Reuse of empty hazardous-chemical containers for food, water or domestic purposes, or their release to communities.

13.0 STREAM-SPECIFIC MANAGEMENT ARRANGEMENTS

Dedicated arrangements for the significant process-specific hazardous waste streams are set out below.

13.1 Spent Catalyst

Source	Change-out of catalysts in primary/secondary reformers, high and low temperature shift converters, hydrotreater, desulphurization beds and ammonia synthesis converters, normally during TAM.
Hazardous characteristics	Contains nickel, cobalt, molybdenum, copper, zinc, chromium and/or iron compounds; toxic and ecotoxic; reduced catalysts may be pyrophoric.
Quantity / frequency	150–200 MT per TAM campaign (Lines 1–3); Line 4 quantities to be added from catalyst vendor data before commissioning.
Handling and storage	Catalyst passivated (or kept under inert/water cover) before unloading; unloading by trained contractor with respiratory protection and dust control; packed in sealed, labelled steel drums or approved bags on pallets; stored in covered, bunded HW shed segregated by catalyst type.
Transportation	Licensed transporter with manifest; for export, Basel PIC, movement documents and IMDG-compliant packaging.
Preferred route	Recovery – metal reclamation by authorized refiner; preference for catalyst suppliers offering take-back.
Final disposal	Licensed hazardous waste landfill after stabilization, only where recovery is demonstrated to be impracticable and approved by HOD, HSEF.
Records	Catalyst change-out records, characterization results, manifests, export documents and certificates of recovery.

13.1.1 Passivation and Handling of Reactive Spent Catalysts

- **Passivation method:** before unloading, reduced catalysts (e.g. reforming Ni, low-temperature-shift Cu/Zn, ammonia-synthesis Fe) are passivated in situ by controlled oxidation in accordance with the catalyst vendor's procedure – nitrogen circulation with stepwise introduction of air, starting at a low oxygen concentration and increasing only while the bed temperature rise remains within the vendor's limit. Where in-situ passivation is not possible, the catalyst is unloaded under a nitrogen blanket into nitrogen-purged drums or by wet unloading where the vendor confirms the catalyst is compatible with water.
- **Monitoring:** bed thermocouples are recorded continuously; inlet and outlet oxygen are measured; the vendor-specific temperature and oxygen limits are recorded in the TAM work pack
- **Acceptance criteria:** passivation is complete when the bed shows no significant temperature rise ($\leq 5^{\circ}\text{C}$) after at least 4 hours with full air flow, and the vendor representative and Technical Services sign the passivation record. After unloading, drum surface temperatures are checked at 1 hour and 24 hours; drums are sealed only when temperatures are stable at ambient.
- **Cover medium compatibility:** nitrogen is used as the default inert cover (with confined-space and asphyxiation controls); water cover is used only where the vendor confirms that the catalyst does not react with water, and the water is subsequently managed via the ETP or as hazardous waste.

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- **Response to self-heating or abnormal conditions:** if a drum or heap shows a surface temperature above 60 °C, smoke or odour, the area is isolated, the drum is not opened, nitrogen or water flooding is applied as specified in the catalyst SDS, and the ERP is activated where necessary; the event is recorded and investigated (Section 16.6).

13.2 ETP Sludge

Source	Clarification and dewatering at the ETP treating process effluent, cooling-water blow-down, oily water and site drainage.
Basis of hazardous classification	Classified as hazardous on a precautionary basis because the influent may contain oil and grease, ammonia/urea residues, treatment chemicals (e.g. corrosion and scale inhibitors) and trace metals from process equipment and catalyst handling. The classification will be confirmed by annual characterization (Table No. 11); if results demonstrate non-hazardous properties, an alternative route may be approved by HOD, HSEF.
Chemical characteristics	Predominantly inorganic solids and biomass with residual oil and grease, nitrogen compounds and trace metals; parameters analyzed are listed in Table No. 11.
Quantity / frequency	9–10 MT/year (dewatered), generated continuously and removed during ETP cleaning; Line 4 contribution to be confirmed after commissioning.
Handling and storage	Dewatered sludge placed in closed plastic containers or lined jumbo bags; stored in covered, bunded shed at the ETP; leachate returned to ETP inlet.
Technical and regulatory basis for incineration	Incineration destroys the organic and oily fraction and pathogens and reduces volume by more than 90%, avoiding off-site transport and landfill of an oily waste. The route is applied within the incinerator authorization and the GIIP requirements of Section 12.3.
Residues	Incinerator ash managed as per Section 12.4.
Records	Sludge generation log, characterization results, incinerator operating log, ash test results.

13.3 Waste Oil and Oily Sludge

Source	Lubricating, seal, hydraulic, compressor, turbine and transformer oils; tank and separator bottoms.
Hazardous characteristics	Ecotoxic, combustible; may contain metals and, for old transformer oil, PCBs (screened before dispatch).
Quantity / frequency	40–60 KL/year.
Handling and storage	Collected in closed, labelled drums with funnels and drip trays; stored on paved, roofed and bunded shed; water and solids not mixed with oil.
Transportation	Licensed transporter with manifest; tanker or sealed drums.
Preferred route	Recovery – re-refining or reprocessing by licensed used-oil recycler (this is the operation previously described as “sale”).
Final disposal	Oily sludge not suitable for recovery – on-site incineration or licensed facility. PCB-containing oil (if detected) – licensed PCB destruction facility only.

13.3.1 PCB-Containing Equipment and Oils

- the Electrical Maintenance Department maintains an inventory of transformers, capacitors and other oil-filled equipment with the date of manufacture and PCB test result.

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- oil from equipment manufactured before 1990 or of unknown history is tested for PCB (ASTM D4059 screening, USEPA 8082A confirmation); equipment and oil with PCB ≥ 50 mg/kg are labelled, registered with the competent authority and fitted with drip trays;
- PCB-containing equipment is not topped up or retro-filled to dilute PCB concentration; decommissioned items and PCB oil are stored in a dedicated, locked, bunded and roofed area and dispatched only to a licensed high-temperature destruction facility (export under Basel code A3180 where no domestic facility exists), consistent with the Stockholm Convention target of environmentally sound management of PCB by 2028.

13.3.2 Decontamination Residues and Rinsewater

- containers and equipment are decontaminated only at a designated wash bay with an impermeable floor and a closed sump;
- rinsewater is collected and characterised (pH, COD, oil and grease and the specific contaminant from the SDS) before transfer; it is sent to the ETP only where it meets the ETP influent acceptance criteria, otherwise it is managed as hazardous waste;
- sump sludge, used absorbents and PPE from decontamination are managed as hazardous waste (stream 14) and recorded in the HW Register;
- each decontamination is recorded (container type, previous contents, method, rinsate volume and route, inspector) before the container is released as non-hazardous.

13.4 Oil-Contaminated Materials

Source	Cotton waste, rags, absorbent pads, used oil filters and contaminated PPE from maintenance and cleaning.
Hazardous characteristics	Combustible; ecotoxic.
Handling and storage	Closed, labelled metal drums at satellite points; filters drained before disposal; transferred to the ETP waste store.
Preferred route / final disposal	On-site incineration; drained metal filter casings recycled as scrap after draining.

13.5 Biomedical (Health-Care) Waste

Source	Medical center (consultations, first aid, minor procedures, pharmacy).
Hazardous characteristics	Infectious, sharps, pharmaceutical and chemical.
Segregation	At point of generation into colour-coded bins and bags: yellow – infectious, pathological and sharps (sharps in puncture-proof, closable containers); brown – chemical and pharmaceutical waste; black – non-clinical waste (managed as general waste).
Storage	Bags filled to no more than three-quarters and sealed; stored in a locked, ventilated, cleanable store at the medical center.
Transportation	Transferred within the complex to the incinerator in closed, leak-proof, labelled containers by trained personnel wearing appropriate PPE; recorded on the evacuation record. Biomedical waste is not transported off site except to a licensed health-care waste facility under manifest.

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Treatment	Incineration in the on-site incinerator, subject to the authorization and technical suitability requirements of Section 12.3 (minimum 850 °C, 2 seconds). Should the incinerator not meet these requirements, biomedical waste shall be sent to a licensed health-care waste treatment facility until compliance is demonstrated.
Pharmaceutical waste	Expired medicines returned to supplier or sent to a licensed facility; not incinerated with infectious waste unless permitted.
Residues	Incinerator ash managed as per Section 12.4.
Worker protection	Hepatitis B vaccination offered to handlers; needle-stick and exposure procedure in place.
Records	Daily biomedical waste log (bags/weight by colour category), transfer records and incinerator log.

13.6 E-waste

Source	Electrical and electronic maintenance, instrumentation, IT and office equipment.
Handling and storage	Stored intact (not dismantled on site) in a secure, roofed store; cathode-ray tubes, batteries and lamps separated.
Preferred route	Recycling by NESREA-registered e-waste recycler; data-bearing devices wiped or destroyed before release.

13.7 Lead-Acid and Other Batteries

Source	Vehicles, forklifts, UPS systems and substations.
Handling and storage	Stored upright with terminals protected, on acid-resistant pallets or trays, in a roofed and ventilated store; damaged batteries placed in acid-resistant containers.
Preferred route	Recycling by licensed battery recycler or supplier take-back.

13.8 Urea Polymer / Granulation Waste

Source	Urea granulator units – lumps and residues containing urea-formaldehyde (UF) granulation additive.
Classification	Managed as hazardous on a precautionary basis pending characterization (Table No. 11).
Quantity / frequency	90–100 MT/year.
Handling and storage	Segregated, bagged and labelled at designated shed; kept dry.
Treatment / disposal	Incineration at a licensed external facility under manifest; on-site incineration only if included in the incinerator authorization and WAC. Opportunities to recover off-specification urea in the process are evaluated as part of waste minimization.

13.9 Laboratory Chemicals, Expired Chemicals and Contaminated Containers

Laboratory waste	Segregated by compatibility group in labelled containers in the laboratory HW cabinet; neutralization of simple acids/alkalis only under a written laboratory procedure; other residues to licensed facility.
Expired chemicals	Returned to supplier where possible; otherwise, licensed facility. Never discharged to drains.

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Contaminated containers	Drums and IBCs triple-rinsed or otherwise decontaminated and recorded before reuse or recycling; contaminated plastic bags incinerated on site.
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13.10 Line 4 Construction and Pre-commissioning Hazardous Waste

During construction and pre-commissioning of Line 4, the EPC Contractor shall implement this HWMP through its Construction Waste Management Procedure and C-ESMP, under IFF and Owner's Engineer oversight. Hazardous waste streams and indicative quantities are summarized below.

Table No. 18: Line 4 Construction and Pre-commissioning Hazardous Waste Inventory

Waste Description	Source	Indicative Quantity	Management Route
Paint and solvent residues	Maintenance and painting	0.3–0.5 t/year	Licensed hazardous waste facility
Fluorescent lamps and fittings	Temporary facilities	0.2 t/year	Licensed recycler
Contaminated PPE, rags and absorbents	Work activities	5 t/year	On-site incinerator or licensed facility
Lube and seal oil with weld spatter, chips, flux and metal oxides	Pre-commissioning flushing	1.3–1.8 t/year	Licensed used-oil recycler / facility
Medical waste	Contractor clinic / first aid	0.05–0.10 t/year	On-site incinerator or licensed health-care waste facility
Chemical cleaning, passivation and hydrotest wastes	Pre-commissioning	Event-based; to be estimated in EPC method statements	Characterized; neutralized and treated at ETP where acceptable, otherwise licensed facility
Waste oil, filters and batteries from vehicles and plant	Construction equipment	To be recorded by EPC Contractor	As per Sections 13.3, 13.4 and 13.7

The EPC Contractor shall provide a HWSA at each laydown area meeting Section 10.3, use only IFF-approved transporters and facilities, and submit monthly HW quantities, manifests and certificates to IFF. All hazardous waste shall be removed and work areas inspected and closed out on demobilization.

EPC close-out criteria. EPC demobilisation from any work area, and release of the related retention, is conditional on the HOD, HSEF signing a Hazardous Waste Close-out Certificate confirming that:

- all hazardous waste has been removed to approved facilities or formally transferred to an IFF HWSA under a signed transfer note;
- all manifests and certificates of disposal/recovery for EPC consignments have been returned and reconciled with the EPC HW register (generated = dispatched + transferred);
- EPC HWSAs and satellite points have been emptied, cleaned and inspected; where staining or spills were recorded, soil has been sampled and, if impacted, remediated and verified;
- there are no open non-conformances or corrective actions related to waste, and the EPC close-out report and records have been handed over to IFF.

14.0 CONTRACTOR AND DOWNSTREAM FACILITY DUE DILIGENCE

Hazardous waste is transferred only to transporters and receiving facilities that have passed the due diligence below and are on the HSEF-approved vendor list. The process applies equally to vendors engaged by the EPC Contractor.

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14.1 Pre-qualification Criteria

Table No. 19: Due Diligence Criteria for Hazardous Waste Contractors and Receiving Facilities

Criterion	Verification Required
Legal permits and licenses	Valid FMEEnv/NESREA, State and (for used oil) NMDPRA permits/licenses covering the specific waste types, operations and quantities; vehicle and driver licenses; copies on file with expiry dates tracked.
Technical capacity	Suitable vehicles, containers, treatment/recovery technology and trained staff for waste type.
Waste acceptance criteria	Written acceptance criteria and confirmation that each waste stream meets them, supported by characterization data.
Treatment / disposal capacity	Adequate capacity for the quantities and timing (including TAM peaks) without uncontrolled stockpiling.
Environmental performance	Pollution controls (containment, effluent and emissions), monitoring results, absence of significant regulatory violations or community complaints.
Occupational health and safety and labour	PPE, training, health surveillance and safe working practices for workers handling the waste; no child or forced labour (AfDB OS2).
Transportation arrangements	Route planning, vehicle maintenance, spill kits, emergency response capability and incident reporting.
Evidence of final disposal	Ability to issue certificates of disposal/recovery and to account for residues and onward transfers.
Insurance and financial standing	Adequate liability insurance and stability to manage the waste responsibly.

14.2 Audit Frequency and Scope

Table No. 20: Contractor and Facility Audit Programme

Category	Frequency	Scope
New vendor (all categories)	Before first consignment	Document review and on-site audit of facility against Table No. 19
High-risk facilities (incineration, landfill, catalyst refiners, battery recyclers, used-oil re-refiners)	Annually or as and when required	On-site audit including functionality check of the facility
Transporters and lower-risk recyclers	Every two years, plus permit check at each renewal	Document review and vehicle/site inspection
Triggered audit	Following incident, complaint, manifest discrepancy or regulatory action	Focused investigation
Overseas recovery facilities	Before first export and every two years	Desk review of permits and certificates; site audit by IFF or competent third party, if required

14.3 Corrective Actions and Sanctions

Audit findings are classified as critical, major or minor and entered in the corrective action tracker with responsible party and deadline (critical – immediate suspension of consignments until closed; major – 30

days; minor – 90 days). Vendors that fail to close critical or repeated major findings are removed from the approved vendor list. The approved vendor list is reviewed quarterly by the Environment Section.

15.0 CRADLE-TO-GRAVE TRACKING AND CHAIN OF CUSTODY

The chain of custody ensures that every hazardous waste consignment can be traced from the point of generation to verified final treatment, recovery or disposal, and that no waste is lost from the tracking system after leaving the complex.

Table No. 21: Hazardous Waste Chain of Custody

Step	Stage	Control / Documentation	Responsibility
1	Generation	Waste identified, classified and labelled; quantity entered in HW Register with waste code.	Generating Department
2	Temporary storage	Satellite accumulation log; transfer to HWSA within 7 days or at 75% capacity, whichever is earlier (Section 10.1).	Generating Department
3	Internal transfer	Waste / Scrap Evacuation Record (IEFCL-HSEF/E-4.409) signed by generator, evacuator and receiver.	Environment Section / Contractor
4	HWSA storage	HWSA inventory log; weekly inspection (Annexure-2).	Environment Section / MMD
5	Dispatch	Vendor and vehicle verified against approved list; weighbridge ticket; Waste Manifest (IEFCL-HSEF/E-4.410) completed in quadruplicate; generator copy retained.	MMD / Environment Section
6	Transportation	Transporter signs manifest and retain copy; manifest and waste information sheet carried in vehicle.	Licensed Transporter
7	Receipt	Receiving facility signs manifest, records any discrepancy in quantity or description; returns signed copy to IFF.	Receiving Facility
8	Treatment / recovery / disposal	Certificate of disposal or recovery issued stating method, date and quantity; for export, Basel movement document completed.	Receiving Facility
9	Verification and reconciliation	Returned manifest and certificate matched to dispatch record; monthly reconciliation of quantities generated, stored, treated on site and dispatched.	Environment Section

15.1 Reconciliation and Escalation

- The signed manifest copy and certificate of disposal/recovery shall be received within 30 days of dispatch.
- If not received within 30 days, the Environment Section follows up with the vendor; if not received within 45 days, further consignments to that vendor are suspended and the matter is escalated to the HOD, HSEF and investigated.

- c) Discrepancies greater than 5% between dispatched and received quantities are investigated and resolved before the next consignment.
- d) A monthly hazardous waste mass balance (opening stock + generated – treated on site – dispatched = closing stock) is prepared for each stream.

Table No. 21A: Escalation Procedure for Missing Manifests or Certificates

Day after dispatch	Action	Responsible
Day 30	Written reminder to vendor; consignment flagged “open” in the HW Register	Environment Section
Day 45	Further consignments to the vendor suspended; HOD, HSEF informed; vendor required to provide evidence of receipt and treatment within 7 days; investigation opened	Environment Section; HOD, HSEF
Day 60	Plant Head informed; formal notice to vendor; triggered audit of the receiving facility (Table No. 20)	HOD, HSEF
Waste unaccounted for after investigation	Treated as a Level 3 incident (Section 18.1.1): notification to the competent authority and lenders per Section 16.5; vendor removed from the approved vendor list; recovery of the waste or evidence of its fate pursued	HOD, HSEF; Plant Head

16.0 EMERGENCY PREPAREDNESS AND SPILL RESPONSE

This section addresses incidents specific to hazardous waste. It operates within the site Emergency Response Plan (ERP), which defines the emergency organization, alarms, evacuation and external coordination. The ERP is a controlled confidential document and is available to the Bank.

16.1 Potential Hazardous Waste Incidents and Response

Table No. 22: Hazardous Waste Incident Scenarios and Response Measures

Scenario	Prevention	Response
Spill or leak at generation point or HWSA	Closed, compatible containers; secondary containment; weekly inspections	Stop source, contain with spill kit, cover drains, clean up, containerise residues as HW
Container failure (corrosion, puncture, bulging)	Compatible containers; inspection	Over-pack, transfer to sound container, decontaminate area
Fire at HWSA or incinerator store	Segregation of flammables, no ignition sources, extinguishers, hydrant coverage	Raise alarm, ERP fire response, isolate area, contain fire-water run-off
Incompatible waste reaction (heat, gas, fumes)	Compatibility matrix; labelling; training	Evacuate upwind, raise alarm, ERP response, gas monitoring, specialist neutralisation
Pyrophoric catalyst self-heating	Passivation/inert cover; segregation from flammables	Cool with water/inert gas as per catalyst SDS, ERP response
Transportation accident on or off site	Licensed transporter, vehicle and driver controls, route planning	Driver secures scene and notifies IFF and authorities; transporter and IFF mobilise spill response; community protection
Needle-stick or exposure to biomedical waste	Sharps containers; PPE; training	First aid, medical assessment and post-exposure management; incident report

Scenario	Prevention	Response
Incinerator incident (flame-out, over-pressure, refractory failure, burn-back, abnormal emission)	Interlocks, burner management system, operator training, preventive maintenance, waste acceptance criteria	Stop feed, shut down safely, isolate fuel, ERP fire response if required, retain waste in storage, investigate before restart
Spill during internal transfer (on site)	Closed containers, spill kit on vehicle, designated routes, speed limits	Stop vehicle, contain, cover drains, clean up, containerise residues as HW, report
Contaminated fire-water	Bunded HWSAs, drain closure devices, fire-water retention in bunds and ETP equalisation basin	Close drain valves, contain run-off, test before treatment at ETP or disposal as HW
Release reaching drains, surface water or off-site receptors	Drain covers, bund integrity, stormwater controls (Section 10.3.2)	Block drains/outfall, deploy booms, notify per Section 16.5, sample receiving water/soil, remediate, inform communities through Community Relations

Command, coordination and recovery. Hazardous waste incidents are managed under the command structure of the ERP: the Shift In-charge acts as Incident Controller until relieved by the Site Main Controller. The Incident Controller directs isolation of the source and of drains, containment, protection of personnel and, where needed, evacuation upwind. Notifications follow Table No. 23. Where the incident exceeds site capability or extends off site, the Incident Controller requests support from the Federal Fire Service, the Rivers State Emergency Management Agency, NOSDRA (oil spills), the police and designated hospitals, and coordinates with neighbouring industries under mutual-aid arrangements. Recovered product, contaminated materials and fire-water are characterised and managed as hazardous waste (Section 16.7) and tracked to final disposal.

16.2 Response Responsibilities

Role	Responsibility
Person discovering the incident	Raise alarm, inform Shift In-charge / Control Room, take initial action only if trained and safe.
Shift In-charge	Activate response, isolate source, call Fire & Safety and Environment Section.
Fire & Safety Section	Lead emergency response, fire-fighting and rescue; provide spill response equipment and PPE.
Environment Section	Advise on containment and clean-up, sampling of affected media, classification and disposal of residues; notifications.
HOD, HSEF	Coordinate investigation and regulatory and lender notification.
Licensed transporter (off-site)	Immediate notification to IFF and authorities; initial containment; cooperation with clean-up.

16.3 Spill Containment and Clean-up Procedure

- Assess the hazard using the label/SDS; wear the specified PPE; keep unauthorised persons away.
- Eliminate ignition sources for flammable materials.
- Stop the release (close valve, upright the container, plug the leak) if safe to do so.
- Contain the spill using absorbent booms, socks or earth bunds; protect drains with drain covers.
- Absorb or recover the spilled material (absorbent pads, pumps); for corrosives, neutralise only under Environment Section guidance.

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- f) Collect all contaminated absorbents, soil and PPE into labelled containers and manage as hazardous waste (Section 16.7).
- g) Decontaminate the area and equipment; verify by visual inspection and, where soil or water may be affected, by sampling.
- h) Restock the spill kit and record the incident.

16.4 Emergency Equipment

Spill kits at each HWSA, ETP store, workshops, laboratories and on waste transport vehicles; fire extinguishers and hydrant coverage; eyewash/safety showers where corrosives are handled; gas detectors for ammonia-bearing areas; PPE including chemical-resistant gloves, coveralls, goggles, face shields and respiratory protection. Equipment is inspected monthly.

Table No. 23A: Emergency Equipment Inspection and Replenishment

Equipment	Locations	Inspection	Replenishment	Responsible
Spill kits (chemical, oil-only, universal)	All HWSAs, ETP store, workshops, laboratories, EPC laydown HWSAs, waste transport vehicles	Monthly and after each use	Within 24 hours of use or of a deficiency	Environment Section (site); EPC HSE (EPC areas); transporter (vehicles)
Fire extinguishers and hydrants	All HWSAs and incinerator area	Monthly visual; annual service	Immediately after discharge	Fire & Safety Section
Eyewash / safety showers	Where corrosives are stored or handled	Weekly activation test	Immediately on failure	Area owner
Ammonia gas detectors	Enclosed stores with ammonia-bearing waste	Monthly bump test; calibration per OEM	Immediately on failure	Instrumentation
Mercury spill kit	Electrical store and laboratory	Quarterly	After use	Environment Section
PPE stock for responders	Fire station and Environment Section store	Monthly	Minimum stock maintained	Fire & Safety Section

Table No. 23B: Suitability of Absorbents and PPE for Specific Hazards

Hazard	Absorbent / PPE
Oils and hydrocarbons	Oil-only (hydrophobic) pads and booms; nitrile gloves; chemical-resistant coveralls
Acids and alkalis	Chemical-resistant universal absorbent and neutraliser (not sawdust or cellulose); PVC/neoprene gloves and suits; face shield and goggles
Oxidisers	Inert mineral absorbent only (no organic absorbents); neoprene gloves; face shield
Solvents and paints	Universal absorbent; butyl or Viton gloves; organic-vapour respirator
Catalyst dust and ash	HEPA vacuum or damp sweeping; FFP3/P3 respirator; disposable coveralls
Ammonia-bearing waste	Water spray for vapour control; full-face respirator with ammonia cartridge, or SCBA for high concentrations; chemical suit
Biomedical waste and sharps	Disinfectant spill kit, tongs and sharps container; puncture-resistant gloves
Mercury (lamps)	Mercury spill kit with amalgamating powder; no vacuum cleaners

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16.5 Notification and Escalation

Table No. 23: Hazardous Waste Incident Notification and Escalation

Level / Recipient	Trigger	Timing
Shift In-charge, Fire & Safety, Environment Section	Any hazardous waste spill, leak, fire, reaction or exposure	Immediately
HOD, HSEF and Plant Head	Any incident requiring ERP activation, off-site impact, injury or release to drains/soil	Immediately (verbal), written within 24 hours
Regulators (FMEnv / NESREA / State Ministry of Environment / NOSDRA for oil spills, as applicable)	Reportable releases, off-site impacts or as required by permit	Within statutory time limits (NOSDRA: oil spills within 24 hours)
Potentially affected communities	Incidents with potential community exposure (e.g. transport accident)	Immediately, through Community Relations and the SEP
AfDB and other lenders	Serious incidents (fatality, serious injury, significant environmental release or community impact)	Promptly, within the timeframe stipulated in the Financing Agreement; investigation report to follow

16.6 Incident Reporting and Investigation

All hazardous waste incidents are recorded on the HSEF incident reporting system. Significant incidents are investigated using root cause analysis within 7 days; corrective and preventive actions are entered in the corrective action tracker and verified for effectiveness. Lessons learned are communicated through toolbox talks and training.

Table No. 23C: Investigation, Corrective Action and Lessons Learned

Step	Responsibility	Timeline
Appoint investigation lead	HOD, HSEF appoints a lead independent of the area for Level 2–3 incidents; area manager for Level 1	Within 24 hours
Root-cause analysis (5-Why / fishbone)	Investigation team incl. Environment Section, area representative and, where relevant, contractor	Level 3: 7 days; Level 2: 14 days
Define corrective and preventive actions	Investigation lead; each action has one named owner and due date in the corrective action tracker	With the investigation report
Implement actions	Action owner	By due date
Verify effectiveness	Environment Section (re-inspection, data review)	30–90 days after implementation
Close actions	Per Table No. 09A (Environment Section Head / HOD, HSEF / Plant Head)	After verification
Lessons learned	HSEF issues a safety alert and toolbox talk to employees and contractors; updates procedures/training where needed	Within 14 days of report approval

16.7 Management of Contaminated Materials from Emergency Response

Absorbents, contaminated soil, fire-fighting run-off, damaged containers and PPE arising from emergency response are characterised and managed as hazardous waste under this HWMP, recorded in the HW Register and tracked to final disposal. Contaminated soil is excavated until visual and analytical verification confirms clean-up; fire-water is contained and tested before treatment at the ETP.

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17.0 TRAINING AND COMPETENCE

Table No. 24: Hazardous Waste Training Programme

Target Group	Training Content	Frequency
All employees and contractor workers	HWMP awareness, segregation, labels, prohibited practices, spill reporting	Induction and annual refresher
Generating departments and waste handlers	Classification, containers and labelling, satellite points, PPE, manual handling, spill response	Before assignment; annual refresher
Environment Section and MMD	Characterisation, HW Register, manifests, vendor due diligence and auditing, reconciliation, regulatory requirements	Before assignment; every two years
Medical centre staff	Biomedical waste segregation, sharps, exposure management	Induction and annual refresher
Emergency response team	HW spill and fire scenarios; drills	At least one HW scenario drill per year

Training records (attendance, content, competency assessment) are retained by HSEF and contractors.

18.0 MONITORING, KEY PERFORMANCE INDICATORS AND REPORTING

18.1 Key Performance Indicators

Table No. 25: Hazardous Waste Key Performance Indicators

Area	Indicator	Target	Frequency / Responsibility
Generation	HW generated by stream (t/month) and per tonne of product	Track trend; reduce year on year	Monthly / Environment Section
Treatment and disposal	HW treated on site and disposed off site by route (t)	100% via approved routes	Monthly / Environment Section
Inspection completion	% of scheduled HWSA and satellite-point inspections completed	100%	Weekly / Environment Section
Storage compliance	% of inspected checklist items found compliant (Annexure-2); number of critical defects not controlled within 24 hours; number of containers beyond maximum storage period	≥ 95%; 0; 0	Weekly / Environment Section
Incidents and spills	Number of HW spills, leaks, fires or exposures (by severity)	0 Level 3 incidents; 100% of incidents and near misses reported	Monthly / HSEF
Reporting culture	Number of HW near misses and Level 1 incidents reported	No reduction target – reporting is encouraged	Monthly / HSEF
Manifest completion	% of off-site consignments with signed manifest and certificate returned within 30 days	100%	Monthly / Environment Section and MMD

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Area	Indicator	Target	Frequency / Responsibility
Contractor compliance	% of active HW vendors with valid permits and current audit	100%	Quarterly / Environment Section
Training	% of relevant personnel trained	100%	Quarterly / HSEF
Regulatory compliance	Number of regulatory non-compliances related to HW	0	Quarterly / HSEF

18.1.1 Incident Severity Classification and Action on Missed Targets

Table No. 25A: Hazardous Waste Incident Severity Levels

Level	Definition	Reporting
Level 1 – Minor	Release fully contained within secondary containment, or < 20 L / 20 kg on an impermeable surface; no injury; no off-site effect	Recorded in incident system within the shift
Level 2 – Moderate	Release outside containment to soil or > 20 L / 20 kg on site; first-aid injury or exposure; labelling or segregation failure with potential for reaction; manifest or chain-of-custody gap	HOD, HSEF within 24 hours; investigation
Level 3 – Significant	Release to drains, surface water, groundwater or off site; fire or explosion; medical-treatment, lost-time injury or fatality; community exposure; loss of a consignment; regulatory notification or permit breach	Immediate notification per Section 16.5, including AfDB

All incidents, exposures and near misses must be reported regardless of severity; no reduction target is set for minor incidents or near misses, and no employee or contractor is penalised for reporting. The zero target applies only to Level 3 incidents. Where any KPI target in Table No. 25 is missed, the KPI owner investigates the cause, prepares a corrective action plan within 14 days for HOD, HSEF approval, and the shortfall and actions are reported in the quarterly management review and the next lender report.

18.2 Inspection and Audit Programme

Activity	Frequency	Responsibility
Satellite accumulation point checks	Daily (walk-through)	Generating Department
HWSA inspection (Annexure-2)	Weekly and before dispatch	Environment Section / EPC Contractor HSE
Contractor and facility audits	As per Table No. 20	Environment Section
Independent E&S audit / lender monitoring	As required by Financing Agreement	IFF / Lenders' consultant

18.2.1 Integrated Hazardous Waste Data Management

All hazardous waste information is held in a single HW Management Register maintained by the Environment Section, in which each record type has a unique identifier and is linked to related records, so that any inspection finding, result, consignment, audit or incident can be traced to its corrective action and closure:

Table No. 25B: Linked Records in the HW Management Register

Record	Unique ID	Linked to
Waste stream / inventory entry	Stream ID (e.g. HW-CAT-L4)	Classification version, Lab Report IDs, storage location, approved route

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Record	Unique ID	Linked to
Monthly quantity entry	Stream ID + month	Mass balance; Consignment IDs
Consignment	Consignment ID	Manifest No., vendor, certificate of disposal/recovery, rejected-load record
Analytical result	Lab Report ID / Sample ID	Stream ID, chain-of-custody form, classification decision
Inspection	Inspection ID	HWSA, defects, corrective action IDs
Vendor audit	Audit ID	Vendor, findings, corrective action IDs, approved vendor list status
Incident	Incident ID	Stream ID, investigation, corrective action IDs, notifications
Corrective action	CA ID (single tracker)	Source record (inspection, audit, incident, monitoring, grievance), owner, due date, verification, closure

18.3 Reporting

Table No. 26: Hazardous Waste Reporting Arrangements

Report	Content	Frequency	Recipient
Environment Monthly Report (IEPL-HSEF/E-4.015)	Quantities by stream and route, mass balance, KPIs, incidents, manifest status	Monthly	HOD HSEF; Plant Management
HSEF management review	KPI trends, audit findings, corrective actions, improvement opportunities	Quarterly	Senior Management
Statutory returns	As required by permits and regulations	As required (quarterly / annual)	FMEEnv / NESREA / State authorities
Lender E&S monitoring report / Annual Monitoring Report (AMR)	HWMP implementation, KPIs, incidents, contractor audits, corrective actions	As specified in the Financing Agreement (at least annually)	AfDB and other lenders
Incident reports	Serious incidents and investigation outcomes	Event-based (Section 16.5)	Regulators; AfDB

Each report in Table No. 26 includes an action and performance register in the following format:

Table No. 26A: Action and Performance Register Template

Item / KPI	Responsible person	Deadline	Performance threshold	Evidence required	Closure status
[e.g. Manifest return rate]	[Name / function]	[dd/mm/yyyy]	[e.g. 100% within 30 days]	[e.g. signed manifests, certificates]	Open / In progress / Closed – verified

18.4 Corrective Action Tracking

Non-conformances from inspections, audits, incidents, monitoring and stakeholder grievances are logged in the HSEF corrective action tracker with description, root cause, action, owner, due date and verification of effectiveness. Overdue actions are escalated to the HOD, HSEF and reported in the quarterly management review.

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Significant non-conformances – Level 3 incidents, critical audit findings, permit or legal breaches, consignments unaccounted for beyond 45 days, and incinerator emission exceedances – are escalated to the HOD, HSEF and the Plant Head within 24 hours of identification and notified to regulators and lenders in accordance with Section 16.5, without waiting for the routine monthly or quarterly report.

19.0 RECORDS AND DOCUMENTATION

Table No. 27: Hazardous Waste Records

Sr. No.	Record	Custodian	Minimum Retention
1	Hazardous Waste Register and inventory (Annexure-1)	Environment Section	10 years
2	Characterisation and laboratory reports	Environment Section	10 years
3	Waste / Scrap Evacuation Records (IEFCL-HSEF/E-4.409)	Generating Dept / Environment / Receiver	5 years
4	Waste Manifests (IEFCL-HSEF/E-4.410) and certificates of disposal/recovery	MMD / Environment Section	10 years
5	Basel Convention notifications, consents and movement documents	Environment Section	10 years
6	HWSA inspection checklists (Annexure-2)	Environment Section	5 years
7	Incinerator operating logs, permits and emission monitoring results	ETP In-charge / Environment Section	10 years
8	Ash TCLP results and paver block production records	Environment Section	10 years
9	Approved vendor list, permits and audit reports	Environment Section / Commercial	Duration of contract + 10 years
10	Incident reports and investigations	HSEF	10 years
11	Training records	HSEF / Contractors	Duration of employment + 5 years
12	Monthly reports, KPIs and lender reports	Environment Section	10 years
13	Classification, reclassification and inventory change records	Environment Section	10 years
14	Contractor and vendor approval records (pre-qualification)	Environment Section / Commercial	Duration of contract + 10 years
15	Rejected-load records	Environment Section / MMD	10 years
16	Emergency drill reports	Fire & Safety Section	5 years
17	Corrective action tracker (all sources)	HSEF	10 years
18	Stormwater Release Log; catalyst passivation records; PCB inventory; decontamination records	Environment Section / Technical Services / Electrical	10 years
19	EPC Hazardous Waste Close-out Certificate and records	IFF Project HSE Lead	10 years

Records may be kept electronically, are protected against loss and are made available to regulators, lenders and auditors on request. All records are indexed by Stream ID and Consignment ID (Section 18.2.1) so that the complete chain of custody for any shipment – classification basis, storage, manifest, transport, receipt and certificate – can be retrieved and audited within two working days.

20.0 STAKEHOLDER ENGAGEMENT, GRIEVANCE REDRESS AND DISCLOSURE

In accordance with AfDB OS10, this HWMP (disclosure version) will be disclosed with the other E&S instruments for the project. Community concerns relating to hazardous waste – for example waste vehicle movements, odour or smoke from the incinerator, or suspected illegal dumping – can be raised through the project Grievance Redress Mechanism described in the Stakeholder Engagement Plan. Waste-related grievances are logged, investigated by the Environment Section, resolved and reported in the monthly report. Summary HWMP performance is included in the periodic stakeholder updates under the SEP.

Table No. 27A: Handling of Waste-Related Grievances

Step	Arrangement	Responsible
Register	Complaints received through any SEP channel (community liaison officers, hotline, grievance boxes, email, walk-in, community leaders) are logged in the GRM register with a unique ID and the category “Waste – transport / odour / smoke / spill / disposal”	Community Relations & Development (CR&D)
Acknowledge	Within the acknowledgement timeline in SEP Table 9-2	CR&D Grievance Officer
Investigate	Technical investigation (site visit, review of transport and GPS records, incinerator logs, sampling of air, water or soil where relevant); findings documented	Environment Section
Resolve and feed back	Proposed resolution communicated to the complainant in the language and format they prefer, within the resolution timeline in SEP Table 9-2	CR&D with Environment Section
Escalate	Unresolved or disputed cases escalated as per SEP Section 9 (grievance committee, senior management, appeal, judicial recourse and AfDB Independent Recourse Mechanism)	CR&D
Record corrective actions	Corrective actions entered in the corrective action tracker with link to the grievance ID; trends reported monthly	Environment Section
Confidentiality	Anonymous complaints accepted; identity of complainants protected and disclosed only with consent	CR&D

Communities along waste transport routes and near the complex are informed through SEP engagement meetings, notices and information on waste vehicles of how to report concerns about waste transport, odour, smoke, spills or suspected improper disposal.

21.0 REVIEW AND UPDATE

The HWMP is reviewed at least annually by the HSEF Department and updated after any material change, including: commissioning of Line 4; new or changed waste streams; changes in legislation or permits; findings of audits, incidents or lender monitoring; or changes in contractors or receiving facilities. IEFCL-HSEF-2.403 will be revised at its next update to align with this HWMP, including the secondary containment criterion (Section 10.3), the inclusion of Line 4 and the clarification of “sale” routes (Section 12.2). Revisions are approved by the HOD, HSEF and significant changes are communicated to AfDB.

In addition to the annual review, the HWMP is reviewed within 30 days of any of the following triggers:

- introduction of a new treatment, recovery or disposal route, or a change of receiving facility;

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- material change to Line 4 operations – commissioning, capacity change, new catalysts or process chemicals, or new waste streams;
- a Level 3 incident or a repeated Level 2 incident involving hazardous waste;
- internal, independent or lender audit findings indicating a systemic gap;
- new or amended legislation, or renewal or amendment of a waste-related permit.

The Environment Section prepares the revision; the HOD, HSEF approves minor revisions and the Plant Head approves major revisions (Table No. 09A). Linked procedures (IEFCL-HSEF-2.403 and forms) are updated within 60 days of approval. Changes are communicated to workers and contractors through toolbox talks, training updates and contractor coordination meetings, and the controlled copies are reissued. A review log records the trigger, rationale, changes made and resulting actions.

“End of Plan”

ANNEXURE-1 HAZARDOUS WASTE REGISTER FORMAT

Format No.: IEFCL-HSEF/E-HW-01 (to be maintained electronically)

Sr. No.	Date	Waste Description	Waste Code	Source / Dept.	Quantity & Unit	Storage Location	Route / Vendor	Manifest No. / Certificate

ANNEXURE-2 HAZARDOUS WASTE STORAGE AREA WEEKLY INSPECTION CHECKLIST

HWSA / Location	
Inspected by / Date	

No.	Inspection Item	Yes	No	Remarks / Action
1	Area fenced, locked and signage in place; access restricted			
2	Floor impermeable, intact and free of spills, cracks or stains			
3	Bunds / containment intact, empty of liquid and of adequate capacity			
4	Roof and weather protection in good condition			
5	All containers closed, in good condition, not leaking or bulging			
6	All containers labelled (HAZARDOUS WASTE, waste code, date, hazard)			
7	Incompatible wastes segregated as per compatibility matrix			
8	Spill kit complete; fire extinguishers in date; eyewash functional			
9	Drainage: no connection to storm drains; sump clean			
10	Inventory log up to date and matches containers in store			
11	Housekeeping satisfactory; no non-hazardous waste stored			
12	Rainwater in bunds tested and logged before release (Section 10.3.2)			
13	No container beyond maximum storage period (Table No. 16A); satellite-point limits complied with			

Defect and Action Record (to be completed for every “No” response)

Item No.	Defect description	Severity (C / Ma / Mi)	Immediate control applied	Action owner	Due date	Closure verified by / date

Severity: **Critical (C)** – loss of containment, incompatible storage, fire protection unavailable or drainage protection lost: immediate control and bay out of service (Section 10.4); **Major (Ma)** – e.g. missing labels, degraded bund coating, storage period exceeded: close within 7 days; **Minor (Mi)** – housekeeping: close within 30 days.

This checklist applies to all permanent HWSAs, EPC and other contractor storage areas and satellite points. Frequency: weekly; twice weekly for HWSAs storing flammable or reactive wastes; daily during TAM campaigns and for EPC laydown HWSAs during pre-commissioning.