



HINDUSTAN ZINC
Zinc & Silver of India

Sustainability Framework

TECHNICAL STANDARD

Resource Use and Waste Management

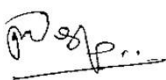
Hindustan Zinc Limited





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1. INTRODUCTION

The purpose of this Technical Standard is to ensure that HZL uses resources and manages all of the wastes it produces in ways that minimise the impact on the environment and to human health; and that supports our policies in relation to sustainability and protection of the environment. This Standard supports HZL's *Health & Safety Policy*. This standard has been adopted from the parent company Vedanta's Sustainability framework.

2. SCOPE

3. This Technical Standard is mandatory and applies to all HZL subsidiaries, operations and managed sites, including new acquisitions, corporate offices and research facilities and to all new and existing employees. This Standard is applicable to the entire operational lifecycle (including exploration and planning, evaluation, operation and closure).

Definitions of key terms used in this document are shown in the following table.

Term	Definition
Basel Convention	An agreement which creates obligations for the states that have ratified it. The primary aim of the treaty is to control the movement of hazardous waste between nations and specifically to prevent transfer of hazardous waste from developed to less developed countries.
Contractor	Any third party organisation which is engaged or commissioned by HZL to undertake work or provide services (such as collection, treatment or disposal of waste).
ESIA	Environmental and Social Impact Assessment – a formalised process designed to identify, assess and document environmental and social impacts associated with a project, along with the mitigation measures and management arrangements for ensuring such measures are implemented.
Hazardous Waste	Wastes listed in Annex I of the Basel Convention and/or those wastes that exhibit one or more of the following characteristics of hazardous waste listed in Annex III of the Convention: <ul style="list-style-type: none"> explosive, flammable liquids, flammable solids, wastes liable to spontaneous combustion, substances or wastes which, in contact with water emit flammable gases, oxidizing, organic peroxides, poisonous (acute), infectious substances, corrosives, liberation of toxic gases in contact with air or water,



Term	Definition
	<ul style="list-style-type: none"> toxic (delayed or chronic), ecotoxic, or capable of yielding another material after disposal, e.g. leachate, which possesses any of the characteristics listed. In addition, any other waste defined as Hazardous by local country legislation shall be assumed to be 'hazardous waste'.
ICMM (International Council on Mining and Metals)	The International Council on Mining and Metals (ICMM) was established in 2001 and seeks to drive performance improvement through its members which comprise mining and metals companies, as well as national and regional mining associations and global commodity associations.
IFC (International Finance Corporation)	Member of the World Bank that finances and provides advice to private sector ventures and projects in developing countries.
Mineral Waste	Waste rock and overburden, tailings and spent heap leach ore from mineral processing rejects from beneficiation or concentration of minerals, bauxite residue from alumina production, dross, refinery discards and sludges, smelter and other furnace slags, dredging materials and soils contaminated by mineral waste.
MSDS (Material Safety Data Sheet)	A document containing information about a material or chemical including the chemical and generic name of its ingredients, the chemical and physical properties of the substance, health hazard information and precautions for safe use and handling.
Non-mineral Waste	Waste materials other than mineral wastes.
Operation(s)	A location or activity that is operated by a HZL Company and its subsidiaries. Locations could include exploration activities, mines, smelters, refineries, wind farms, offices including corporate head offices and research and development facilities.
Proximity Principle	The proximity principle states that waste should generally be disposed of as near to its place of origin as possible (providing that suitable facilities are available). This is to ensure that potential problems associated with waste disposal are not simply exported to other regions or countries and because transportation of wastes can have a significant environmental impact.
Stakeholder	Persons or groups that are directly or indirectly affected by a project as well as those that may have interests in a project and/or the ability to influence its outcome, either positively or negatively. This can refer to shareholders, lenders, employees, communities, industry, governments and interested third parties.
Subcontractor	A contractor directly engaged or commissioned by a principal contractor to undertake work on behalf of HZL.



Term	Definition
Supplier	A third party that supplies products, equipment, services or utilities to a HZL Company; 'Supplier' is distinguishable from a 'Contractor' which provides people to deliver work or provide a service.
Supply Chain	The movement of materials as they flow from their source to the end customer. Supply Chain includes purchasing, manufacturing, warehousing, transportation, customer service, demand planning, supply planning and management. It is made up of the people, activities, information and resources involved in moving a product from the supplier to customer (the customer being HZL).
Sustainability Management System (SMS)	The structured framework that provides the arrangements for managing the environmental, health, safety and social aspects through the lifetime of the project and operation, including closure and decommissioning.
Waste	Any substance (solid, liquid, or contained gaseous material) or object that is being discarded – e.g. by disposal, recycling or incineration.
Waste Transfer Note (WTN)	A multi-part form used to record details of a consignment of waste which travels with the load of waste as it is passed along the chain of custody until reaching its final treatment or disposal point. Each person accepting responsibility for the load of waste must sign the form to acknowledge they have received it.

4. PROGRAMME REQUIREMENTS

This Standard aims to define the minimum processes that need to be established to manage sustainability risks associated with resource use and the management of wastes from HZL's activities. The sustainability risks associated with resource use and wastes that HZL generates will depend on the nature and complexity of the activities being undertaken. The requirements described below shall be followed by all HZL operations.

4.1. General Principles

- HZL operations shall ensure that the requirements of this Technical Standard are adhered to in the use of resources and management of all types of Waste to ensure that sustainability related impacts are systematically considered in all business decision-making processes.
- HZL operations shall investigate innovative methods where common waste challenges are identified across the company.
- HZL recognises the limitations in resource availability, and Operations shall minimise both the use of resources, such as fresh water, energy and materials, and the subsequent generation of waste in all its activities.
- Operations shall apply the principles of the Waste Hierarchy in the design and implementation of all of its operations (see Section 4.3). Specifically, the opportunities to eliminate, reduce, reuse, recycle and recover waste wherever practicable shall be identified and implemented. Specific attention shall be focused on hazardous and high volume wastes such as process or mineral wastes although the principles detailed in this Standard shall apply to all types of Waste.



- e) Operations shall manage all unavoidable waste in such a way that the risk of harm to human health is minimised and pollution of the environment is avoided.
- f) Operations shall apply the Proximity Principle, aiming to dispose of all waste as near to its point of origin as possible, taking into account the availability of suitable facilities, in order to minimise the energy, possibility of accident and environmental impact associated with the long distance transport of waste and to ensure that potential problems associated with waste disposal are not simply exported to other regions or countries.
- g) HZL shall also meet the requirements of the *IFC Performance Standards*. The waste management-related requirements are summarised as follows:
 - *Performance Standard 1 – Assessment and Management of Social and Environmental Risks and Impacts*. This Standard is also applicable in that it requires an assessment of all the potential environmental impacts of a project and the minimisation and/or mitigation of these impacts. This includes the potential impacts associated with the generation of waste by a project.
 - *Performance Standard 3 – Resource Efficiency and Pollution Prevention*. The generation of hazardous and non-hazardous waste will be avoided or minimised as far as reasonably practicable. Where waste generation cannot be avoided but has been minimised, the waste will be recovered and reused as far as practical. Where waste can not be recovered or reused, it will be treated, destroyed and disposed of in an environmentally sound manner. If the generated waste is considered hazardous, commercially reasonable alternatives for its environmentally sound disposal will be investigated considering the limitations to its transboundary movement. When waste disposal is conducted by third parties, contractors will be used that are reputable and legitimate enterprises licensed by the relevant regulatory agencies.
 - *Performance Standard 4 – Community Health, Safety and Security*. Commercially reasonable efforts shall be exercised to control the safety of the transportation and disposal of waste.
- h) Operations shall ensure that waste management contractors (including transport and disposal contracts) are assessed and evaluated as part of the procurement process prior to approval and meet the requirements of the *Supplier and Contractor Management Technical Standard*.
- i) HZL procurement and supply contracts shall include requirements for the provider to follow the waste hierarchy and that, in order of priority, waste is avoided, reduced, reused, recycled and properly treated or disposed.

4.2. Resource Use

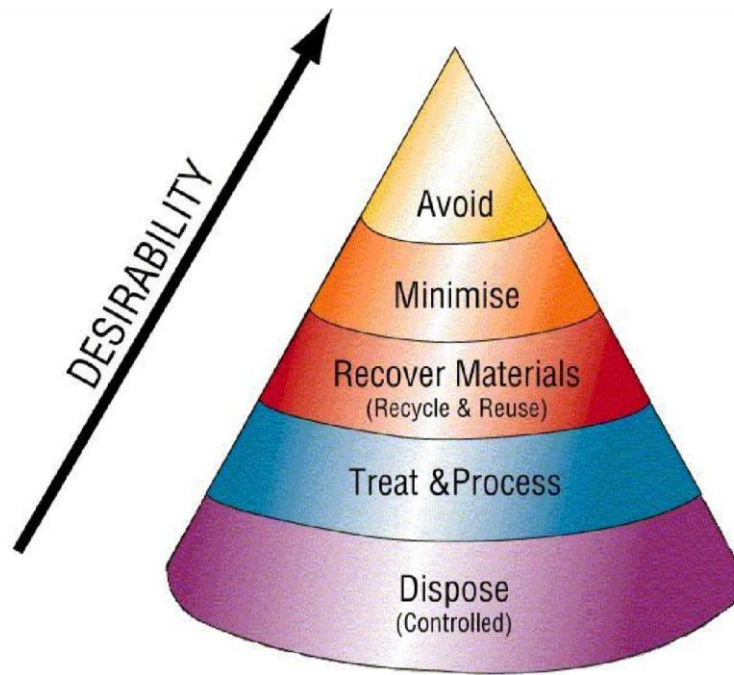
- a) HZL shall design its operations and select equipment to minimise resource use across the lifecycle of each site and/or development.
- b) Operations shall implement technically and financially feasible measures and cost effective options to improve efficiency in the consumption of energy, water and other resources with a focus on areas that are considered core business activities.
- c) As stated by IFC Performance Standard 3 (Resource Efficiency and Pollution Prevention), operations will adopt principles of cleaner production in product design and production processes with the objective of conserving raw materials, energy and water.
- d) Resource-related risks shall be identified as part of the Environmental and Social Impact Assessment (ESIA) process and addressed in the Sustainability Management System.



- e) Operations shall ensure that resource-related decisions take into account local circumstances such as environmental sensitivities and thresholds and are aligned with ESIA requirements and/or sustainability risk assessments.
- f) The requirements for process and potable water over the lifetime of each operation or project shall be determined and any existing water stress in terms of the existing environment and current users shall be evaluated (and in the case of projects, prior to proposed activities). Water use requirements shall also meet the commitments outlined in the *HZL Water Management Policy* and the requirements of the *Water Management Technical Standard*.
- g) Operations shall ensure that there is a sustainable and secure supply of water. Where water is provided by a public or private supplier, the original water body will be identified, and the sustainability of water supply will be evaluated taking account of potential future changes in water availability due to climate change and other demands on the specific source(s) of the supply.
- h) In areas where the supply of water may be adversely affected by withdrawals, the potential impact of the proposed water uses on other users (human and animal) and vegetation will be evaluated, and action taken according to the finding.
- i) Operations shall:
 - Maximise the internal re-use of water in order to minimise the requirements for the supply of fresh water;
 - Investigate the opportunities for rainwater collection and the potential for using effluent from another process as the source of water; and
 - Minimise freshwater use, especially in areas prone to seasonal, sporadic or all-year-round water stress and/or water shortages.
- j) Operations shall seek to reduce energy use wherever reasonably practicable and in line with the *HZL Energy & Climate Change Policy* and the requirements of the *Energy and Carbon Technical Standard*.
- k) Targets shall be developed to drive improvements in HZL's efficiency in using resources. An action plan to meet these targets shall be implemented and progress towards achieving them will be monitored and reported to HZL.

4.3. Adopting the Waste Hierarchy

- a) Operations shall demonstrate a commitment to applying the waste management hierarchy principles. Priority shall be given to avoidance and minimisation of Waste generation followed by recovery, reuse and recycling. The least preferred option shall be disposal (landfill or incineration).



These principles shall be considered in the context of the life cycle of the material selection, design phase, project or facility, and with consideration of environmental regulations and availability of resources locally to handle waste.

- b) Operations shall design and operate processes to minimise the amount of waste that is generated, as well as by ensuring the implementation of good practices. The hazards associated with wastes which are generated shall also be reduced through substitution of raw materials with less hazardous materials and by stringent segregation of hazardous and non-hazardous wastes.
- c) The amount of waste that is recycled shall be maximised by:
 - Establishing contact with local recycling companies to establish the full range of materials that can be recycled and in what form the materials need to be presented; and
 - Segregation and proper storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of the materials
- d) Operations shall work with its partners, suppliers and other stakeholders to identify ways to use unavoidable wastes as inputs to other processes wherever possible.

4.4. Waste Management Planning

- a) A Waste Management Plan (WMP) and procedures shall be developed by Operations management as part of the Sustainability Management System to manage waste and optimise the use of materials.
- b) The WMP for each operation shall specify how operation wastes are to be managed (in accordance with this Standard) and shall cover the following aspects:
 - Legal Context – detailing specific local laws and regulations relating to waste management as well as any international legal/regulatory obligations
 - Roles and Responsibilities – of the different site managers and staff in relation to managing waste at the site
 - Waste Arisings – the sources, types, and quantities of waste generated by the site

- Waste Minimisation and Recycling – measures to be taken to reduce the amount of waste to be disposed
 - Storage and On-site Handling – a description of how waste is to be managed on site including containers and labelling
 - Waste Collection and Transfer – including waste tracking procedures to the final approved destination
 - Treatment and Disposal – for specific types of waste
 - Monitoring, Data Management and Reporting
- c) Targets shall be developed to drive improvements in mineral and non-mineral waste management. These shall include hazard and/or quantity reduction of wastes destined for disposal.

4.5. Waste Identification and Classification

- a) A waste inventory shall be established detailing the types and quantities of waste that are expected to be produced so that proper planning can be undertaken for the on-site handling and storage of all the different waste streams and so that appropriate arrangements can be made for on- or off-site treatment and disposal. The inventory shall be updated, based on monitoring of actual quantities of waste generated and revised predictions regarding future site activities, at least on an annual basis.
- b) Different wastes shall be classified according to any local requirements and as 'hazardous'/'non-hazardous' in accordance with local legal/regulatory definitions or international standards (such as the Basel Convention).
- c) In the case of mineral wastes, the physical as well as chemical characteristics and any hazardous properties shall be documented.

4.6. On-site Handling and Storage of Waste

- a) The ultimate end point of the treatment and disposal of all wastes, including any residues from treatment, shall be identified and wastes shall be handled and stored in such a way so as to facilitate the planned treatment and disposal.
- b) Non-mineral wastes shall not be disposed of on-site or stored on a permanent basis.
- c) The arrangements for the collection and storage of waste at particular sites will vary depending on the ultimate fate of the different wastes. Non-mineral waste shall be stored in containers that are:
 - In good condition and appropriate volume, material and shape for the type of waste being contained; and
 - clearly labelled to show the contents and any associated hazards.
- d) Wastes shall be segregated to prevent incompatible materials coming into contact with each other and to prevent contamination of potentially recyclable materials.
- e) All waste shall be stored securely in designated areas, with a suitable surface and a method to contain any leakage or contaminated runoff water. Secondary containment shall be provided for the storage of all liquid waste. This shall have a capacity of 110% of the largest storage container or 25% of the total storage capacity, whichever is greater.
- f) Hazardous wastes shall be stored separately from non-hazardous wastes. Underground storage tanks and underground piping shall not be used for hazardous liquid wastes for new projects and, for on-going operations, shall be avoided and alternative storage methods identified where practicable.



- g) Storage areas for hazardous waste shall:
 - display information about the specific materials being stored including material safety data sheets (MSDSs) and any specific hazards or precautions that need to be taken;
 - have appropriate warning signs in English (and the local language if not English) and including any international hazard symbols;
 - be secure to prevent unauthorised access;
 - be equipped with emergency wash facilities; and
 - have spill clean-up kits available to deal with spillages or leakages of waste.
- h) Access to hazardous waste storage areas shall be restricted to authorised personnel that have received appropriate training.

4.7. On-site Waste Treatment and Disposal

- a) Operations management shall develop and maintain a procedure for identifying the hazards, potential modes of failure and assessment of the risks posed by tailings dams, ash ponds and other mineral waste disposal facilities.
- b) For each mineral Waste disposal facility, operations shall maintain a record of the longterm physical and chemical behaviour and impacts on the environment. Where required, conceptual and/or numerical models may be used to ascertain the behaviour and impacts
- c) HZL shall ensure that the design and construction of all waste disposal facilities are:
 - compatible with the waste behaviour, addressing any threats to the environment, particularly those posed by contaminated run-off and seepage, wind and water erosion, direct exposure to chemical hazards, asbestiform minerals, and geotechnical instability;
 - engineered to best available or applicable technology for stability and safety; and
 - located within permitted boundaries in a manner that minimises impacts to sensitive receiving environments and water resources.
- d) Tailings disposal facilities shall not be used for storing water.
- e) Mineral waste disposal facilities shall be managed and operated to ensure they are safe with respect to:
 - the waste mass and its physical and chemical reactions;
 - the containment structure and its stability;
 - waste placement, segregation and handling requirements; and
 - the potential for spills and improperly placed materials.
- f) All HZL waste disposal and storage facilities and operations shall be supervised by appropriately qualified and trained personnel.
- g) The physical stability of waste disposal structures shall be monitored to provide an early warning for potential failure. Regular monitoring of the geochemical behaviour of the waste repositories shall also be undertaken for validation and review of the waste behaviour model and early warning of potential pollution problems.
- h) An independent and external review of all major waste storage facilities shall be undertaken by qualified engineering specialist(s) according to protocols and frequencies appropriate to their physical and chemical hazards and level of risks. The frequency of external reviews shall be at least annually for physical and chemical hazards. Any



significant findings will be reported immediately to the operation's overall manager who will be responsible for ensuring that appropriate remedial action is instigated.

- i) An emergency management process, including detailed communication arrangements with local Stakeholders shall be developed and maintained for responding to potential incidents involving waste storage facilities and transport to disposal facilities. The emergency management process shall meet the requirements of the HZL *Emergency and Crisis Management* Technical Standard.
- j) The potential risks and benefits of off-site versus on-site treatment of non-mineral wastes shall be evaluated based on the distances to potential treatment and disposal facilities and the performance standards of those facilities. If appropriate, on-site pre-treatment technologies, such as thermal oxidation (incineration) shall be employed to reduce the quantity and/or hazardous nature of waste prior to disposal off-site.
- k) If the absence of viable alternatives necessitates the development of on-site or off-site HZL waste treatment and disposal facilities, these facilities shall be designed and operated to international standards of health, safety and environmental protection such as those required by the IFC (Performance Standards and EHS/Sector Guidelines) or European Union.

4.8. Waste Transfer and Off-Site Treatment/Disposal

- a) Operations shall seek to ensure that any third party used to transport, treat and/or dispose of waste is competent to undertake the task, in advance of any transport, treatment and/or disposal contract being arranged.
- b) Operations shall ensure that no waste is disposed of by burning or dumping in unapproved or unregulated locations.
- c) A waste tracking system shall be used to track waste from the point of leaving a HZL operation through to its final disposal point. If there is no national legislation specifying the details of the tracking system, operations shall use a system of Waste Transfer Notes (WTNs). A copy of the WTN, which describes the nature and quantity of waste, shall accompany each load of waste and will be signed by all parties involved in chain of custody for the transfer and disposal of the waste. A copy of each WTN signed at the final treatment or disposal facility shall be returned to the HZL operation as evidence of the waste's proper disposal.
- d) Periodic audits of the full waste management process, including the transportation, treatment and disposal of waste shall be undertaken to ensure that waste contractors are working in accordance with the agreed contract and performance expectations. The frequency of audits shall be based upon the risks associated with the types and quantities of wastes being transported and disposed of. As a minimum, waste contractor audits shall be conducted once every three years.
- e) Where there are inadequate local disposal facilities, HZL operations shall take a proactive approach to stimulate the development of responsible methods of waste treatment and disposal, for example by supporting the upgrade of existing facilities or by encouraging local third-party capacity building.
- f) If the lack of an acceptable waste treatment or disposal facility necessitates the export of a particular type of waste, this shall be undertaken in compliance with the Basel Convention and any applicable local law.

4.9. Monitoring and Record Keeping

- a) Waste storage areas shall be inspected on a weekly basis.
- b) Completed WTN notes shall be kept for a period of two years, or longer if required by local legislation.



- c) Waste audit reports (including waste contractor audit reports) shall be available and maintained. Actions identified from waste audits shall be tracked and closed-out and meet the requirements of the *Corrective and Preventive Action Management Standard*.
- d) Records shall be maintained of all wastes sent off-site from each HZL operation, including details of the disposal/treatment facility. A documented inventory shall also be kept, including location, of on-site waste landfills and storage areas. Historical and abandoned landfills will be included in this inventory and their location documented.
- e) The Waste Management Plan and waste inventory are maintained and are available.
- f) Resource use, such as water and energy consumption, as well as the amounts of hazardous and non-hazardous waste generated and disposed shall be recorded to monitor progress in achieving performance targets.

4.10. Change Management

- a) HZL shall ensure that a change management process is in place in relation to waste management arrangements, which meets the requirements of the *Management of Change Management Standard*. This shall include processes to deal with changes relating to the following:
 - HZL operations or activities, including materials used, which give rise to significantly increased use of resources, different types of waste or significantly different quantities of waste;
 - Approval of any significant modification to mineral waste disposal facilities or waste handling and disposal procedures;
 - Point of contact or other key personnel involved in management of waste disposal activities; and
 - Local or international waste management regulations that could impact the way in which wastes are managed.

5. ROLES AND RESPONSIBILITIES

HZL operations and sites shall ensure that roles and responsibilities for implementing and complying with this Standard are allocated. Key responsibilities shall be included in job descriptions, procedures and/or other appropriate documentation.

6. COMPLIANCE AND PERFORMANCE

Each HZL operation shall ensure it complies with the requirements of this standard. Performance against the requirements of this Standard shall be assessed periodically, documented and, where required, reported to HZL. The assessment of performance shall include setting and reporting on key performance indicators (KPIs) where these have been established at HZL Company or local level. The evaluation of performance shall include, as a minimum, confirmation that:

- The operation has set resource use efficiency targets and has a plan in place to meet these targets.
- The operation has a Waste Management Plan in place that clearly specifies responsibilities and general procedures for the management of wastes generated on site.
- If relevant, the operation has records of the external review of major waste storage facilities to assess their physical and chemical hazards. There should be a record of any remedial actions undertaken in the light of the findings from the reviews.
- Waste storage areas are inspected on a weekly basis (and appropriate action taken in a timely manner).
- A waste tracking system, such as a Waste Transfer Note system is being used to check transfer and disposal of wastes.

- All waste management contractors (collection and treatment/disposal) have been checked prior to contracts being arranged and periodically thereafter to check their health, safety and environmental performance.
- The following parameters are being monitored and recorded:
- Resource use - including water and energy consumption
- Waste generation rates – for different types of waste
- Quantities of waste recycled, treated and disposed (on and off-site)

7. SUPPORTING INFORMATION

Reference	Description
ICMM (International Council of Mining and Metals)	The ICMM has produced and published good practice guidance on a range of health, safety, environment and community issues relating to mining. http://www.icmm.com/library
International Finance Corporation Performance Standards Guidance Notes	The IFC has published Guidance Notes to guide the implementation of the full range of performance standards. These are available on the website. The guidance is currently being updated and draft versions (V2) are available however these have not yet been finalised and formally published. http://www.ifc.org/ifcext/sustainability.nsf/Content/PerformanceStandards

8. REVIEW

This Technical Standard shall be periodically audited and reviewed to determine its accuracy and relevance with regard to legislation, education, training and technological changes. In all other circumstances, it shall be reviewed no later than 12 months since the previous review.

9. RELATED DOCUMENTATION

A summary of the references and supporting documents relevant to this document is provided in the following table.

Doc. Ref.	Document name
POL 05	Supplier and Contractor Management
POL 07	Water Management
POL 10	Energy and Carbon Management
MS 06	Competency, Training and Awareness
MS 07	Management of Change
TS 13	Emergency and Crisis Management
TS 14	Water Management
TS 16	Energy and Carbon Management

