

AIR EMISSIONS MANAGEMENT



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PURPOSE OF THE DOCUMENT

This position statement sets out HZL's approach to Air quality management and outlines the requirements to avoid (or if not possible), minimise, the adverse impact of our operations on the air quality. Alongside the emission of greenhouse gases, mining and mineral processing can result in other air emissions such as Particulate Matter (PM), Nitrogen oxide (NOx) emissions, and Sulphur oxide (SOx) emissions. The discourse around air quality has grown substantially in the recent years with renewed engagement from various stakeholders. With more and more studies pointing out that air pollution increases the risk of a variety of adverse health outcomes, we realize how air quality deterioration is more harmful than previously understood. Air quality which does not meet the stipulatory discharge standards leads to detrimental impacts on the environment and human health, eventually resulting in financial losses. At HZL, we continuously strive towards ensuring that all our projects and operations implement management measures to avoid or minimise potential adverse impacts on ambient air quality.

OUR IMPACTS

Large-scale air emissions can cause serious impact on the environment as well as well-being of our workers and local communities. Emissions caused by crushing, collection, storage, and transportation from mining, smelting and captive power plants (CPP) activity can negatively impact the air quality, if they are not properly managed. With increasing government regulations, failure to comply with emission norms and minimise air emissions could lead to regulatory actions such as imposition of levies/fines, escalation in costs related to monitoring and reporting, among others.

GOVERNANCE

The constitution of a separate Sustainability and ESG Committee at the Board level has helped to scale our sustainability focus and efforts. The four-member committee holds its meetings on a half-yearly basis.

The committee is led by an independent director as the chairperson of the committee. The role of the Sustainability and ESG Committee is to assist the Board in meeting its responsibilities in ESG matters and to ensure a strong governance on sustainability matters. It is also responsible for providing oversight on sustainability strategy, setting long-term goals & targets, ensuring continual improvement of our sustainability related performance as well as implementation of appropriate processes and policies across the Company. It also plays a key strategic role in eliminating potential damage to the environment and enhance our commitment towards stakeholders. This committee is supported by Executive level sustainability committee, which is chaired by our CEO. The Committee is to assist the Board in meeting its responsibilities in ESG matters including air quality-related issues . It also provides oversight on our air quality management strategy, goals & targets set, and ensuring adherence of our operating sites to the minimum requirements to monitor, assess and manage emissions of common air pollutants to be protective of human health and the environment.

SUSTAINABILITY MANAGEMENT FRAMEWORK

Our Sustainability Management Framework is aligned with both, the Vedanta Sustainability Framework (VSF) and the Integrated Management System (IMS).



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The Technical Standard on Environment & Social Impact Assessment and Environmental Management guides us to ensure that we manage our impacts to the environment through effective management systems and processes that work towards improving our environmental performance including air quality management. The standard is in alignment with IFC Performance Standard, ICMM, IFC EHS Guideline and IFC sector-specific Guideline requirements. It is applicable to the entire operation lifecycle (including exploration and planning, evaluation, operation, and closure).

OUR STRATEGY

By exploring various technological and process improvement options, we have shaped our emission management strategy. This strategy is focused on investing in environmental abatement technologies such as air emission control equipment, maintaining process integrity and active engagement with key stakeholders.

At HZL, we are committed to reduce our non-GHG air emissions and are actively engaged in various measures to manage and monitor air quality parameters such as particulate matter (PM), SO_x and NO_x . Our emphasis is on prevention and management of air quality through operational discipline and process improvement. Broadly, our strategy to manage and monitor the air emissions involves the following:

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- Usage of well-designed state of art air pollution control devices (APCD)
- Periodical inspection and maintenance of APCD
- Effective fugitive emission management
- Continuous emission monitoring and reporting

Identification of emission sources is a very crucial step in strategy formulation. With all our mines being underground, we have identified smelting process, acid plants and captive power plants (CPP) as our major sources of emission. For instance, two major sources of SO_x emission in our operations include sulphuric acid plant (controlled activity) and captive power plant (emission depends on coal quality). Continuous Emission Monitoring System (CEMS) has been installed at various source emissions and data is being sent to a central server as well as reported to statutory bodies like the State and Central Pollution Control Boards. The measured emission parameters are then compared with the regulatory and industry standards for identifying abnormalities, if any. In case any deviation is found in our performance, immediate corrective and preventive actions are taken.

Туре	Emission Management Measures				
PM Emissions	 High efficiency (99.875%) electrostatic precipitator (ESP) for CPP Flue gas cleaning techniques, like ammonia dosing before letting out air through stack, used in power plant to achieve maximum cleaning of flue gas to: Reduce stack emissions Conform to statutory requirements Fulfill moral obligation and civic responsibility Reduce wear on ID fans Zinc and Lead Smelters are equipped with bag filters, ESPs, and scrubbers, to effectively maintain PM emission within 50 mg/Nm³ 				
SO _x emissions	 Double Conversion Double Absorption (DCDA) installed in acid plant to maintain SO₂ emissions within stipulated norms TGT installed in Pyro Smelter CLZS, Lead Smelter Dariba and Roaster -2 of Debari Zinc Smelter to further cut down on SO₂ emission from stack (Calcine-based scrubbing); It is further proposed to install TGT in acid plants of five other roasters to further minimise the SO₂ emission and keep the stack emission at 0.5 kg/ tonne of acid Cesium dotted V₂O₅ catalyst for efficient conversion of SO₂ to SO₃ Adequate stack height for better dispersion 				
NO_x emissions	 Installation of NO_x Control Solutions to maintain emissions below permissible limits 				
Other measures for fugitive dust emissions	 Water sprinkling at raw material handling for dust suppression Dust extraction system in conveyors at each transfer point and in fly ash/ calcine silo to minimise emissions Cement concrete internal roads to control fugitive dust generation Vacuum road sweeping and water sprinkling to minimise fugitive dust emissions due to traffic 				
Air quality monitoring	 Online stack monitoring and Continuous Ambient Air Quality Monitoring Stations for real time monitoring Continuous Emission Monitoring System (CEMS) to measure particulate matter, Sulphur dioxide, Oxides of nitrogen, mercury, temperature, and oxygen content of flue gas etc. 				





DEFINING & MEASURING OUR IMPACT

General Requirements

The following general requirements regarding air quality management are applicable to all the HZL operations:

Implementation of environmental programmes and operational controls:

- Establish an inventory of air emissions from all point sources, fugitive sources, mobile sources and from process activities associated with combustion, materials storage and other sources relating to HZL's operations.
- Install, operate, and maintain air emission abatement technologies required to manage the emissions generated.
- Develop management measures that incorporate, as a minimum, controls to reduce air quality risks/impacts to as low as reasonably practicable; and
- Record this process in an Air Quality Management Plan.

Regulatory requirements:

 Identify, assess, and comply with applicable laws and regulations, permits, licenses, external standards and other applicable requirements for source air emissions, fugitive dust emissions and ambient air quality. Ensure compliance with National Ambient Air Quality Standards (NAAQS) 2009, for criteria pollutants such as SO_x, NO_x, and PM.

Objectives and Targets

 Set targets and deadlines for emission reduction of pollutants including SO_x, NO_x, and PM to improve the air quality across all the sites.

Monitoring and Performance Management

- Conduct advanced dispersion modelling using the real emission data, if there are measurable point sources emitting significant pollutants.
- Establish a regular and up-to-date monitoring programme for air emissions (point and fugitive) arising from the operations.
- Where there is the potential for the internal air quality targets to be compromised, record:
 - the relevant ambient air quality parameters;
 - meteorological conditions affecting air emission dispersion;

- changes to the receiving environment (e.g. location of residences, decrease in cumulative capacity, etc); and
- other notable off-site emission sources in the vicinity.
- Quantify annual emissions of relevant pollutants for regulatory and other reporting purposes.
- Perform and document planned & corrective maintenance, calibration, and inspections of emissions control and monitoring equipment.
- Verify the air quality compliance with the help of qualified persons and using any valid/accepted methods.

Communication and Stakeholder Engagement:

Communicate with relevant stakeholders especially local community in case of any potential impact on air quality and generate awareness on significant pollutants emitted from the operation (including their concentration and distribution).

Review:

- Revise the Air quality management strategy in case of any changes to the emission inventory as determined for the original project plan annually or as and when required.
- Ensure alignment of the strategy with achieving sustainable mine closure, especially in the case of air emissions which that would continue into closure.

Additional Requirements for Project phase

In case of construction of new mining/ smelting operations and facilities, apart from the general requirements listed above, HZL shall:

- Establish the baseline for the local region surrounding the operation, i.e., baseline concentrations of ambient air pollutants including SO_x, NO_x, PM₂₅ and PM₁₀.
- Conduct screening-level dispersion modelling during the Pre-feasibility phase based on the monitoring data received from the exploration/prospecting stage. Identify pollutants which may be significant by having a detailed understanding of the chemistry and constituents of the materials which will be processed.
- Conduct advanced dispersion modelling during the Feasibility phase, for pollutants that the screeninglevel dispersion model indicated have the potential for significant adverse impacts on air quality or receiving soil and water bodies.



METRICS AND GOALS

(GRI 305-7)

Recognising the connected nature of the environment, our employees' health, and the well-being of the communities around our operating locations, we have aligned our approach closely with international standards and ambitions. In line with this, we have set the following targets for 2025:

Reduction in SO_2 and NO_x emission by 17% by 2025

We monitor and evaluate our performance in emission reduction and evaluate opportunities for further improvement with the help of the following indicators:

Pollutant Type	2019-20	2020-21	2021-22	2022-23	2023-24
PM Emissions from stack (MT)	1.027	1.097	963	1.048	1.261
SO Emission (MT)	23.069	19.600	22.006	17.247	25.199
NO, Emission (MT)	8,913	8,098	6,145	4,851	7, 033

We report on our performance against indicators and goals related to Air quality Management on an annual basis in our Sustainability Report.

INITIATIVES

Across the business, we continue to pursue improvements to air quality management, focusing on emissions of particulate matter, SO2, NOX etc emitted by our operational activities including mining, materials handling, processing, and transportation. Over the years, we have implemented several engineering controls across our sites to reduce dust exposure to our employees and contractors, as well as the risk of dust emissions from our operations. For instance, chiller units (60 m3/s) at surface for intake air were installed at Sindesar Khurd Mine, provide cooled air at working face in mine's deepest areas. This helped improve the ambient working conditions in summers, resulting in enhanced productivity and efficiency. We have also installed and commissioned continuous ambient air quality monitoring system at all units to help establish and improve over baseline ambient air quality. In FY 2023-24, we successfully initiated the placement of Hygiene & DCV Bag filter in smelters and Adoption of Tail Gas Treatment Plant for effective dust collection.



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