Responsible Tailings Management

RESPONSIBLE TAILINGS MANAGEMENT

PURPOSE OF THE DOCUMENT

This document sets out HZL's approach to the governance of tailings storage facilities (TSFs) to minimize the risk of catastrophic failure of tailings facilities. Tailings are a common mineral waste of the mining process which are generated during the process of separating out the valuable mineral from mined ore. Responsible tailings management constitutes one of the material risks of mining industry, owing to its multidisciplinary and complex nature. In case of failures of any kind, the consequences would be catastrophic to human life as well as the environment.

With climate change resulting in increasing number of extreme weather conditions and changes in average rainfall, the risk of tailings facility failure is more if not constructed, operated, and maintained to meet the best global practices. In this context, the Global Industry Standard on Tailings Management (GISTM) jointly released by International Council on Mining and Metals (ICMM), United Nations Environment Program (UNEP) and Principles for Responsible Investment (PRI) in August 2020, is a significant development in the international mining sector. This document provides guidance on managing tailings storage facilities (TSFs) throughout its life including design, operation, closure, and post-closure.

At HZL, we are committed to compliance with GISTM and to managing our TSFs in a safe and environmentally responsible way, without compromising on the health and well-being of our employees as well as communities.

IMPACT

A tailings incident has the potential to have a devastating impact on communities and the surrounding environment, not to mention the significant impact upon the companies that have them. Tailing management plans are an essential prerequisite for sound storage practice, as most failures of tailing storages around the world result from inadequate management of the storages. Effective implementation of a management plan not only results in a safer tailing storage facility (TSF) but will frequently reduce overall costs associated with operation and closure of the facility. The main focus of management of tailings facilities is to prevent potential failures. HZL currently manages 4 tailings facilities and 3 are in active use. Each facility likely requires careful monitoring and maintenance to manage risks and ensure they operate within safety guidelines.

HZL has set up Dry Tailing Plants at Zawar and Dariba, which is based on separating water from tailings slurry generated in the beneficiation process. Company repurposes tailings materials and waste rock as backfill to stabilize our underground mining operations, while the remaining tailings are then placed in a specially designed tailings storage to minimize the environmental, social, and economic risks. Key benefits of dry tailing technology include recirculation of more than 80% of the process water present in tailings, a faster rehabilitation and restoration of storage site at mine closure and ensuring re-availability of water for further use and Reduced Risk of Tailings Dam Flow Failures.

Hindustan Zinc is in the process of implementing global leading practices in tailing dam management, and we are associating with renowned global experts to provide long-term monitoring and advice on the design, construction, and operation of our three tailing storage facilities. Overall good construction quality, along with upgradation of tailing slurry transport and discharge lines through installation of piezometers (and inclinometer) with automated data collection and web-based monitoring, are indeed indicative of a world-class approach to tailings management. The GISTM requires ITRBs to be in-place for TSFs with consequence classifications of 'Extreme' or 'Very High', In FY25,WE appointment Engineer of Record (EOR) and the Independent Technical Review Board (ITRB) for all TSF.

Further, the pH and ABA (Acid Base Accounting) of the dams is regularly monitored to check for Acid Drainage. To prevent contamination of surface water and soil erosion, garland drains are constructed around the waste dump to collect the run-off water from the dump so that it may be utilized after proper treatment.

OUR JOURNEY

August 2020
GISTM launched based on 6 topic,15 principle and 77 auditable requirements

September 2021
1st GISTM Assessment by external expert based on Desktop Assessment

May 2023
2nd GISTM assessment by external expert based on Site visit

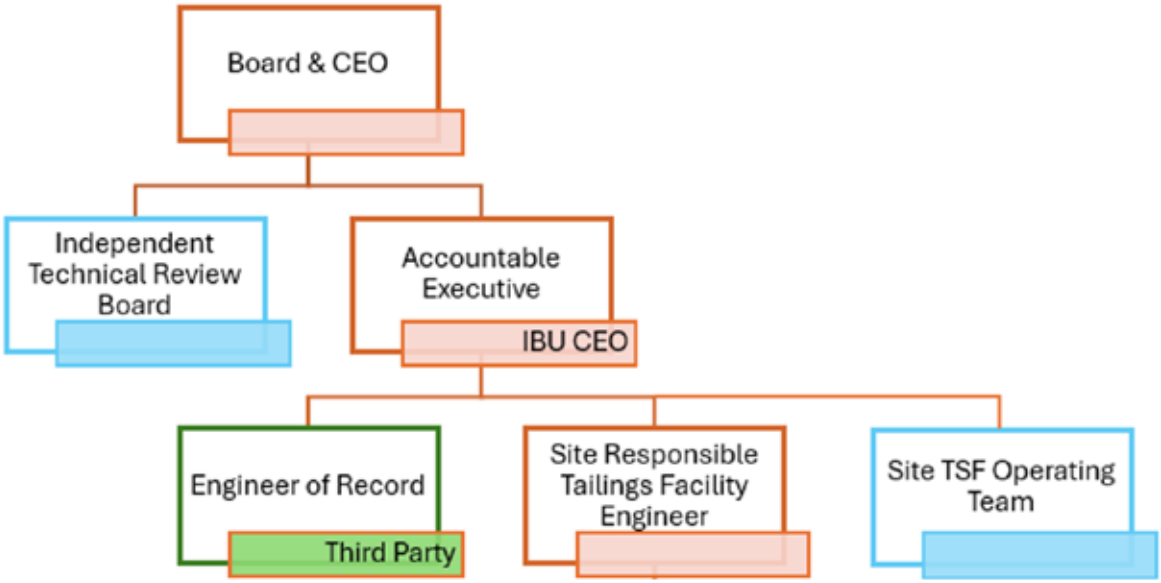
May 2023
40% compliance with GISTM

Jun-2025
Action plan in place to close gaps

GOVERNANCE

Our approach to TSF management is supported by strong governance and effective risk management. We have implemented a comprehensive TSF Framework, with clear governance, accountabilities, systems, training, auditing, and reporting. Defined roles are mandated across all operated assets: Site TSF Operating Team, Responsible Tailings Facility Engineer and Engineer of Record. These roles manage the day-to-day operations and safety at site and communicate regularly to the relevant Accountable Executive (AE).

The AE reports of the Chief Executive Officer and are held accountable through scheduled monthly Tailings Community of Practice (CoP) meetings.



The Tailings Community of Practice has been established at corporate level and Tailing Storage facility committee at all the three mining sites which is comprising representatives of various functions. By strengthening our governance model and clarifying the chain of accountability, the Tailings CoP is responsible for:

- Implementation of best practices and Compliance to Global Industry Standards on Tailing Management by 2025.
- Third Party Assurance on Tailing management.
- Driving CAPA and improving management of Tailing storage facilities.
- Mitigating harm from short- and long-term risks on Tailing management and to minimize the risk of catastrophic failure
- Ensure Compliance

STRATEGY & APPROACH

Our strategy on responsible tailings management broadly includes the following aspects from both technical and governance perspectives:

- Tailing Management Policy & Tailing Management Plan
- Tailing Storage Design
- Risk Assessment & Management
- Surveillance of Tailing Dams
- Emergency Planning and Response
- Incorporating Best Practices

POLICY & STANDARD

HZL has established a Tailings Management Facility Standard (TMFS) to assess and manage the impacts of Tailings Storage Facilities (TSFs) on human health and ecosystems, applying uniformly across all mining practices and Environment and CSR staff are active participants in the monthly TSF Committee meetings.

Our robust TMF Policy and Standard and are updated every two years or as needed as benchmarking, new guidelines and legal compliances. This has been developed based

on ICMM guidelines as well as HZL's Tailing Management Facility (TMF) Standard.

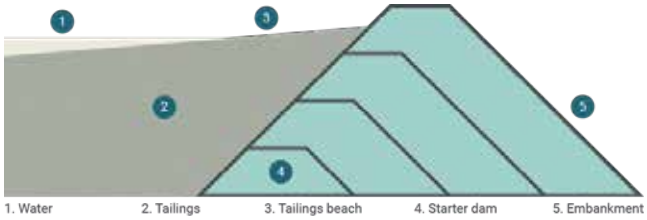
Key Elements of the Framework

- Design and Maintenance
- Risk Assessment and Management
- Monitoring and Surveillance
- Emergency Preparedness and Response planning
- Regulatory Compliance and Standards

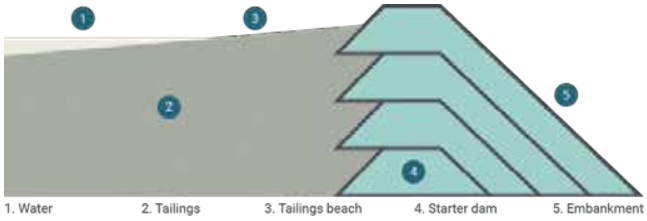
DESIGN AND MAINTENANCE

We recognize the uniqueness of our mining locations and accordingly consider factors such as local topography and climate, the geotechnical, geological, and seismic activity, its proximity to people and infrastructure, land rehabilitation, and future land use while designing our storage facilities.

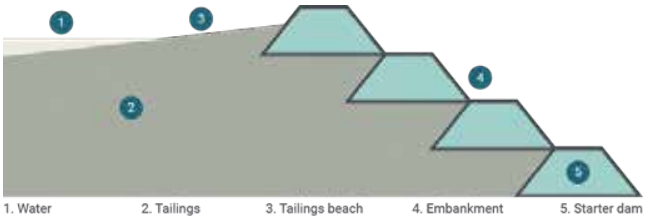
Downstream design continues the construction of the embankment wall on the external side of the compound with the batter extending on to what we call natural surface (or land that previously has not been disturbed), by depositing more support rock and bunding against the previously built tailings wall, thereby expanding the footprint, width and height of the initial embankment wall.



Center line design involves the continuation of the embankment construction on the external side of the compound however, does rely on the deposited tailings adjacent to the top of the initial embankment wall to support the raises.



Upstream design allows the embankment wall to be constructed on the inner side of the compound and relies on the strength of the deposited tailings to support the structural material for each lift of the embankment. This method allows for smaller quantities of earth and rock fill to be built on top of the tailings and therefore does not expand the footprint of the facility. Based on the above said factors, we choose the best method from among the three main tailings construction methods, i.e., downstream, centreline, and upstream design.



HZL has established comprehensive planning and design criteria for its tailings facilities to minimize risks across all phases of the facility lifecycle. As part of its commitment to enhanced safety and environmental stewardship, HZL is transitioning from a wet to a dry stacking tailings system. This shift was guided by thorough engineering assessments to ensure safe operations, reduce geochemical risks, and minimize potential impacts on people and the environment. Additionally, this approach helps to significantly reduce the volume of tailings and water stored in external tailings facilities.

A robust maintenance program has been implemented to proactively address wear and tear on tailings dam infrastructure, including measures such as timely identification and remediation of seepage. To further ensure structural integrity, HZL conducts regular stability analyses of its tailings storage facilities.

RISK ASSESSMENT AND MANAGEMENT

The assessment and management of risk is essential to the effective operation of TSFs across their entire lifecycle. HZL carried out Regular and periodic risk assessments to identify potential hazards and impacts related to tailings dams. This includes evaluating the structural integrity of the dam, the potential for tailings leakage, and the effects on surrounding ecosystems.

Safety Reviews , Risk Assessments, failure Modes Analysis and Dam Break assessment carried by external expert - Golder Associates in 2019 to address all potential failure modes of the structure, its foundation, abutments, reservoir (tailings deposit and pond), reservoir rim and appurtenant structures to minimize risk to ALARP(as low as reasonably practicable) using a methodology that considers credible failure modes, site conditions, and the properties of the slurry. Risk assessments must be used to inform the design.

The DSRs are required to be carried out by an external expert who assesses and evaluates the safety of a dam or system of dams against Credible Failure Modes and defines an action plan to address any findings.

Dam Safety Review (DSR) has been conducted for all Tailings Storage Facilities (TSFs) during the financial year 2024–25. This review was carried out by an external independent expert, in alignment with industry best practices and regulatory requirements.

Every year, an internal expert conducted an evaluation of internal risks for the whole TSF. The risk assessment

included the following categories: Risks, Hazards Mitigation Plan, Responsibility, Status and Target Date.

The Independent Technical Review Board (ITRB) is an essential component in the management of tailings facilities, particularly under frameworks like the Global Industry Standard on Tailings Management (GISTM)

An ITRB is a committee or group or third party responsible for reviewing the technical aspects of tailings dam projects, including design, construction, and monitoring practices. This board would ensure that best practices and regulatory requirements are followed.

Systematic Reviews

	Internal/ External	Frequency	Previous Review
ITRB	External	Continuous	FY 2025-26
EOR	External	Continuous	Started from jun-25
Dam Safety Review (DSR)	External	Every 5 years	FY 2025-26
Annual Dam Safety Inspection	EOR	Annual	FY 25-26
Dam Break assessment	External	As required or every 5 years	FY 2019-20
Annual Performance Review	Internal	Annual	FY 24-25
OMS manual review	Internal	Annual	FY 24-25
Emergency Response Plan (ERP) Review	Internal/External	Annual or post-incident	FY 24-25
Satellite Monitoring (InSAR)	External	continuous	Agreement for TSF monitoring

MONITORING AND SURVEILLANCE

Environmental Monitoring

Regular environmental monitoring is conducted around the TSFs, covering parameters such as groundwater quality, seepage, dust control, surface water quality, and air quality. This monitoring helps detect deviations from established standards and enables timely corrective actions to mitigate potential impacts.

Surveillance and Inspection

Surveillance involves inspection and monitoring of the operation, structural integrity, and safety of a facility. It consists of both qualitative and quantitative comparison of actual to expected behaviour. Regular review of surveillance information can provide an early indication of performance trends that, although within specification, warrant further evaluation or action.

Visual Monitoring and Inspection

- Weekly/Monthly and annual monitoring of the impoundment, dam safety instrumentation monitoring, and environmental monitoring by TSF committee
- Geotech Monitoring on Tailing Dam
- Pillar-prism-total station data for measurement of Slope displacement
- Piezometer for measurement of pore water pressure
- Inclinometer for measurement of Sub-surface deformation which are are connected to a web-based platform that triggers alerts when water levels or deformation indicators exceed safe thresholds. This system supports the development of a response escalation plan based on real-time data.
- Cameras are placed for security purpose monitoring

WATER MANAGEMENT

HZL has developed and maintains a dynamic water balance model and associated water management plans for its TSFs. These plans consider a wide range of factors including climate change, hydrological and hydrogeological conditions, mine planning, and operational requirements. The objective is to ensure the integrity of the TSFs throughout their lifecycle and to prevent unintentional releases.

Satellite monitoring

We have engaged a service provider to deploy high-resolution satellite monitoring using Interferometric Synthetic Aperture Radar (InSAR) across all Tailings Storage Facilities (TSFs). This monitoring captures surface movement data every 12 days, which aligns with the current industry standard for this type of data collection.

The data is available via a cloud-based platform, ensuring its continuous availability for review and analysis, as well as supporting our operations in making decisions particularly in response to any anomalous movements.

The platform also enables oversight by both internal teams and external assurance providers, enhancing transparency and governance

EMERGENCY PLANNING & RESPONSE

Emergency Preparedness and Response Plan which is linked with trigger action response plan(TARPs) is available at all the three mines and is enabling us to identify emergency and hazardous conditions threatening the TSF, expedite effective response actions to prevent failure, and reduce loss of life and property damage. These systems, which demonstrate leadership and commitment to responsible tailings management practices, were developed through consultation with communities. We continually review our facilities and procedures and are committed to maintaining the highest standard of safety at our operations. See Our Performance Standard on Emergency Planning and Preparedness for further information.

Mock Drills and Training: Regular drills and training exercises are conducted every 6 months to ensure readiness for emergency situations. This involves practicing response scenarios and updating plans based on lessons learned. A record of all such drills shall be maintained. The lapses in the mock drill shall be circulated so that all short coming can be improved and help in designing a better system. All the rescue and fire-fighting teams must be properly trained to carry out their duties in an Emergency.

Key features of Emergency Planning and Response are as follows:

- Identify emergency and hazardous conditions threatening the TSF
- Assessing, mapping, and mitigating the potential impacts from a hypothetical failure scenario
- Training and awareness to operations personnel in responding to emergency conditions
- Testing of effectiveness through validation/Mock drills
- Process of reporting on TSFs' failures

The ERCP planned to be revised based upon again completion of the dam break assessment in FY 25-26 to align with the requirement of GISTM as well as regulatory authorities.

Stakeholder Engagement

HZL is committed to fostering long-term, constructive relationships with its stakeholders through culturally appropriate and context-specific engagement mechanisms. These mechanisms facilitate open dialogue, information sharing, and feedback collection throughout the lifecycle of industrial assets, including TSFs.

Local engagement initiatives aim to build community awareness of TSF management practices and, where appropriate, involve stakeholders in decision-making processes that may impact public safety. In line with HZL's Social Performance Policy, each site maintains a local-level complaints and grievance mechanism, enabling stakeholders to raise concerns, which are then addressed in a timely and consultative manner.

Tailing Dam Management

- All the Company's tailings facilities are designed and constructed to the highest engineering standards and Indian regulations.
- External and internal inspection and monitoring of the TSFs to review the integrity/stability of our TSF structures and their associated management practices
- Effectiveness of reclaim water system
- Collection and recycling of supernatant water
- Conducting periodic TSF risk assessments and developing mitigation plans to minimise associated risks
- Surveillance of tailings storage facility
- Effectiveness of emergency planning and response
- Utilization of tailings in backfilling
- Replacement of wet tailing disposal system with dry tailing disposal
- Dam break analysis and Emergency preparedness
- Company introduced a satellite based Interferometric Synthetic Aperture Radar (InSAR) monitoring technique to provide early warning of surface ground movements
- Framework for closure & post-closure activities as per HZL's Tailing Management Facility (TMF) Standard.

TECHNOLOGY INTERVENTION

HZL is committed to integrating new and innovative technologies as part of our overall tailings management process. We make use of established and emerging dewatering approaches for applicable locations, as well as enhanced surveillance to add to our already extensive monitoring and response program across all of our facilities.

By leveraging modern technology and maintaining high construction standards, HZL can effectively manage risks and ensure the safety and sustainability of their tailings facilities.

INCORPORATING BEST PRACTICES

The following are few best practices developed and incorporated at our three TSFs with an objective of continuously improving our tailings management:

- Clear policy on tailings management, and strong management commitment for safe and responsible
- Management of Tailings Storage Facility (TSF)
- TSF Committee – in-house experts to strengthen compliance to Vedanta TMF standard
- Reputable engineering and design firms selected for the design of these facilities
- Periodic TSF risk assessment conducted, and mitigation plan developed to minimize associated risks
- Tailings utilization in back filling through Paste fill/ Hydro fill. At SKM, we have commissioned +100 metres incline hole (+75 metres vertical) for backfilling the SK area to employ more tailings in the mine instead of sending the same to the tailing dam. This cost effective and environment-positive initiative is a milestone in the mine's sustainable growth journey.
- Replacement of wet tailings disposal system with dry tailings disposal
- Supernatant water collected and recycled in process
- Garland Drains around tailings dam, Zero Liquid Discharge maintained from tailings dam
- HZL introduced a satellite-based Interferometric Synthetic Aperture Radar (InSAR) monitoring technique to provide early warning of surface ground movements

HZL'S ACTIVE TSFS

Rampura Agucha Mine

Rajpura Dariba Mine

Zawar Mine

High Risk Potential Tailing Sites

Waste	Source of Generation	Disposal/Management Practice	% of waste recycled/reused
Waste Rock	Mining	Utilised in mine backfilling and tailing dam height raising/embankment, the remaining is safely disposed of in a dedicated overburden dump yard as per mine plan	17.44%
Tailing	Ore beneficiation process	Utilised in mine backfilling through Hydro fill or Paste fill technology, while the remaining is safely disposed of in Tailings Storage Facilities (TSF)	32.54%

TAILING DAM INVENTORY

Dariba

Facility Description

SL.NO	DESCRIPTION	DARIBA
1	Tailing facility Name	HZL - RDM complex RDC Tailing dam
	Consequence classification	(Extreme)
2	Location (Latitude / longitude coordinates)	24°57'58.7"N 74°08'51.0"E
3	Ownerships (Owned and operated, subsidiary, JV)	Operated 65% owned
4	Status (Active, Inactive)	Active
5	Date of initial operation	1982

SL.NO	DESCRIPTION	DARIBA
6	Is the dam currently operated or closed as per approved dam design	Yes
7	Raising method (Upstream, centre line, modified centre line, downstream, landform etc.	Phase 1 to Phase 9 – Downstream and partially U/S in most of the phase
8	Current maximum height (m	32m
9	Current Tailing Storage impoundment volume (Million m3)	20 million m3
10	Planned Tailing Storage impoundment volume (Million m3) in 5 years (January 2024)	12.9 million m3
11	Most recent independent expert review	Dec-22
12	Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/ or closure	Yes
13	What is your hazard categorization of this facility, based on the consequence of failure	Category A
14	What guideline do you follow for the classification system	ICOLD
15	Has this facility, at any point in its history, failed to be confirmed or certified as stable, or experienced notable stability concerns, as identified by an independent engineer (even if later certified as stable by the same or different firm)	No
16	Do you have internal / in house engineering specialist oversight of this facility? Or you have external engineering support for this purpose?	External and internal
17	Has formal analysis of the downstream impact on communities, ecosystem and critical instruction in the event of catastrophic failure been undertaken and to reflect final conditions? If so, when did this assessment take place?	Yes, 2018
18	Is there (a) a closure plan in place for this dam (b) does it include long term monitoring	Yes
19	Have you, or do you plan to, assess your tailings facilities against the impact of more regular extreme weather events as a result of climate change, e.g. over the next two years?	Yes
20	Any other relevant information and supporting documentation	Tailings volume reduced through consumption in underground mine paste fil

RAMPURA AGUCHA

Facility Description

SL.NO	DESCRIPTION	RAMPURA AGUCHA
1	Tailing facility Name	RA Mines Tailing dam
	Consequence classification	Extreme
2	Location (Latitude / longitude coordinates)	25°50'53.5"N 74°44'25.7"E
3	Ownerships (Owned and operated, subsidiary, JV)	Owned & Operated
4	Status (Active, Inactive)	Active
5	Date of initial operation	1991
6	Is the dam currently operated or closed as per approved dam design	Yes
7	Raising method (Upstream, centre line, modified centre line, downstream, landform etc.	Phase 1 to Phase 9 – Downstream, Phase 8 – Partly Upstream (600m)
8	Current maximum height (m	60m
9	Current Tailing Storage impoundment volume (Million m3)	60.68 million m3
10	Planned Tailing Storage impoundment volume (Million m3) in 5 years (January 2024)	10.8
11	Most recent independent expert review	Jan-25
12	Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/ or closure	Yes
13	What is your hazard categorization of this facility, based on the consequence of failure	Category A (EXTREME)
14	What guideline do you follow for the classification system	ICOLD
15	Has this facility, at any point in its history, failed to be confirmed or certified as stable, or experienced notable stability concerns, as identified by an independent engineer (even if later certified as stable by the same or different firm)	No
16	Do you have internal / in house engineering specialist oversight of this facility? Or you have external engineering support for this purpose?	External (IIT, IISC, GeoTheta)
17	Has formal analysis of the downstream impact on communities, ecosystem and critical instruction in the event of catastrophic failure been undertaken and to reflect final conditions? If so, when did this assessment take place?	Yes, 2017
18	Is there (a) a closure plan in place for this dam (b) does it include long term monitoring	Yes
19	Have you, or do you plan to, assess your tailings facilities against the impact of more regular extreme weather events as a result of climate change, e.g. over the next two years?	Yes
20	Any other relevant information and supporting documentation	Tailings volume reduced through consumption in underground mine paste fill

ZAWAR MINES

Facility Description

SL.NO	DESCRIPTION	ZAWAR
1	Tailing facility Name	Zawar Tailing storage facility
	Consequence classification	Extreme
2	Location (Latitude / longitude coordinates)	24˚20'32.34" N 73˚42'45.58" E
3	Ownerships (Owned and operated, subsidiary, JV)	Operated 65% owned
4	Status (Active, Inactive)	Active
5	Date of initial operation	1982
6	Is the dam currently operated or closed as per approved dam design	Yes. Dry stack method in process
7	Raising method (Upstream, centre line, modified centre line, downstream, landform etc.	TSF-2: Phase 1 to 5 with Downstream and phase 6 to 8 with Upstream followed by Dry stacking. TSF-1and 2: Dry stacking
8	Current maximum height (m	TSF-1- Dry stacking from 383 mRL to 423 mRL TSF-2- 60 m through wet disposal mode followed by 40m dry stacking (434 mRL to 474 mRL
9	Current Tailing Storage impoundment volume (Million m3)	TSF-2: 28.38 TSF-1: 7.47
10	Planned Tailing Storage impoundment volume (Million m3) in 5 years	10.76 Million m3 (FY25 to FY30)
11	Most recent independent expert review	Jan-25
12	Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/ or closure	Yes
13	What is your hazard categorization of this facility, based on the consequence of failure	Extreme
14	What guideline do you follow for the classification system	Canadian Dam Association
15	Has this facility, at any point in its history, failed to be confirmed or certified as stable, or experienced notable stability concerns, as identified by an independent engineer (even if later certified as stable by the same or different firm)	No
16	Do you have internal / in house engineering specialist oversight of this facility? Or you have external engineering support for this purpose?	Internal/External
17	Has formal analysis of the downstream impact on communities, ecosystem and critical instruction in the event of catastrophic failure been undertaken and to reflect final conditions? If so, when did this assessment take place?	Yes, 2019
18	Is there (a) a closure plan in place for this dam (b) does it include long term monitoring	Yes(Conceptual)
19	Have you, or do you plan to, assess your tailings facilities against the impact of more regular extreme weather events as a result of climate change, e.g. over the next two years?	Yes
20	Any other relevant information and supporting documentation	Presently dry stack is being done for tailing storage. Also, started backfilling in mines through hydro fill and paste fill plant

DEBARI

Facility Description

SL.NO	DESCRIPTION	DEBARI
1	Tailing facility Name	Jarosite Pond III
2	Location (Latitude / longitude coordinates)	24°35'40.9"N 73°49'24.1"E
3	Ownerships (Owned and operated, subsidiary, JV)	Operated 65% owned
4	Status (Active, Inactive)	Inactive
5	Date of initial operation	2002
6	Is the dam currently operated or closed as per approved dam design	Disposal Stopped Since Jul 2019. Yet to be closed as per approved design
7	Raising method (Upstream, centre line, modified centre line, downstream, landform etc.	Upstream & Downstream
8	Current maximum height (m	17m
9	Current Tailing Storage impoundment volume (Million m3)	No storage allowed; capping is planned(Capex Mancom asked to explore for emptying the Jarosite Pond instead of capping)
10	Planned Tailing Storage impoundment volume (Million m3) in 5 years (January 2024)	0
11	Most recent independent expert review	44440
12	Do you have full and complete relevant engineering records including design, construction, operation, maintenance, and/ or closure	Yes
13	What is your hazard categorization of this facility, based on the consequence of failure	Yet to be classified
14	What guideline do you follow for the classification system	HW rules 2016
15	Has this facility, at any point in its history, failed to be confirmed or certified as stable, or experienced notable stability concerns, as identified by an independent engineer (even if later certified as stable by the same or different firm)	No
16	Do you have internal / in house engineering specialist oversight of this facility? Or you have external engineering support for this purpose?	External
17	Has formal analysis of the downstream impact on communities, ecosystem and critical instruction in the event of catastrophic failure been undertaken and to reflect final conditions? If so, when did this assessment take place?	No
18	Is there (a) a closure plan in place for this dam (b) does it include long term monitoring	Yes
19	Have you, or do you plan to, assess your tailings facilities against the impact of more regular extreme weather events as a result of climate change, e.g. over the next two years?	Yes
20	Any other relevant information and supporting documentation	Disposal Stopped since July 2019. External inspection carried out and capping is planned