ज़ावर माइन्स
पिन कोड - 313901
जिला - उदयपुर (राज.)

HINDUSTAN ZINC LIMITED
हिन्दुस्तान जिंक लिमिटेड

Telephone - (0294) 2723400

Zawar Mines
PIN Code – 313901
Dist-Udaipur (Raj.)

HZL/ZM/ENV/2025 1180

Date: 22.05.2025

The Deputy Director (S), Scientist - C,
Ministry of Environment, Forest & Climate Change
Integrated Regional Office,
A- 209 & 218, Aranya Bhawan, Jhalana Institutional Area
Jaipur (Rajasthan) - 302004

Sub: – Six monthly Environment Compliance report for Zawar Group of Mines near Village-Zawar, Dist. Udaipur, Rajasthan of M/S Hindustan Zinc Limited

Ref: - Environment Clearance Letter No. – J-11015/259/2012-IA.II (M), dated 05.01.2017 & J-11015/259/2012-IA-II(M), dated 16.10.2020

Sir,

With reference to aforesaid subject and cited reference, please find enclosed six-monthly compliance report for the conditions stipulated in the Environment Clearances of Zawar Group of Mines near Village-Zawar, Dist. Udaipur, Rajasthan of M/S Hindustan Zinc Limited for the period from October' 2024 to March' 2025 along with monitoring data report for your kind consideration.'

We trust that the measures taken towards environmental safeguards comply with the stipulated environmental conditions. We look forward to your further guidance which shall certainly help us in our endeavour for further improve upon our Environmental Management Practices.

Thanking You,

For Hindustan Zinc Limited

Yours faithfully,

(Anshul Kumar Khandelwal)
CEO- IBU Zawar
Hindustan Zinc Ltd

CEO-IBU Zawar
Hindustan Zinc Limited
Zawar Mines
District-Udaipur (Raj.)
PIN-313901

CC:

- Incharge (Zonal Office)
  Central Pollution Control Board,
  3rd Floor, Sahkar Bhawan, North T.T. Nagar, Bhopal – 462003
- Member Secretary,
  Rajasthan State Pollution Control Board,
  4, Institutional Area, Jhalana Doongri, Jaipur 302004 (Raj)
- Regional Officer,
  Rajasthan State Pollution Control Board,
  F-470, Near UCCI Building, Madri Industrial Area, Udaipur-313003 (Raj)
- Office Copy Env Cell

Environment Clearance Letter No. – J-11015/259/2012-IA.II (M), dated 05.01.2017		
S.No.	**SPECIFIC CONDITIONS**	**COMPLIANCE STATUS**
1	Environmental clearance is granted subject to final outcome of Hon'ble Supreme Court of India, Hon'ble High Court of Rajasthan and any other Court of Law, if any, as may be applicable to this project.	• The directions of the Hon'ble courts shall be adhered to.
2	This Environmental Clearance is subject to obtaining requisite NBWL Clearance from the Standing Committee of National Board for Wildlife, if any, applicable for this Mining project	• Not applicable, as the Jaisamand Wildlife Sanctuary and other protected areas are not falling within the 10 km of aerial distance of mine lease area. Letter certifying the same by DCF-Wildlife is attached as **Annexure-1** • Further, Zawar mine lease boundary is outside the eco sensitive zone of Jaisamand wildlife and sanctuary
3	No mining activities will be allowed in forest area, if any, for which the Forest Clearance is not available.	• We have obtained Forest Diversion/ Clearance for carrying out Mining activities (total forest land: 1537.91 ha which includes diversion of 114.94 ha for surface rights and diversion of 1422.97 ha underground mining). Recent renewal of Forest diversion/ clearance was obtained vide letter no: F.No.8-1/1997-FC dated 23.01.2015
4	The project proponent shall obtain Consent to Operate from the State Pollution Control Board, Rajasthan and effectively implement all the conditions stipulated therein.	• Consent to operate have been obtained from the Rajasthan State Pollution Control Board (RSPCB) vide letter no. • **CTO for Mines:** F(Mines)/Udaipur(Sarada)/53(1)/2016-2017/5003-5007 dated 20/12/2022 valid up to 31.12.2027 • **CTO for Beneficiation Plant:** F(HDF)/Udaipur (Sarada)/1(1)/2020-2021/5368-5370 dated 28/12/2022 valid up to 31.12.2027 • The conditions stipulated therein are being implemented and complied.

5	The Proponent should install online Ambient Air Quality Monitoring System and there should be system for display of digital AAQ data within 03 months at least at three locations as per wind direction. Online provisions of pH and turbidity meters at discharge points of STP and ETP and also at water storage ponds in the mining area may be made. Project Proponent should display the result digitally in front of the main Gate of the mine site	• CAAQMS have been installed at 3 locations as per wind direction with digital display of data in front of the main gate of the mine site. Also provided pH and turbidity meters.  **DIGITAL DISPLAY**  **CAAQM STATION**  **PH & TURBIDITY METERS** • We are maintaining zero discharge from our operations.
6	The Project Proponent has to take care of gullies formed on slopes. Dump mass should be consolidated with proper filling/leveling with the help of dozer/compactors. The report on slope and stability monitoring should be sent to MoEF&CC and its Regional office every six-months.	• We are carrying out mining activities through underground mining method. Waste rock generated is backfilled into underground voids. Part of the waste rock are used for stabilizing slopes of tailing storage facilities. • Presently, there is no storage of waste rock on surface. All initial waste dumps have already been vegetated & rehabilitated.

		 **WASTE DUMP REHABILITATED AND TURNED INTO ROCK GARDEN**
7	The reclamation at waste dump sites shall be ecologically sustainable. Scientific reclamation has been followed. The local species may be encouraged and species are so chosen that the slope, bottom of the dumps and top of the dumps are able to sustain these species. The aspect of the dump is also a factor which regulates some climatic parameters and allows only species adopted to that micro climate. This may be recommended to be studied by hiring Expert Ecology Group.	• We are carrying out mining activities through underground mining method. Waste rock generated is backfilled into underground voids. Part of the waste rock are used for stabilizing slopes of tailing storage facilities. • Presently, there is no storage of waste rock on surface. All initial waste dumps have already been vegetated & rehabilitated.
8	There is need for regular monitoring of invertebrates and aquatic life of water bodies including the reservoir located close to the mining lease to establish that fish and other animals including the water is not contaminated with heavy metal. There could be a research on "bio accumulation of heavy metals in invertebrates" to completely establish that there is no impact of mining.	• We are regularly carrying out monitoring and studying invertebrates and aquatic life of water bodies. Study conducted by M/s JM Environet Pvt Ltd indicated that there is no adverse impact of mining operation. Copy of study enclosed herewith as **Annexure-9**
9	A specialized Institution may be hired to carry out ecological survey on the plant species to evaluate their growth in terms of stunted, deformed and seed viability. The sensitive species and indicator species to heavy metal pollution may be screened out and plantation accordingly designed. Similarly, uptake of Zinc, Cadmium and lead etc. by crops and vegetables grown in the crop lands around the mining lease may be studied. Bottom sediment analysis of ponds, wells and Rivers to ascertain the level of accumulation of heavy metal may be done.	• We are regularly carrying out the ecological survey of plant species and plantation is carrying out regularly in and around our operation. Study conducted by M/s JM Environet Pvt Ltd indicated that there is no adverse impact of mining operation.
10	The Proponent shall conduct an Occupational health study with respect to the pressure impact on ear drums as person goes	• We conducted Occupational Health study with respect to the pressure impact on Ear drum in the underground working through M/s Sure Safety and no impact was found.

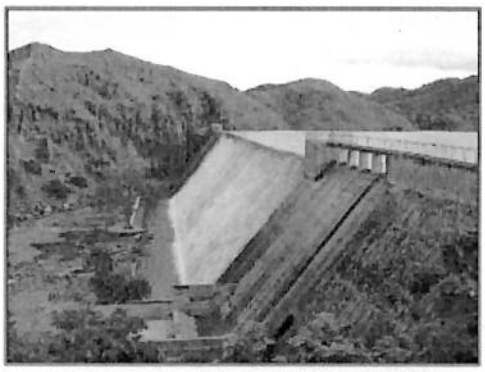
	underground and implement the recommendations.	
11	Project Proponent shall carry out vibration studies well before approaching any such habitats or other buildings to evaluate the zone of influence and impact of blasting on the neighborhood. Within 500 meters of such sites vulnerable to blasting vibrations, avoidance of use of explosives and adoption of alternative means of mineral extraction. A provision for monitoring of each blast should be made so that the impact of blasting on nearby habitation and dwelling units could be ascertained. The covenant of lease deed under Rule 31 of MCR 1960 provides that no mining operations shall be carried out within 50 meters of public works such as public roads and buildings or inhabited sites except with the prior permission from the Competent Authority.	• Blast Vibration monitoring is being done regularly by inhouse team. CIMFR has been engaged for blast vibration monitoring and other controlling measures. • Controlled blasting with major use of electronic detonator
12	Main haulage road in the mine should be provided with permanent water sprinklers and other roads should be regularly wetted with water tankers fitted with sprinklers. The material transfer points should invariably be provided with Bag filters and or dry fogging system. Belt-conveyors should be fully covered to avoid air borne dust; Use of effective sprinkler system to suppress fugitive dust on haul roads and other transport roads shall be ensured.	• Water sprinkling is done on haul road in mines on regular basis to arrest fugitive dust if any. • Water sprinklers have been provided at transfer points. • Covered Conveyors have been provided to control fugitive emissions. • Roads at surface are black tarred/ cemented and Mechanised vacuum road sweepers have been deployed to clean roads on the surface to arrest fugitive dust generation.  **Mechanized vacuum road sweepers**
13	The monitoring of PM 2.5 in the vehicle emission shall be conducted to improve the mine environment and report submitted to the Regional Office of the MoEFCC.	• MoEF recognized laboratory are engaged for carrying out environment monitoring. Ambient PM 2.5 monitoring is done at the surface and readings are well within norms.

14	The Project Proponent reported that there are seven Schedule-I species viz. Peafowl *(Pavo cristatus)*, Osprey *(Pandion haliaetus)*, Tawny eagle *(Aquila rapax)*, Crested honey buzzard *(Pernisptilorhynchus)*, Shikra *(Accipiter badius)*, Leopard *(Pantherapardus)*, Indian pangolin *(Manis crassicaudata)* in the study area. The PP shall implement the Conservation Plan and enhance the budget for implementation of Conservation Plan for Schedule I Species and also increase the budget for plantation/green belt development. The Proponent shall implement the Wildlife Conservation Plan along with the funds so allocated with consultation of Chief Wild Life Warden of the State Govt. A copy of action plan shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office, Lucknow and the Chief Wild Life Warden of the State Govt.	• Wild life conservation plan for Schedule-1 for Zawar Mines is approved by Chief Wild Life Warden, Jaipur as per "SOP issued in May 2019". • We have deposited an amount of Rs. 3,69,00,000/- in 2022 through online transaction to the account of "Rajasthan Protected Areas, Conservator society, Udaipur". Details of online transaction done is UTR-2052671107403. Amount deposited for contribution towards conservation of wildlife and administrative cost for processing inspections, etc. • In 2021, contributed 8.8 lacs rupees to forest department towards development cum maintenance of safari park/ golden park and forest nursery. • Site has undertaken various conservation measures for conservation so far: constructed 39 check dams for soil conservation & water recharge and plantation in the lease area. Also, working areas are properly fenced/ boundary in place to avoid any interaction. • In 2023-24, an amount of Rs 100 lac deposited to forest department and plantation work carried out on 100 Ha during 2024 monsoon. • As per wildlife protection Act 2022, we have revised WLCP & submitted to Chief Wild Life Warden for approval in Jan 2025.
15	Proponent shall carry out monitoring of lead in the blood samples of the employees and the villagers in the areas surrounding the mine in their schedule of health check-up. The nearby water bodies shall be monitored every six months and report submitted to Regional office of the MoEFCC to ascertain impact due to lead contamination.	• Third party monitoring of lead in blood of employees and villagers is being done and continued. Monitoring reports indicate that lead level in blood are below the norms. Details enclosed in **Annexure 5** • Monitoring of nearby water bodies is conducted as part of post project monitoring and monitored data enclosed.
16	Implementation of Action Plan on the issues raised during the Public Hearing shall be ensured. The Project Proponent shall complete all the tasks as per the Action Plan submitted with budgetary provisions during the Public Hearing.	• We have taken appropriate actions for the issues raised during public hearing. Detailed are enclosed as **Annexure 8**.
17	Implementation of the outcome of study with regard to "optimization of blast design parameter for the safety and stability of surface structures and subsequent monitoring of vibration on the surface structures for their long term stability" which was carried out by Central Institute of Mining and Fuel Research should be ensured.	• Blast Vibration monitoring is being done regularly by inhouse team. CIMFR has been engaged for blast vibration monitoring and other controlling measures. • Controlled blasting with major use of electronic detonator
18	Continuous monitoring of radioactive elements, if any, shall be undertaken till entire mine is dewatered and report has to be submitted to MoEFCC Regional Office. Periodic monitoring of any adverse impact of Radon and its daughter products on any worker should be included in the Occupational Health Monitoring Programme.	• Analysis done for Mine dewatering and there is absence of any radioactive elements. (Monitoring report enclosed as **Annexure 6**.

Environment Clearance Letter No. – J-11015/259/2012-IA.II (M), dated 05.01.2017		
S.No.	**STANDARD CONDITIONS**	**COMPLIANCE STATUS**
1	A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment, Forest and Climate Change 5 years in advance of final mine closure for approval.	• Presently, mine is in operation stage. This point is noted for future adherence and compliance.
2	No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment, Forest and Climate Change.	• Complied. Mining is carried out as per Mine plan duly approved by IBM vide letter no. E11996-MCDR-MPC0Zn/1/2024-AJM-IBM_RO_AJM Date-04/03/2025
3	No change in the calendar plan including excavation, quantum of mineral and waste should be made.	• Calendar plan, as per approved mine plan, is being adhered to.
4	The project proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of water (surface water and ground water) for the project.	• Water is drawn from Captive Tidi Dam with permission of Water Resources department, Govt. of Rajasthan vide agreement dated 17.09.1976 and amended time to time.
5	Mining shall be carried out as per the provisions outlined in mining plan approved by Indian Bureau of Mines (IBM) as well as by abiding to the guidelines of Directorate General Mines Safety (DGMS).	• Mining is being carried out as per the Mining Plan duly approved by IBM vide letter no. E11996-MCDR-MPC0Zn/1/2024-AJM-IBM_RO_AJM Date-04/03/2025 and as per the guidelines of DGMS.
6	The lands which are not owned by Proponent, mining will be carried out only after obtaining the consents from all the concerned land owners as per the provisions of the Mineral Concession Rules, 1960 and MMDR Act, 1957.	• Noted and Complied.
7	Digital processing of the entire lease area using remote sensing technique shall be carried out regularly once in three years for monitoring land use pattern and report submitted to Ministry of Environment, Forest and Climate Change its Regional Office.	• Digital processing of the entire lease area using remote sensing technique is being carried out regularly once in three years • Last study was done in August 2024. Copy of report was submitted in previous compliance report submitted in November 2024.
8	The critical parameters as per the Notification 2009 such as PM10, PM2.5, NOx and SOx etc. in the ambient air within the impact zone, peak particle velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharged water shall also be monitored [(TDS, DO, PH and Total Suspended Solids (TSS)]. The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the Company in public domain. The circular No. J-20012/1/2006-IA.II (M) dated 27.05.2009 issued	• Monitoring is being done for ambient air quality and effluent and monitored data are enclosed herewith. • Display board has been placed near main gate. • Required details is uploaded on company website https://www.hzlindia.com/ at Sustainability section > Environment compliance > Zawar Mines

	by Ministry of Environment, Forest and Climate Change shall also be referred in this regard for its compliance.	
9	Effective safeguard measures such as regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of PM10 and PM2.5 such as haul road, loading and unloading point and transfer points. Fugitive dust emissions from all the sources shall be controlled regularly. It shall be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard. Monitoring of Ambient Air Quality to be carried out based on the Notification 2009, as amended from time to time by the Central Pollution Control Board	• Water sprinkling is carried out at loading, unloading and transfer points. • Closed Conveyors are provided to control fugitive emissions. • Regular water sprinkling is done at haul roads underground. • Roads are regularly cleaned via mechanized vaccum sweeper to control fugitive dust. • Ambient Air Monitoring is being carried out fortnightly at 8 stations and are within limits. • Detailed reports are enclosed as **Annexure - 2.**
10	Regular monitoring of ground water level and quality shall be carried out in and around the mine lease by establishing a network of existing wells and constructing new piezometers during the mining operation. The project proponent shall ensure that no natural water course and/or water resources shall be obstructed due to any mining operations. The monitoring shall be carried out four times in a year pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January) and the data thus collected may be sent regularly to Ministry of Environment, Forest and Climate Change and its Regional Office, Central Ground Water Authority and Regional Director, Central Ground Water Board.	• Ground water level and quality is being monthly monitored through network of piezometers & wells in and around mine area. • Monitoring reports are being submitted to MoEF, IRO, Jaipur and CPCB, Bhopal on six monthly basis as part of 6 monthly compliance of EC and to Central Ground Water Authority. • No natural water course and/or water resources have been obstructed due to any mining operations. • Detailed reports are enclosed as **Annexure-3**
11	Regular monitoring of the flow rate of the springs and perennial nallahs flowing in and around the mine lease shall be carried out and records maintain. The natural water bodies and or streams which are flowing in an around the village, should not be disturbed. The Water Table should be nurtured so as not to go down below the pre-mining period. In case of any water scarcity in the area, the Project Proponent has to provide water to the villagers for their use. A provision for regular monitoring of water table in open dug well located in village should be incorporated to ascertain the impact of mining over ground water table.	• The natural water bodies and or streams which are flowing in an around the village, are not being disturbed. There are no perennial nallah in the and around the lease. • Entire fresh water requirement is sourced from a captive surface water source i.e Tidi dam. No ground water is extracted for industrial use except for the ground water intersection due to mining. • Pre-mining ground water table is not available as modern mining is going on in the area since 1950. Ground water recharge structures are being constructed for ground water recharge. • Ground water level and quality is being regularly monitored through network of piezometers & key wells in and around mine area. • Detailed reports are enclosed as **Annexure-3**
12	Regular monitoring of water quality upstream and downstream of water	• Ground water level and quality is being regularly monitored through network of piezometers & key wells

	bodies shall be carried out and record of monitoring data should be maintained and submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office, Central Ground Water Authority, Regional Director, Central Ground Water Board, State Pollution Control Board and Central Pollution Control Board.	in and around mine area. • Monitoring reports are being submitted to MoEF, IRO, Jaipur and CPCB, Bhopal on six monthly basis as part of 6 monthly compliance of EC and to Central Ground Water Authority. • Detailed reports are enclosed as **Annexure-3**
13	Transportation of the minerals by road passing through the village shall not be allowed. A 'bypass' road should be constructed (say, leaving a gap of at least 200 meters) for the purpose of transportation of the minerals so that the impact of sound, dust and accidents could be mitigated. The project proponent shall bear the cost towards the widening and strengthening of existing public road network in case the same is proposed to be used for the Project. No road movement should be allowed on existing village road network without appropriately increasing the carrying capacity of such roads.	• Road used for transportation of ore does not pass through any village
14	The illumination and sound at night at project sites disturb the villages in respect of both human and animal population. Consequent sleeping disorders and stress may affect the health in the villages located close to mining operations. Habitations have a right for darkness and minimal noise levels at night PPS must ensure that the biological clock of the villages is not disturbed; by orienting the floodlights/ masks away from the villagers and keeping the noise levels well within the prescribed limits for day light/night hours.	• Mining being underground, there is no such impact. • Also, nearby villages are far away from the surface infrastructures in the core zone. • Noise level monitored are well within the limit.
15	Main haulage road in the mine should be provided with permanent water sprinklers and other roads should be regularly wetted with water tankers fitted with sprinklers. The material transfer points should invariably be provided with Bag filters and or dry fogging system. In case of Belt- conveyors facilities the system should be fully covered to avoid air borne dust; Use of effective sprinkler system to suppress fugitive dust on haul roads and other transport roads shall be ensured.	• Being underground mines, main haulage roads are underground. • Water sprinkling is carried out to suppress fugitive dust on haul roads • All the roads used for ore transportation are tarred/ cemented.
16	Sufficient number of Gullies to be	• There are no artificial gullies in the mine lease because

	provided for better management of water. Regular Monitoring of pH shall be included in the monitoring plan and report shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis.	of absence of surface waste dump.
17	There shall be planning, developing and implementing facility of rainwater harvesting measures on long term basis and implementation of conservation measures to augment ground water resources in the area in consultation with Central Ground Water Board.	• The captive Tidi dam with a capacity of 8.5 mcm constructed by HZL is a major rainwater harvesting measure form which the water is sourced for the project. • We have constructed 39 rainwater harvesting around all mines.  **TIDI DAM**  **Checkdam**  **Checkdam**
18	The Project Proponent has to take care of gullies formed on slopes. Dump mass should be consolidated with proper filling/leveling with the help of dozer/compactors.	• We are carrying out mining activities through underground mining method. Waste rock generated is backfilled in to underground voids. Part of the waste rock are used for stabilizing slopes of tailing storage facilities. • Presently, there is no storage of waste rock on surface.

		All initial waste dumps have already been vegetated & rehabilitated.
19	The reclamation at waste dump sites shall be ecologically sustainable. Scientific reclamation shall be followed. The local species may be encouraged and species are so chosen that the slope, bottom of the dumps and top of the dumps are able to sustain these species. The aspect of the dump is also a factor which regulates some climatic parameters and allows only species adopted to that micro climate.	• All the initial waste dumps have been reclaimed and became ecologically sustainable. • No fresh waste dumps in the mine lease.
20	The top soil, if any, shall temporarily be stored at earmarked site(s) only and it should not be kept unutilized for long. The topsoil shall be used for land reclamation and plantation. The over burden (OB) generated during the mining operations shall be stacked at earmarked dump site(s) only and it should not be kept active for a long period of time. The maximum height of the dumps shall not exceed 8m and width 20 m and overall slope of the dumps shall be maintained to 45°. The OB dumps should be scientifically vegetated with suitable native species to prevent erosion and surface run off. In critical areas, use of geo textiles shall be undertaken for stabilization of the dump. The entire excavated area shall be backfilled and afforested. Monitoring and management of rehabilitated areas should continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis.	• The project is expansion of an underground mine and beneficiation plant within existing area. Thus, no top soil is generated. • We are carrying out mining activities through underground mining method. Waste rock generated is backfilled in to underground voids. Part of the waste rock are used for stabilizing slopes of tailing storage facilities. • Presently, there is no storage of waste rock on surface. All initial waste dumps have already been vegetated & rehabilitated. • Compliance reports are submitted to MoEF, IRO Jaipur and CPCB, Bhopal on six monthly basis.
21	Catch drains and siltation ponds of appropriate size shall be constructed around the mine working, mineral and OB dumps to prevent run off of water and flow of sediments directly into the river and other water bodies. The water so collected should be utilized for watering the mine area, roads, green belt development etc. The drains shall be regularly desilted particularly after monsoon and maintained properly. The drains, settling tanks and check dams of appropriate size, gradient and	• The waste generated from the mine development work is dumped in the voids created due to stopping. Part of the waste rock is utilized for covering slope of tailing storage facility. • Being underground mine, there is no generation of overburden and hence OB dumps are there. • Drains are maintained at required places like around tailing storage facilities, inside beneficiation plants. The drains are cleaned and maintained on regular basis. • The concentrate from the beneficiation plant is accommodated in concentrate stockpile yards having covered sheds and is secured by stone masonry walls of appropriate height. • Concentrate from the stockpile yard is directly loaded into trucks mechanically/ manually for end use at

	length shall be constructed both around the mine pit and over burden dumps to prevent run off of water and flow of sediments directly into the river and other water bodies and sump capacity should be designed keeping 50% safety margin over and above peak sudden rainfall (based on 50 years data) and maximum discharge in the area adjoining the mine site. Sump capacity should also provide adequate retention period to allow proper settling of silt material. Sedimentation pits shall be constructed at the corners of the garland drains and desilted at regular intervals.	captive smelter.
22	Plantation shall be raised in a 7.5m wide green belt in the safety zone around the mining lease, backfilled and reclaimed area, around water body, along the roads etc. by planting the native species in consultation with the local DFO/Agriculture Department and as per CPCB Guidelines. The density of the trees should be around 2500 plants per ha. Greenbelt shall be developed all along the mine lease area in a phased manner and shall be completed within first five years.	• Till date, plantation has been done in 170.85 ha in including rehabilitated areas, around beneficiation plant, on matured tailing dam, roads and social a forestry. • Apart from this, we have carried out plantation in Plantation in nearby forest area through forest department in 75 ha in RDF 1 & RDF 2 during FY 2019-20 and 75 ha in RDF 1 & RDF 2 during FY 2021-22 and 100 Ha in RDF scheme in 2024 • Further, we have planted 21000 nos. of plantation in FY2024-25
23	Project Proponent shall follow the mitigation measures provided in Office Memorandum No. Z-11013/57/2014-IA.II (M), dated 29th October, 2014, titled "Impact of mining activities on Habitations-Issues related to the mining Projects wherein Habitations and villages are the part of mine lease areas or Habitations and villages are surrounded by the mine lease area", if any, applicable to the project.	• There is no adverse impact on the habitations as our mining activities are underground and suitable measures have been taken wrt environment management.
24	The Project Proponent shall make necessary alternative arrangements, where required, in consultation with the State Government to provide alternate areas for livestock grazing, if any. In this context, Project Proponent should implement the directions of the Hon'ble Supreme Court with regard to acquiring grazing land. The sparse trees on such grazing ground, which provide mid-day shelter from the scorching sun, should be scrupulously guarded against felling and plantation of	• No grazing land has been acquired as part of operations.

<table>
<tr><td></td><td>such trees should be promoted.</td><td></td></tr>
<tr><td>25</td><td>The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered fauna, if any, spotted in the study area. Action plan for conservation of flora and fauna shall be prepared and implemented in consultation with the State Forest and Wildlife Department. A copy of action plan shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office.</td><td>• Wild life conservation plan for Schedule-1 for Zawar Mines is approved by Chief Wild Life Warden, Jaipur as per "SOP issued in May 2019".
• We have deposited an amount of Rs. 3,69,00,000/- in 2022 through online transaction to the account of "Rajasthan Protected Areas, Conservator society, Udaipur". Details of online transaction done is UTR-2052671107403. Amount deposited for contribution towards conservation of wildlife and administrative cost for processing inspections, etc.
• In 2021, contributed 8.8 lacs rupees to forest department towards development cum maintenance of safari park/ golden park and forest nursery.
• Site has undertaken various conservation measures for conservation so far: constructed 39 check dams for soil conservation & water recharge and plantation in the lease area. Also, working areas are properly fenced/ boundary in place to avoid any interaction.
• In 2023-24, an amount of Rs 100 lac deposited to forest department and plantation work carried out on 100 Ha during 2024 monsoon.
• As per wildlife protection Act 2022, we have revised WLCP & submitted to Chief Wild Life Warden for approval in Jan 2025.</td></tr>
<tr><td>26</td><td>As per the Company Act, the CSR cost should be 2% of average net profit of last three years. Hence CSR expenses should be as per the Company Act/Rule for the Socio Economic Development of the neighborhood Habitats which could be planned and executed by the Project Proponent more systematically based on the Need based door to door survey by established Social Institutes/Workers. The report shall be submitted to the Ministry of Environment, Forest and Climate Change and its Regional Office on six monthly basis.</td><td>• CSR expenditure is being done for the Socio Economic Development of the neighborhood based on the Need based door to door survey by established Social Institutes/Workers.
<table>
<tr><th>Sakhi & Samadhan</th><th>Shiksha Sambal</th><th>Mobile Health Vehicle</th><th>Govt. Coaching Classes</th></tr>
<tr><td>4972 women connected though 405 SHGs, 32 VOs and 1 federation under Sakhi project. Farmer Producer Organization with 1755 shareholders were operational at since more than one</td><td>HZL is lending support in improving the board results of 1200+ students under Shiksha Sambal Project in 10 Govt Schools and as a part of which 3 camps were organized bringing together 600+ students of these Schools (Summer Camp, Diwali Learning Camp &</td><td>Medical Camps are conducted in the interior hamlets of our operational villages. So far 5 medical camps with 200+ beneficiaries were conducted.

Specific camps such as Anaemia camp for girls (70+), Cancer screening camp (150 +) and Organ Donation Camp</td><td>We have started 3 month long coaching classes for the youth of our nearby villages. This was done with the help from our implementation Partner Anushka Academy. More than 110 students attended the sessions regularly and they shall be appearing for the upcoming</td></tr>
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</table>

			year, they also conducted AGM with distribution of shareholders. Sakhi Namkeen Unit set up in Paduna, directly employing 6 Rural Women for manufacturing & packaging unit and supporting 15 women as Business Sakhis. The unit did sales worth Rs. 20.2 lakhs in the year 2024-25. 500+ Rural Women supported to start generating livelihood through micro-enterprise activity under Sakhi Project, today they run their own	Winter Camp) for better coverage and preparation of the exams	(400+) were also conducted. Mobile Health Van was launched which provides door to door consultation across 24 villages. On an average more than 750 beneficiaries are reached on a monthly basis.	Govt exams for Patwari, Tehsil level positions etc.

			small Kirana stores, flour mill, stitching , beauty parlour etc.			
27	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.		• There are no construction labor residing in the site.			
28	Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / muffs		• Following noise control measures have been taken: o Specifying permissible noise level limit for equipment below 85 dB(A) o Acoustic enclosures with insertion loss of at least 25 dB(A) o Suitable evasee at the outlet of ventilation fans o Plantation for attenuation of noise • Employees are provided with ear plugs / muffs with proper training and awareness for its usage • Monitoring results are attached as **Annexure – 4.**			
29	Industrial waste water (workshop and waste water from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated l9th May, 1993 and 3lst December, 1993 or as amended from time to time. Oil and grease trap should be installed before discharge of workshop effluents.		• Oil and grease trap is provided at workshop and water is reused for alternate uses. Zero discharge is being maintained. • Sewage is treated and reused for plantation and dust suppression. • Two STP's with combined capacity of 450 KLD have been provided			

		 Ram Nagar Sewage Treatment Plant – 150 KLD capacity 
30	Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects.	• Personnel Protective Equipments (PPEs) are provided to the workers. • Initial and refreshers training are also provided covering safety and occupational health aspects. Regular safety interactions are also carried out.
31	A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization.	• There is a separate Environment Management cell with qualified environmental professionals headed by AGM- Environment under the direct control of CEO- IBU Zawar and Corporate HSE.
32	The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry and its Regional Office.	• Being complied regularly. • Year wise expenditure are reported to MoEF, Integrated Regional Office, Jaipur. Expenses during **Oct'24 to Mar'25** is **Rs. 358.797 Lakhs.**
33	The project authorities should inform to the Regional Office regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.	• Project is expansion of existing underground mines, no land development is required.
34	The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment, Forest and Climate Change, its Regional Office, Central Pollution Control Board and State Pollution Control Board.	• Six monthly reports are being submitted on regular basis for the EC.

35	The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information / monitoring reports.	• Noted and complied.
36	A copy of clearance letter will be marked to concerned Panchayat / local NGO, if any, from whom suggestion / representation has been received while processing the proposal.	• No suggestion / representation has been received from any Panchayat / local NGO.
37	State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and Collector's office/ Tehsildar's Office for 30 days.	• Copies of Environment Clearance have been submitted to RSPCB Regional Office, District Industry Centre and Collector's office/ Tehsildar's Office
38	The project authorities should advertise at least in two local newspapers widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and also at web site of the Ministry of Environment, Forest and Climate Change at www.environmentclearance.nic.in and a copy of the same should be forwarded to the Regional Office.	• It was advertised in Rajasthan Patrika and Dainik Bhaskar. • Advertisements are attached as **Annexure-7.**

Environment Clearance Letter No. – J-11015/259/2012-IA-II(M), dated 16.10.2020		
S.No.	**Specific Conditions**	**Compliance Status**
(a)	Gap plantation shall be carried in consultation with State Forest Department in the total Mining lease area where the surface rights were not acquired. These plantations shall be maintained and monitoring to be done to achieve the survival rate of 90%.	Deposited Rs 100 lacs to state forest department in FY 2020-21 and carried out plantation in 25 ha and 50 ha under RDF-1 & 2 scheme of forest department. A part from this, carried out 2500 nos. of plantation at tailing storage facility and 1000 nos. as gap plantation in mine area. Also, carried out 6000 nos. of plantation in 2023-24. Carried out plantation in 100 Ha through forest department under RDF Scheme in 2024
(b)	The conversation plan for Schedule-I species reported in the study are namely. 1 reptilian (Bengal Monitor Lizard), 3 avifaunal (Osprey, Indian Peafowl and White rumped Vulture), 2 mammalians (Indian Pangolin and Indian Leopard) and 1 butterfly (Crimson Rose) should be prepared and implemented in consultation with State Forest Department including the recommendations of the Chief Wildlife Warden.	• Wild life conservation plan for Schedule-1 for Zawar Mines is approved by Chief Wild Life Warden, Jaipur as per "SOP issued in May 2019". • We have deposited an amount of Rs. 3,69,00,000/- in 2022 through online transaction to the account of "Rajasthan Protected Areas, Conservator society, Udaipur". Details of online transaction done is UTR- 2052671107403. Amount deposited for ccontribution towards conservation of wildlife and administrative cost for processing inspections, etc. • In 2021, contributed 8.8 lacs rupees to forest department towards development cum maintenance of safari park/ golden park and forest nursery. • Site has undertaken various conservation measures for conservation so far: constructed 39 check dams for soil conservation & water recharge and plantation in the lease area. Also, working areas are properly fenced/ boundary in place to avoid any interaction. • In 2023-24, an amount of Rs 100 lac deposited to forest department and plantation work carried out on 100 Ha during 2024 monsoon. • As per wildlife protection Act 2022, we have revised WLCP & submitted to Chief Wild Life Warden for approval in Jan 2025.
(c)	As proposed no additional water shall be used for the proposed expansion. The requirement shall e met from the existing daily water demand of 14,000 KLD, out of which 2,400 KLD water is used for mining purpose, 8,600 KLD for beneficiation plant and 3,000 KLD for domestic use which is drawn from Tidi Dam through pipeline.	Total water requirement for Mines, beneficiation and domestic purposes is kept below the 14,000 cum/ day/. Source of fresh water is Tidi dam (surface water).
(d)	The project proponent should obtain the NOC from the CGWA regarding the intersection of workings with the groundwater table.	NOC for ground water intersection from CGWA for all the four operating mines i.e. Mochia Mines, Balaria Mine, Baroi Mine and Zawarmala mine are in place and are under renewal.
(e)	Mist spraying arrangements shall be provided to suppress the dust emission at the loading, crushing and transfer points. The effective water spraying arrangements shall be made at the tailing dam to control the air borne dust.	We have provided suitable water spraying arrangement for water spraying to arrest fugitive dust generation. Also, moisture is maintained in ore while loading and crushing. Water is sprinkled in the tailing storage facility on a regular basis.

(f)	The project proponent should implement all the additional measures that are proposed in the present application.	Noted and complied.

कार्यालय उप वन संरक्षक, वन्यजीव उदयपुर

ANNEXURE-1

बडी रोड देवाली, पोस्ट बॉक्स न. 161, फोन 0294–2453686
Email ID -dcfwl.udpr.forest@rajasthan.gov.in

क्रमांक: एफ 9(10 किमी.–469)राव/उवरा/वजी/2023–24/ 6405 दिनांक: 14/08/2023

निमित्त

खनि अभियन्ता,
उदयपुर

विषय: राष्ट्रीय उद्यान/वन्यजीव अभयारण्य की सीमा से 10 किमी. परिधि से बाहर होने या नही होने के आशय का प्रमाण पत्र के संबंध में।

संदर्भ: आपका पत्रांक: 2652 दिनांक 04.08.2023 एवं इस कार्यालय का पत्रांक 11715 दिनांक 29.11.2016 के क्रम में।

महोदय,

उपरोक्त विषयान्तर्गत प्रारांगिक पत्र के क्रम में लेख है कि मैसर्स हिन्दुस्तान जिंक लिमिटेड, यशद भवन, स्वरूप सागर, उदयपुर के पक्ष में खनिज लेड जिंक एवं सिल्वर, खगन पट्टा संख्या – 03/1989, निकट ग्राम जावर, तहसील सराड़ा, जिला उदयपुर के सम्बंध में राष्ट्रीय उद्यान/वन्यजीव अभयारण्य की सीमा से 10 किमी की परिधी में होने या नही होने का आशय प्रमाण पत्र चाहा गया है। जिसके क्रम में उक्त आवेदित क्षेत्र के जी.पी.एस. रिडिंग की जांच की गयी, जिसके अनुसार उक्त आवेदित क्षेत्र इस वनमण्डल के अभयारण्यों की सीमा से निम्नानुसार है:–

क्र.सं.	विषय	संरचना		
1.	आवेदित खनन क्षेत्र के सीमा स्तम्भों का विवरण	Pillar No.	Latitude	Longitude
		Block No.- A (1)		
		11	24 20 55.69	73 41 25.35
		12	24 21 42.3	73 41 17.06
		13	24 22 15.95	73 40 55.84
		14	24 22 51.59	73 41 21.31
		15	24 22 50.06	73 42 9.83
		1	24 22 12.95	73 44 20.54
		2	24 21 19.08	73 45 12.24
		3	24 20 19.52	73 43 57.28
		4	24 20 18.2	73 43 22.67
		5	24 19 1.1	73 42 4.88
		8	24 19 0.3	73 40 23.24
		9	24 20 48.07	73 40 24.17
		10	24 20 49.24	73 41 0.64
		11	24 20 54.95	73 41 25.41
		Block No.- B (3)		
		8	24 16 19.37	73 41 47.03
		20	24 16 30.81	73 42 48.18
		28	24 16 25.64	73 42 54.55
		27	24 14 49.31	73 43 6.58
		22	24 14 48.65	73 43 0.24
		26	24 14 54.57	73 42 51.35
		25	24 14 47.59	73 42 44.97
		24	24 14 43.66	73 42 7.5
		23	24 16 18.8	73 41 46.32
2.	सज्जनगढ वन्यजीव अभयारण्य की सीमा से दूरी	23.085 किलोमीटर		
3.	सज्जनगढ वन्यजीव अभयारण्य के ईको सेन्सिटिव जोन की सीमा से दूरी	21.450 किलोमीटर		
4.	जयसमन्द वन्यजीव अभयारण्य की सीमा से दूरी	10.800 किलोमीटर		
5.	जयसमन्द वन्यजीव अभयारण्य के ईको सेन्सिटिव जोन की सीमा से दूरी	3.180 किलोमीटर		
6.	फुलवाड़ी की नाल, वन्यजीव अभयारण्य की सीमा से दूरी।	35.490 किलोमीटर		
7.	फुलवाड़ी की नाल, वन्यजीव अभयारण्य के ईको सेन्सिटिव जोन की सीमा से दूरी।	25.490 किलोमीटर		

अतः उक्त आवेदित खनन क्षेत्र की सीमा से 10 किमी.की परिधि में कोई भी राष्ट्रीय उद्यान/वन्य अभयारण्य स्थित नही है।

Signature valid
Digitally signed by Arunkumar
Designation: Deputy Conservator Of Forest
Date: 2023.08.13 10:12:38 IST
Reason: Approved

(अरुण कुमार डी.)

RajKaj Ref No. : 4496772

ANNEXURE – 2

AIR MONITORING AT ZAWAR GROUP OF MINES								
STACK MONITORING (All units are in mg/Nm3)								
Sampling Points	Parameters	Prescribed Limits	**Oct-24**	**Nov-24**	**Dec-24**	**Jan-25**	**Feb-25**	**Mar-25**
Mochia Crusher Stack	SPM	150	29.8	28.1	26.5	25.5	26.9	27
Balaria Crusher Stack	SPM	150	25.2	26.8	28.3	27.5	27	26.5
DE - 2 (Mill 2)	SPM	150	28	25.5	27.8	26.4	27.8	27.2
DG Set 6 MW	SPM	75	-	-	-	-	-	47
	NOX (as NO2) (At 15% O2, dry basis in ppm)	710	-	-	-	-	-	585
	CO	150	-	-	-	-	-	110.4
	NMHC (as C)	100	-	-	-	-	-	64.9

AMBIENT AIR QUALITY MONITORING (All units are in µg/m3)							
Oct -24							
S.No.	STATIONS	PM_{10}	$PM_{2.5}$	SO_2	NO_X	CO	Pb
1	Mill Office	63.7	38.1	7.6	11.2	916	0.18
2	Mochia Mine	58.4	35.2	7.2	10.8	802	0.15
3	Balaria Mine	50.9	30.5	6.5	9.4	573	0.10
4	Administrative Block	72	43.1	10.5	18.7	916	0.27
5	Zawar Mala Mine	53	32	6.9	9.1	802	0.11
6	Baroi Mine	61.9	36.5	7.1	10.4	802	0.19
Prescribed Limits		**100**	**60**	**80**	**80**	**2000**	**1**

Nov -24							
S.No.	STATIONS	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	Pb
1	Mill Office	63	38	7.6	11.2	916	0.16
2	Mochia Mine	59.3	35	8.2	12.9	1031	0.20
3	Balaria Mine	51.9	31.8	6.4	9.7	573	<0.10
4	Administrative Block	68.8	41	8.5	14.7	916	0.27
5	Zawar Mala Mine	54.7	32	7	9.6	802	0.10
6	Baroi Mine	62	37	7.3	11	802	0.15
Prescribed Limits		**100**	**60**	**80**	**80**	**2000**	**1**

Dec -24							
S.No.	STATIONS	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	Pb
1	Mill Office	59.4	35.6	7	10.8	687	0.13
2	Mochia Mine	52	31.4	6.4	9.6	687	0.12
3	Balaria Mine	50.6	29.9	6.2	9.5	573	0.10
4	Administrative Block	63.8	38.4	9.7	16.5	916	0.26
5	Zawar Mala Mine	54.9	32.8	6.5	10.1	573	0.11
6	Baroi Mine	58.8	35	6.7	10	687	0.11
Prescribed Limits		**100**	**60**	**80**	**80**	**2000**	**1**

AMBIENT AIR QUALITY MONITORING (All units are in µg/m3)							
Jan -25							
S.No.	STATIONS	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	Pb
1	Mill Office	66	39.5	8.2	13.5	1031	0.24
2	Mochia Mine	61.2	37	7.8	12	916	0.18
3	Balaria Mine	57.5	34.9	6.8	10.5	687	0.12
4	Administrative Block	70	41.8	10.1	16.9	1031	0.25
5	Zawar Mala Mine	58.6	35	7.4	11.2	687	0.13
6	Baroi Mine	65.3	38.7	7.6	11.6	916	0.21
Prescribed Limits		**100**	**60**	**80**	**80**	**2000**	**1**

Feb -25							
S.No.	STATIONS	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	Pb
1	Mill Office	70.3	42.6	8.7	14.2	1145	0.28
2	Mochia Mine	64.4	38.2	8.5	13.9	1031	0.22
3	Balaria Mine	62	37	7.5	12.1	802	0.15
4	Administrative Block	68	40.5	9.7	16.4	916	0.24
5	Zawar Mala Mine	66	41	8.2	13.6	916	0.20
6	Baroi Mine	62	36.8	7.3	10.4	802	0.16
Prescribed Limits		**100**	**60**	**80**	**80**	**2000**	**1**

Mar -25							
S.No.	STATIONS	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	Pb
1	Mill Office	63	38.3	7.4	11.2	802	0.14
2	Mochia Mine	56.3	34	6.8	10.3	573	0.11
3	Balaria Mine	54	32	6.7	9.8	687	<0.10
4	Administrative Block	68	41	10.3	17	1031	0.29
5	Zawar Mala Mine	60.1	35.7	7.4	11.9	916	0.13
6	Baroi Mine	63.3	38	7	10.6	802	0.12
Prescribed Limits		**100**	**60**	**80**	**80**	**2000**	**1**

ANNEXURE – 3

Ground Water Quality at Zawar Group of Mines								
Nov-24								
S.No.	Parameters	IS : 10500:2012		Zawarmata Hand pump	Zawarmata Well	Naka Well	Mahadev ki Nal Well	Tiger Well
		Acceptable	Permissible					
1	pH	6.5-8.5	No Relaxation	7.90	8.24	8.0	7.98	8.01
2	Chlorides	250	1000	59.98	109.97	57.98	95.97	83.97
3	TSS	-	-	<5	<5	<5	<5	<5
4	Zinc	5	15	0.06	0.05	0.03	0.09	0.04
5	Lead	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
6	Iron	0.3	No Relaxation	0.04	0.04	0.03	0.05	0.05
7	Copper	0.05	1.5	<0.01	<0.01	<0.01	<0.01	<0.01
8	Cadmium	0.003	No Relaxation	<0.003	<0.003	<0.003	<0.003	<0.003
9	Cyanides	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
10	Nickel	0.02	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
11	Cobalt	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
12	Chromium	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
13	Total Organic Carbon	-	-	0.5	1.2	<0.5	0.7	1.1
Except pH all values are in mg/lt.								

Ground Water Quality at Zawar Group of Mines

Dec-24

S.No.	Parameters	IS : 10500:2012		Zawarmata Hand pump	Zawarmata Well	Naka Well	Mahadev ki Nal Well	Tiger Well
		Acceptable	Permissible					
1	pH	6.5-8.5	No Relaxation	7.52	7.96	7.74	7.23	7.48
2	Chlorides	250	1000	57.98	97.97	55.98	75.98	77.98
3	TSS	-	-	<5	<5	<5	<5	<5
4	Zinc	5	15	0.04	0.05	0.02	0.14	0.04
5	Lead	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
6	Iron	0.3	No Relaxation	0.03	0.04	0.02	0.04	0.04
7	Copper	0.05	1.5	<0.01	<0.01	<0.01	<0.01	<0.01
8	Cadmium	0.003	No Relaxation	<0.003	<0.003	<0.003	<0.003	<0.003
9	Cyanides	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
10	Nickel	0.02	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
11	Cobalt	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
12	Chromium	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
13	Total Organic Carbon	-	-	0.8	1	<0.5	1.2	1.6

Except pH all values are in mg/lt.

Ground Water Quality at Zawar Group of Mines								
Jan-25								
S.No.	Parameters	IS : 10500:2012		Zawarmata Hand pump	Zawarmata Well	Naka Well	Mahadev ki Nal Well	Tiger Well
		Acceptable	Permissible					
1	pH	6.5-8.5	No Relaxation	7.84	8.20	8.17	7.11	7.94
2	Chlorides	250	1000	61.98	91.97	61.98	67.98	75.98
3	TSS	-	-	<5	6	<5	9	<5
4	Zinc	5	15	0.05	0.03	0.03	0.14	0.03
5	Lead	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
6	Iron	0.3	No Relaxation	0.04	0.04	0.03	0.08	0.05
7	Copper	0.05	1.5	<0.01	<0.01	<0.01	<0.01	<0.01
8	Cadmium	0.003	No Relaxation	<0.003	<0.003	<0.003	<0.003	<0.003
9	Cyanides	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
10	Nickel	0.02	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
11	Cobalt	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
12	Chromium	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
13	Total Organic Carbon	-	-	1	1	<0.5	2.5	1
Except pH all values are in mg/lt.								

Ground Water Quality at Zawar Group of Mines

Mar-25

S.No.	Parameters	IS : 10500:2012		Zawarmata Hand pump	Zawarmata Well	Naka Well	Mahadev ki Nal Well	Tiger Well
		Acceptable	Permissible					
1	pH	6.5-8.5	No Relaxation	7.94	7.78	8.16	7.65	7.91
2	Chlorides	250	1000	67.98	95.97	39.99	77.98	71.98
3	TSS	-	-	<5	<5	<5	<5	<5
4	Zinc	5	15	0.20	0.13	0.13	0.23	0.11
5	Lead	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
6	Iron	0.3	No Relaxation	0.03	0.03	<0.01	0.05	0.03
7	Copper	0.05	1.5	<0.01	<0.01	<0.01	<0.01	<0.01
8	Cadmium	0.003	No Relaxation	<0.003	<0.003	<0.003	<0.003	<0.003
9	Cyanides	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
10	Nickel	0.02	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
11	Cobalt	-	-	<0.01	<0.01	<0.01	<0.01	<0.01
12	Chromium	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01
13	Total Organic Carbon	-	-	0.8	<1	<0.5	1.6	1.3

Except pH all values are in mg/lt.

Piezometer Well Water Quality at Zawar Group of Mines									
Dec-24									
S.No.	Parameters	IS : 10500:2012		Near Bridge Vala Patel House (Pz – 01)	Near In front of Old Tailing Dam (Pz –02)	Near Tailing Dam Pump House (Pz – 03)	Near Magazine Area (Pz -04)	Near Below Tailing Pipe Lines (Pz –05)	Near Way to Tailing Dam Road (Pz –06)
		Acceptable	Permissible						
1	pH	6.5-8.5	No Relaxation	8.39	7.48	6.97	6.81	7.82	6.85
2	Chlorides	250	1000	45.98	63.98	95.97	61.98	35.99	45.98
3	Zinc	5	15	0.07	0.13	0.07	0.10	0.02	0.05
4	Lead	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
5	Iron	0.3	No Relaxation	0.02	0.03	0.05	0.04	0.02	0.04
6	Copper	0.05	1.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
7	Cadmium	0.003	No Relaxation	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
8	Nickel	0.02	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
9	Chromium	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
10	Cyanide	0.05	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
11	Cobalt	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
12	Total Organic Carbon	-	-	2	2	2.9	2.4	0.8	3.3
Except pH all values are in mg/lt									

Piezometer Borewell/Handpump Water Quality at Zawar Group of Mines

Dec-24

S.No.	Parameters	IS : 10500:2012		Govt. Handpump from Kheda Falan	Borewell water from Naya Kheda	Borewell water from Kheda Falan
		Acceptable	Permissible			
1	pH	6.5-8.5	No Relaxation	7.48	7.60	7.83
2	Chlorides	250	1000	7.99	69.98	5.99
3	Zinc	5	15	<0.01	0.02	<0.01
4	Lead	0.01	No Relaxation	<0.01	<0.01	<0.01
5	Iron	0.3	No Relaxation	0.03	0.03	0.03
6	Copper	0.05	1.5	<0.01	<0.01	<0.01
7	Cadmium	0.003	No Relaxation	<0.003	<0.003	<0.003
8	Nickel	0.02	No Relaxation	<0.01	<0.01	<0.01
9	Chromium	0.05	No Relaxation	<0.01	<0.01	<0.01
10	Cyanide	0.05	-	<0.01	<0.01	<0.01
11	Cobalt	-	-	<0.01	<0.01	<0.01
12	Total Organic Carbon	-	-	3	3.7	2.3

Except pH all values are in mg/lt

Piezometer Well Water Quality at Zawar Group of Mines									
Mar-25									
S.No.	Parameters	IS : 10500:2012		Near Bridge Vala Patel House (Pz – 01)	Near In front of Old Tailing Dam (Pz –02)	Near Tailing Dam Pump House (Pz – 03)	Near Magazine Area (Pz -04)	Near Below Tailing Pipe Lines (Pz –05)	Near Way to Tailing Dam Road (Pz –06)
		Acceptable	Permissible						
1	pH	6.5-8.5	No Relaxation	8.15	7.60	7.26	7.22	7.73	7.51
2	Chlorides	250	1000	153.95	75.98	63.98	59.98	45.99	45.98
3	Zinc	5	15	0.69	0.15	0.38	<0.01	0.03	0.10
4	Lead	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
5	Iron	0.3	No Relaxation	0.03	0.03	0.06	0.04	0.02	0.02
6	Copper	0.05	1.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
7	Cadmium	0.003	No Relaxation	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
8	Nickel	0.02	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
9	Chromium	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
10	Cyanide	0.05	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
11	Cobalt	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
12	Total Organic Carbon	-	-	4.2	2.4	4.1	1.7	1.2	2.7
Except pH all values are in mg/lt									

Piezometer Borewell/Handpump Water Quality at Zawar Group of Mines

Mar-25

S.No.	Parameters	IS: 10500:2012		Govt. Handpump water from Kheda Falan	Borewell water from Naya Kheda	Borewell water from Kheda Falan
		Acceptable	Permissible			
1	pH	6.5-8.5	No Relaxation	7.09	7.47	7.52
2	Chlorides	250	1000	13.99	71.98	17.99
3	Zinc	5	15	<0.01	0.03	<0.01
4	Lead	0.01	No Relaxation	<0.01	<0.01	<0.01
5	Iron	0.3	No Relaxation	0.03	0.03	0.03
6	Copper	0.05	1.5	<0.01	<0.01	<0.01
7	Cadmium	0.003	No Relaxation	<0.003	<0.003	<0.003
8	Nickel	0.02	No Relaxation	<0.01	<0.01	<0.01
9	Chromium	0.05	No Relaxation	<0.01	<0.01	<0.01
10	Cyanide	0.05	-	<0.01	<0.01	<0.01
11	Cobalt	-	-	<0.01	<0.01	<0.01
12	Total Organic Carbon	-	-	3.5	4.2	3.4

Except pH all values are in mg/lt

Tidi Upstream and Downstream Water Quality at Zawar Group of Mines

Nov-24 (Except pH all values are in mg/lt)					
S. No.	Parameters	IS : 10500:2012		Tidi Upstream	Tidi Downstream
		Acceptable	Permissible		
1	pH	6.5-8.5	No Relaxation	7.78	7.83
2	Chlorides	250	1000	75.98	77.98
3	TSS	-	-	12	12
4	Zinc	5	15	0.87	0.08
5	Lead	0.01	No Relaxation	<0.01	<0.01
6	Iron	0.3	No Relaxation	0.02	0.03
7	Copper	0.05	1.5	<0.01	<0.01
8	Cadmium	0.003	No Relaxation	<0.003	<0.003
9	Cyanides	0.05	No Relaxation	<0.01	<0.01
10	Nickel	0.02	No Relaxation	<0.01	<0.01
11	Cobalt	-	-	<0.01	<0.01
12	Chromium	0.05	No Relaxation	<0.01	<0.01
13	Sulphate	200	400	42.52	40.91

Dec-24 (Except pH all values are in mg/lt)					
S. No.	Parameters	IS : 10500:2012		Tidi Upstream	Tidi Downstream
		Acceptable	Permissible		
1	pH	6.5-8.5	No Relaxation	8.15	8.11
2	Chlorides	250	1000	59.98	57.98
3	TSS	-	-	7	6
4	Zinc	5	15	0.10	0.08
5	Lead	0.01	No Relaxation	<0.01	<0.01
6	Iron	0.3	No Relaxation	0.02	0.02
7	Copper	0.05	1.5	<0.01	<0.01
8	Cadmium	0.003	No Relaxation	<0.003	<0.003
9	Cyanides	0.05	No Relaxation	<0.01	<0.01
10	Nickel	0.02	No Relaxation	<0.01	<0.01
11	Cobalt	-	-	<0.01	<0.01
12	Chromium	0.05	No Relaxation	<0.01	<0.01
13	Sulphate	200	400	34.33	35.65

Jan-25 (Except pH all values are in mg/lt)					
S. No.	Parameters	IS : 10500:2012		Tidi Upstream	Tidi Downstream
		Acceptable	Permissible		
1	pH	6.5-8.5	No Relaxation	7.96	8.25
2	Chlorides	250	1000	73.98	89.97
3	TSS	-	-	8	8
4	Zinc	5	15	0.50	0.06
5	Lead	0.01	No Relaxation	<0.01	<0.01
6	Iron	0.3	No Relaxation	0.02	0.02
7	Copper	0.05	1.5	<0.01	<0.01
8	Cadmium	0.003	No Relaxation	<0.003	<0.003
9	Cyanides	0.05	No Relaxation	<0.01	<0.01
10	Nickel	0.02	No Relaxation	<0.01	<0.01
11	Cobalt	-	-	<0.01	<0.01
12	Chromium	0.05	No Relaxation	<0.01	<0.01
13	Sulphate	200	400	29.83	42.92

Mar-25 (Except pH all values are in mg/lt)					
S. No.	Parameters	IS : 10500:2012		Tidi Upstream	Tidi Downstream
		Acceptable	Permissible		
1	pH	6.5-8.5	No Relaxation	8.12	7.51
2	Chlorides	250	1000	87.97	67.98
3	TSS	-	-	12	8
4	Zinc	5	15	0.24	0.10
5	Lead	0.01	No Relaxation	<0.01	<0.01
6	Iron	0.3	No Relaxation	0.03	0.02
7	Copper	0.05	1.5	<0.01	<0.01
8	Cadmium	0.003	No Relaxation	<0.003	<0.003
9	Cyanides	0.05	No Relaxation	<0.01	<0.01
10	Nickel	0.02	No Relaxation	<0.01	<0.01
11	Cobalt	-	-	<0.01	<0.01
12	Chromium	0.05	No Relaxation	<0.01	<0.01
13	Sulphate	200	400	48.79	42.32

Ground Water Level Monitoring at Zawar Group of Mines

S.No.	Piezometers	Oct-24(m)	Nov-24(m)	Dec-24(m)	Jan-25 (m)	Feb-25 (m)	Mar-25(m)
1.	Near Bridge (Vala Patel House) (Pz – 01)	1.17	1.30	1.43	1.5	2.15	2.22
2.	Near In front of Old Tailing Dam (Pz – 02)	3.40	3.53	3.66	1.73	2.04	2.27
3.	Near Tailing Dam Pump House(Pz – 03)	2.15	2.27	2.68	2.71	2.82	2.91
4.	Near Magazine Area(Pz – 04)	3.58	3.73	3.86	3.88	4.10	4.38
5.	Near Below Tailing Pipe Lines(Pz – 05)	2.35	2.48	2.58	2.71	2.81	3.02
6.	Near Way to Tailing Dam Road(Pz – 06)	2.15	2.25	2.35	2.48	2.71	2.83

S.No.	Wells in the area	Oct-24(m)	Nov-24(m)	Dec-24(m)	Jan-25 (m)	Feb-25(m)	Mar-25(m)
1.	Zawarmata Well	3.76	3.41	3.805	3.829	4.083	4.172
2.	Mahadev ki Nal Well	1.55	1.09	1.409	1.416	1.633	1.880

DETAILS OF QUARTERLY STP ANALYSIS REPORT								
S.No.	**Parameters**	**Standard**	**Ashok Nagar**			**Ram Nagar**		
			Oct - 24	**Nov -24**	**Dec-24**	**Oct - 24**	**Nov -24**	**Dec-24**
1	Total Suspended Solids	Not to exceed 100 mg/l	7	6	6	6	6	6
2	pH Value	Between 5.5 to 9	7.40	7.40	7.22	7.53	7.50	7.10
3	Oil and Grease	Not to exceed 10 mg/l	<5	<5	<5	<5	<5	<5
4	Ammonical Nitrogen (as N)	Not to exceed 50 mg/l	<5	<5	<5	<5	<5	<5
5	Biochemical Oxygen Demand	Not to exceed 30 mg/l	8	7	8	7	5	6
6	Chemical Oxygen Demand	Not to exceed 250 mg/l	40	40	43	35	30	37
7	Nitrate	Not to exceed 50 mg/l	17.72	25.25	18.61	16.39	23.04	16.83

DETAILS OF QUARTERLY STP ANALYSIS REPORT

S.No.	Parameters	Standard	Ashok Nagar			Ram Nagar		
			Jan - 25	Feb -25	Mar-25	Jan - 25	Feb -25	Mar-25
1	Total Suspended Solids	Not to exceed 100 mg/l	15	14	<5	13	16	<4
2	pH Value	Between 5.5 to 9	7.55	7.60	7.57	7.44	7.70	8.19
3	Oil and Grease	Not to exceed 10 mg/l	<5	<5	<5	<5	<5	<5
4	Ammonical Nitrogen (as N)	Not to exceed 50 mg/l	<5	<5	<5	<5	<5	<5
5	Biochemical Oxygen Demand	Not to exceed 30 mg/l	7	8	9	9	7	5
6	Chemical Oxygen Demand	Not to exceed 250 mg/l	40	47	40	48	42	20
7	Nitrate	Not to exceed 50 mg/l	20.4	18.8	32.5	15.6	22	33.4

Tailing Dam Reclaim Water (Except pH all values are in mg/lt.)								
S.No	**Parameters**	**Standard**	**Oct- 24**	**Nov- 24**	**Dec- 24**	**Jan-25**	**Feb-25**	**Mar- 25**
1	pH	5.5-9.0	7.25	7.56	7.23	7.45	7.57	7.29
2	Chlorides	-	109.97	97.97	103.97	139.96	111.97	129.96
3	TSS	100	23	18	19	9	14	13
4	Oil and Grease	10	<5	<5	<5	<5	<5	<5
5	BOD 3 days at 27°C	30	6.7	4	4	5	6.1	5.5
6	COD	250	25.2	12.9	14.1	17.8	25.5	12
7	Zinc	5	0.19	0.10	0.10	0.23	0.16	0.66
8	Lead	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
9	Iron	3	0.02	0.06	0.02	0.03	0.04	0.02
10	Copper	3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
11	Cadmium	2	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
12	Cyanides	0.2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
13	Nickel	3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
14	Cobalt	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
15	Chromium	2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

ANNEXURE – 4

AMBIENT NOISE MONITORING AT ZAWAR GROUP OF MINES [in dB (A)]		
Stations/Month	**Dec-24**	
	Day	Night
Mill Office	64.8	58.1
Central Mochia Mine	59.6	51.4
Balaria Mine	67.1	53.5
Administrative Block	58.3	50.6
Zawar Mala Mine	59.8	52
North Baroi Mine	60.4	49.8
Hydrofill Plant	63.3	54
Dry Tailing Plant	61.5	53
Hospital	54.2	44
Ramnagar Colony	53.5	44
West Mochia Mine	61.5	54.7
Central Baroi Mine	68.2	59.7
Permissible Limit	**75 dB (A)**	**65 dB (A)**

AMBIENT NOISE MONITORING AT ZAWAR GROUP OF MINES [in dB (A)]		
Stations/Month	**Mar-25**	
	Day	Night
Mill Office	61.7	55
Central Mochia Mine	61.5	52.3
Balaria Mine	66	52.4
Administrative Block	58.9	52
Zawar Mala Mine	61.5	51.7
North Baroi Mine	61.9	51
Hydrofill Plant	61.3	52.8
Dry Tailing Plant	62.6	52.5
Hospital	54.7	44.5
Ramnagar Colony	53.9	42.7
West Mochia Mine	62.6	54.4
Central Baroi Mine	65.6	56.1
Permissible Limit	**75 dB (A)**	**65 dB (A)**

ANNEXURE-5

Sno	NAME	AGE	GENDER	UNIT/MINES	Date	Lead (µg/l)
1	ASHISH PRAJAPATI	22	M	Balaria	16 Feb 2024	87.13
2	RAPETI SIVAKESH	22	M	Balaria	16 Feb 2024	105.03
3	SHAYON ROY	23	M	Balaria	16 Feb 2024	74.72
4	NARAYAN LAL KALAL	36	M	Balaria	17 Feb 2024	54.38
5	PRAKASH CHANDRA MEENA	28	M	Balaria	16 Feb 2024	24.91
6	SURAJ MAL	28	M	Balaria	16 Feb 2024	36.33
7	KHEMRAJ KALASUA	33	M	Balaria	16 Feb 2024	54.82
8	SHIV LAL	44	M	Balaria	16 Feb 2024	50.43
9	MUKESH KUMAR MEENA	29	M	Balaria	16 Feb 2024	87.82
10	HEMAT LOHAR	31	M	Balaria	16 Feb 2024	44.42
11	VEERU KUMAR MEENA	31	M	Balaria	16 Feb 2024	54.12
12	RAMESH CHANDRA MAHANTA	30	M	Balaria	17 Feb 2024	100.63
13	YOGENDRA KUMAR YADAV	31	M	Balaria	16 Feb 2024	37.43
14	MAHENDRA SINGH DEVRA	44	M	Balaria	17 Feb 2024	88.67
15	BHERA MEENA	40	M	Balaria	16 Feb 2024	96.87
16	MANISH KUMAR	30	M	Balaria	17 Feb 2024	82.65
17	GAURAV SHARMA	21	M	Balaria	16 Feb 2024	41.32
18	PRABHU LAL MEENA	35	M	Balaria	17 Feb 2024	98.77
19	SUNDER LAL JAIN	37	M	Balaria	17 Feb 2024	112.32
20	SHAANTI LAL	30	M	Balaria	16 Feb 2024	58.08
21	GOJIYA VIPUL	26	M	Balaria	16 Feb 2024	46.99
22	AMBALAL	50	M	Balaria	17 Feb 2024	48.52
23	BHARAT SINGH SHEKHAWAT	27	M	Balaria	17 Feb 2024	62.58
24	ISWAR	52	M	Balaria	17 Feb 2024	77.54
25	SIDESWAR JENA	28	M	Balaria	17 Feb 2024	112.32
26	GEBI LAL	36	M	Balaria	17 Feb 2024	99.56
27	VINOD KUMAR	50	M	Balaria	16 Feb 2024	43.55
28	THAWARCHAND	37	M	Balaria	16 Feb 2024	51.44
29	MANOHAR LAL MEENA	32	M	Balaria	17 Feb 2024	85.4
30	SURAJ KUMAR	30	M	Balaria	17 Feb 2024	52.48
31	MANGAL CHAND	38	M	Balaria	16 Feb 2024	49.75
32	JOGESHWAR MAHANTA	30	M	Balaria	17 Feb 2024	70.32
33	BHUPENDRA SHARMA	38	M	Balaria	17 Feb 2024	81.97
34	CHAGAN LAL KALAL	44	M	Balaria	17 Feb 2024	112.5
35	MAHENDRA SINGH	32	M	Balaria	17 Feb 2024	80.79
36	SUNIL SINGH	35	M	Balaria	17 Feb 2024	47.16
37	RUPA MEENA	44	M	Balaria	16 Feb 2024	51.73
38	NARENDRA KUMAR MEENA	44	M	Balaria	17 Feb 2024	52.66
39	LAKSHMI LAL	40	M	Balaria	16 Feb 2024	53.32
40	SHIVA	30	M	Balaria	17 Feb 2024	105.95

41	TULSI DAS	50	M	Balaria	17 Feb 2024	83.36
42	SANJAY KUMAR	28	M	Balaria	17 Feb 2024	81.97
43	KAUSHIK KUMAR	32	M	Balaria	16 Feb 2024	60.57
44	OJALAL	55	M	Zawarmala	16 Feb 2024	53.45
45	SURAJ KUMAR	34	M	Zawarmala	17 Feb 2024	75.86
46	NISHITHRANJAN KUNDU	38	M	Zawarmala	17 Feb 2024	104.52
47	ASHOK KUMAR KHARADI	41	M	Zawarmala	17 Feb 2024	54.95
48	LALIT KUMAR PANCHAL	35	M	Zawarmala	16 Feb 2024	79.13
49	SHANTI LAL MEENA	39	M	Zawarmala	17 Feb 2024	83.43
50	GANESH SINGH	33	M	Zawarmala	17 Feb 2024	40.51
51	CHANDRA LAL	37	M	Zawarmala	16 Feb 2024	58.09
52	KAVAD KARSHAN	29	M	Zawarmala	17 Feb 2024	46.12
53	PRAVEEN	22	M	Zawarmala	16 Feb 2024	42.23
54	TULSIRAM	28	M	Zawarmala	17 Feb 2024	93.69
55	UTTAM MANDAL	28	M	Zawarmala	17 Feb 2024	113.07
56	NARAYAN LAL MEENA	32	M	Zawarmala	17 Feb 2024	57.99
57	MAHESH DAS VAISHNA	43	M	Zawarmala	17 Feb 2024	42.23
58	GOPI YADAV	29	M	Zawarmala	16 Feb 2024	93.46
59	SUNDAR SINGH	34	M	Zawarmala	16 Feb 2024	50.02
60	SHESH NATH SINGH	40	M	Zawarmala	16 Feb 2024	38.87
61	SANJAY KUMAR	33	M	Zawarmala	16 Feb 2024	35.45
62	DEVI SINGH CHOUHAN	38	M	Zawarmala	16 Feb 2024	55.91
63	JAI SHANKER	43	M	Balaria	17 Feb 2024	63.46
64	PAWAN	27	M	Balaria	16 Feb 2024	36.01
65	GULABCHAND	30	M	Balaria	16 Feb 2024	69.99
66	AHAMAD HUSSAIN	36	M	Balaria	17 Feb 2024	91.4
67	ANIL JAISWAL	39	M	Balaria	17 Feb 2024	105.42
68	SUMANTA BARMAN	31	M	Balaria	17 Feb 2024	69.78
69	NAVEEN RAJPUROHIT	32	M	Balaria	17 Feb 2024	98.66
70	RAMESH CHAND	35	M	Balaria	16 Feb 2024	79.45
71	PUSHPENDRA SINGH	29	M	Balaria	16 Feb 2024	77.21
72	NISHANT KUMAR SINGH	26	M	Balaria	16 Feb 2024	56.54
73	MATCHA ARAVIND	26	M	Balaria	17 Feb 2024	87.58
74	KUWAR PAL SINGH	32	M	Balaria	17 Feb 2024	60.63
75	BANSHI LAL	40	M	Balaria	17 Feb 2024	69.28
76	DINESH KUMAR	36	M	Balaria	17 Feb 2024	76
77	KANTI LAL	44	M	Balaria	17 Feb 2024	86.69
78	PANKAJ SINGH	31	M	Balaria	17 Feb 2024	66.49
79	SURAJ PRATAP SINGH RATHORE	23	M	Balaria	17 Feb 2024	63.79
80	SATNAM SINGH SAINI	39	M	Balaria	17 Feb 2024	116.11
81	KALU LAL MEENA	38	M	Balaria	17 Feb 2024	87.83
82	GAJENDRA SINGH PANWAR	37	M	Balaria	16 Feb 2024	55.75
83	KUNAL SINGH PARIHAR	33	M	Balaria	16 Feb 2024	100.11
84	DEEPAK KUMAR LOHAR	32	M	Balaria	17 Feb 2024	95.41

85	SURENDRA SINGH PANWAR	32	M	Balaria	17 Feb 2024	62.35
86	KISHORE BHISE	33	M	Balaria	17 Feb 2024	82.03
87	DAALCHAND	34	M	Balaria	16 Feb 2024	34.91
88	MUKESH KUMAWAT	34	M	Balaria	17 Feb 2024	86.69
89	DHARMENDRA KUMAR SINGH	33	M	Balaria	16 Feb 2024	44.72
90	RAKESH KUMAR KHATIK	30	M	Balaria	16 Feb 2024	47.54
91	DHANRAJ NAGDA	37	M	Balaria	16 Feb 2024	30.5
92	AVINASH PATHANIA	33	M	Balaria	16 Feb 2024	45.44
93	KUSHAL SINGH PANWAR	36	M	Balaria	16 Feb 2024	53.99
94	BANSILAL MEENA	33	M	Balaria	16 Feb 2024	30.7
95	PRAVEEN RATNADI	48	M	Balaria	17 Feb 2024	93.05
96	DEVENDRA MENARIA	28	M	Balaria	17 Feb 2024	64.78
97	K MAREE MUTTU	43	M	Balaria	16 Feb 2024	78.02
98	AMAR MAITY	31	M	Balaria	17 Feb 2024	80.93
99	SHIV PRAKASH SINGH	46	M	Balaria	17 Feb 2024	105.26
100	RAMESH CHANDRA MENARIA	30	M	Balaria	17 Feb 2024	79.76
101	GANGARAM MEENA	33	M	Balaria	16 Feb 2024	41.37
102	VIKAS VAISHNAV	31	M	Balaria	17 Feb 2024	115.54
103	MUESH KUMAR MEENA	39	M	Balaria	17 Feb 2024	66.74
104	SIDDHARTH BOSE	36	M	Balaria	17 Feb 2024	74.67
105	RAKESH KUMAR	40	M	Balaria	17 Feb 2024	80.46
106	PRASANTA PROTIHAR	35	M	Balaria	17 Feb 2024	58.45
107	INDRAJEET	32	M	Balaria	16 Feb 2024	108.41
108	SURESH SINGH	36	M	Balaria	17 Feb 2024	60.74
109	PRAKASH MEENA	43	M	Balaria	17 Feb 2024	96.05
110	ANIL KUMAR MEENA	33	M	Balaria	17 Feb 2024	94.77
111	SANJAY KUMAR PANWAR	32	M	Balaria	17 Feb 2024	96.62
112	PANNA LAL	37	M	Balaria	17 Feb 2024	115.54
113	LALU RAM	36	M	Balaria	17 Feb 2024	104.52
114	SHIV LAL	27	M	Balaria	17 Feb 2024	87.83
115	DEVA	45	M	Balaria	17 Feb 2024	79.57
116	BADRI LAL MEENA	31	M	Balaria	17 Feb 2024	67.96
117	KAMAL KUMAR PANCHAL	34	M	Balaria	17 Feb 2024	83.36
118	VAL CHANDA MEENA	33	M	Balaria	17 Feb 2024	81.26
119	DINESH KUMAR MEENAS	30	M	Balaria	17 Feb 2024	58.52
120	KAILASH CHANDRA MEENA	29	M	Balaria	17 Feb 2024	54.56
121	SHANKER LAL PATEL	36	M	Balaria	17 Feb 2024	85.47
122	SANGRAM CHAUHAN	27	M	Balaria	17 Feb 2024	61.1
123	LALIT KISHORE AUDCHIYA	57	M	Balaria	17 Feb 2024	76
124	SUKHJINDER SINGH	32	M	Balaria	17 Feb 2024	52.66
125	SERAFAT ALI	35	M	Balaria	17 Feb 2024	62.6
126	NANA MEENA	45	M	Balaria	17 Feb 2024	104.56
127	KAMLESH AUDICHYA	32	M	Balaria	17 Feb 2024	90.51

128	MANOHAR LAL	39	M	Balaria	17 Feb 2024	99.45
129	RAJU HAQUE	38	M	Balaria	17 Feb 2024	63.24
130	RAJENDRA SINGH	37	M	Balaria	17 Feb 2024	70.89
131	RAJENDRA KUMAR	56	M	Balaria	17 Feb 2024	70.89
132	BHAGWAN LAL	41	M	Balaria	17 Feb 2024	87.01
133	JEEVA RAM	45	M	Balaria	17 Feb 2024	58.09
134	DINESH	38	M	Balaria	17 Feb 2024	46.34
135	RAJ KUMAR	54	M	Balaria	17 Feb 2024	52.48
136	KISHAN LAL	34	M	Balaria	17 Feb 2024	111.46
137	NANA	53	M	Balaria	17 Feb 2024	117.93
138	MEGHA	52	M	Balaria	17 Feb 2024	75.32
139	AMRA	45	M	Balaria	17 Feb 2024	79.57
140	PUNJA	40	M	Balaria	17 Feb 2024	35.94
141	SURYAKANTA BEHERA	51	M	Balaria	17 Feb 2024	60.74
142	BANSHI LAL	45	M	Balaria	17 Feb 2024	100.31
143	SOHAN LAL	45	M	Balaria	17 Feb 2024	91.76
144	BABU LAL	30	M	Balaria	17 Feb 2024	64.28
145	POONAM CHAND	49	M	Balaria	17 Feb 2024	87.44
146	GOUTAM	52	M	Balaria	17 Feb 2024	52.98
147	NATHU LAL	57	M	Balaria	17 Feb 2024	76.32
148	DEVI LAL MEENA	46	M	Balaria	17 Feb 2024	87.44
149	SOHAN	47	M	Balaria	17 Feb 2024	66.99
150	LAXMAN	50	M	Balaria	17 Feb 2024	78.82

ANNEXURE- 6

Original

ULR NO: TC531220000000851F TC-5312

Modern Test Centre

- (Accredited To AERB vide certificate No: AERB/RSD/ACC-16/R-3/2017/1073)
- (Accredited To NABL through ISO/IEC 17025:2017)
- (Recognized by BIS vide OSL Code-5123116)

Off:-Gandhi Nagar 5th line Extn. East, Berhampur-760001, Dist-Ganjam (Odisha)
Lab:-Neelanchala Nagar 3rd lane, Berhampur-760010, Dist-Ganjam (Odisha), Phone:-0680 2403321-22
Visit us: www.moderntestcenter.com Mail: - moderntestcenter@gmail.com
Ref: - 26308/MTC/LF/7.8/14/2020 DATE: 20/07/2020

TEST CERTIFICATE

Issued to: M/s. Hindustan Zinc Limited, Zawar Mines
PO: Zawar Mines
Udaipur, Pin: 313901.

LOCATION: BALARIYA MINE

Customer Reference No: Nil Dt. 08/07/2020
Date of Receipt: 20/07/2020

Date of Initiation of Test : 20/07/2020
Date of Completion of Test: 20/07/2020

TEST CERTIFICATE NO: 2113 18896 **DATE: 20/07/2020**

TEST CERTIFICATE AS PER IS 14194 (PART- 1 & PART-2): 2013

PART A: *PARTICULARS OF SAMPLE SUBMITTED*

a) Nature of sample	: Dewatering Water	f) Quantity	: 1 No's
b) Grade / Variety/ Type/Class/Size etc	: 1 lit bottle	g) Mode of packing	: Packed in Carton
c) Brand Name, if any	: Not available	h) Condition of Seal of Certifying Body Or the Regulatory authority	: Not applicable
d) Name of the test suggested	: Beta Emitters & Alpha Emitters		
e) Batch No. & Date of Manufacture /Collection/Sampling	: Batch No: Not Specified : DOS: 06/07/2020	I) Any other information	: No Specific Observation

PART B: *SUPPLIMENTARY INFORMATIONS*

a) Reference to sampling ~~by lab~~/submitted by party : Sample submitted by SCS Enviro Services, Jaipur, Rajasthan
By Lab: i) Location : ----------
ii) Date & time of collection : ----------
iii) Name of lab representative (Wherever applicable) : ----------
b) Supporting documents like graphs, tables, Sketches for the measurements taken and The results derived, if any to be attached : ---------
c) Deviation from the test methods as Prescribed in relevant ISS / Work Instructions, if any : No deviation
d) Deviation from environmental condition, if any : No deviation

PART C: *TEST RESULTS*

Sl. No	Parameter	Specified value maximum as per IS 10500:2012	Result
1	Beta Emitters	1 $Bq.l^{-1}$	BDL
2	Alpha Emitters	0.1 $Bq.l^{-1}$	BDL

N.B:- BDL is below detection limit of the detector.
The DL for Beta Emitters is 0.134 $Bq.l^{-1}$
The DL for Alpha Emitters is 0.007 $Bq.l^{-1}$

PART D: *REMARKS*

1) The results stated above relates to the sample tested only.
2) This report in full or in part shall not be published, advertised, used for any legal action unless prior permission has been secured from the competent Authority of the laboratory.
3) The sample shall be kept for three month after the test and can be returned on request or shall be destroyed. Any customer complain or by regulatory authority shall be entertained, if and only if the complain is registered within one month from date of report.

For Modern Test Centre
Signature with seal
Authorised Signatory

2190

Original

TC-5312

ULR NO: TC531220000000852F

Modern Test Centre

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- (Recognized by BIS vide OSL Code-5123116)

Off:-Gandhi Nagar 5th line Extn. East, Berhampur-760001, Dist-Ganjam (Odisha)
Lab:-Neelanchala Nagar 3rd lane, Berhampur-760010, Dist-Ganjam (Odisha), Phone:-0680 2403321-22
Visit us: www.moderntestcenter.com Mail: - moderntestcenter@gmail.com

Ref: - 26309/MTC/LF/7.8/14/2020 DATE: 20/07/2020

TEST CERTIFICATE

Issued to: M/s. Hindustan Zinc Limited, Zawar Mines
PO: Zawar Mines
Udaipur, Pin: 313901.

LOCATION: BAROI MINE

Customer Reference No: Nil Dt. 08/07/2020
Date of Receipt: 20/07/2020

Date of Initiation of Test : 20/07/2020
Date of Completion of Test: 20/07/2020

TEST CERTIFICATE NO: 2113 18897 **DATE: 20/07/2020**

TEST CERTIFICATE AS PER IS 14194 (PART- 1& PART-2): 2013

PART A: *PARTICULARS OF SAMPLE SUBMITTED*

a) Nature of sample	: Dewatering Water	f) Quantity	: 1 No's
b) Grade / Variety/ Type/Class/Size etc	: 1 lit bottle	g) Mode of packing	: Packed in Carton
c) Brand Name, if any	: Not available	h) Condition of Seal of Certifying Body Or the Regulatory authority	: Not applicable
d) Name of the test suggested	: Beta Emitters & Alpha Emitters	i) Any other Information	: No Specific Observation
e) Batch No. & Date of Manufacture /Collection/Sampling	: Batch No: Not Specified : DOS: 06/07/2020		

PART B: *SUPPLIMENTARY INFORMATIONS*

a) Reference to sampling ~~by lab~~/submitted by party : Sample submitted by SCS Enviro Services, Jaipur, Rajasthan
By Lab: i) Location : ----------
ii) Date & time of collection : ----------
iii) Name of lab representative (Wherever applicable) : ----------
b) Supporting documents like graphs, tables, Sketches for the measurements taken and The results derived, if any to be attached : ---------
c) Deviation from the test methods as Prescribed in relevant ISS / Work Instructions, if any : No deviation
d) Deviation from environmental condition, if any : No deviation

PART C: *TEST RESULTS*

Sl. No	Parameter	Specified value maximum as per IS 10500:2012	Result
1	Beta Emitters	1 $Bq.l^{-1}$	BDL
2	Alpha Emitters	0.1 $Bq.l^{-1}$	BDL

N.B:- BDL is below detection limit of the detector.
The DL for Beta Emitters is 0.134 $Bq.l^{-1}$
The DL for Alpha Emitters is 0.008 $Bq.l^{-1}$

PART D: *REMARKS*

1) The results stated above relates to the sample tested only.
2) This report in full or in part shall not be published, advertised, used for any legal action unless prior permission has been secured from the competent Authority of the laboratory.
3) The sample shall be kept for three month after the test and can be returned on request or shall be destroyed. Any customer complain or by regulatory authority shall be entertained, if and only if the complain is registered within one month from date of report.

For Modern Test Centre
Shankar Kumar
Signature with seal
Authorised Signatory

21401

Original

ULR NO: TC531220000000853F TC-5312

Modern Test Centre

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- (Accredited To NABL through ISO/IEC 17025:2017)
- (Recognized by BIS vide OSL Code-5123116)

Off:-Gandhi Nagar 5th line Extn. East, Berhampur-760001, Dist-Ganjam (Odisha)
Lab:-Neelanchala Nagar 3rd lane, Berhampur-760010, Dist-Ganjam (Odisha), Phone:-0680 2403321-22
Visit us: www.moderntestcenter.com Mail: - moderntestcenter@gmail.com
Ref: - 26310/MTC/LF/7.8/14/2020 DATE: 20/07/2020

TEST CERTIFICATE

Issued to: M/s. Hindustan Zinc Limited, Zawar Mines
PO: Zawar Mines
Udaipur, Pin: 313901.

LOCATION: MOCHIA MINE

Customer Reference No: Nil Dt. 08/07/2020
Date of Receipt: 20/07/2020

Date of Initiation of Test : 20/07/2020
Date of Completion of Test: 20/07/2020

TEST CERTIFICATE NO: 2113 18898 **DATE: 20/07/2020**

TEST CERTIFICATE AS PER IS 14194 (PART- 1& PART-2): 2013

PART A: *PARTICULARS OF SAMPLE SUBMITTED*

a) Nature of sample	: Dewatering Water	f) Quantity	: 1 No's
b) Grade / Variety/ Type/Class/Size etc	: 1 lit bottle	g) Mode of packing	: Packed in Carton
c) Brand Name, if any	: Not available	h) Condition of Seal of Certifying Body Or the Regulatory authority	: Not applicable
d) Name of the test suggested	: Beta Emitters & Alpha Emitters	i) Any other information	: No Specific Observation
e) Batch No. & Date of Manufacture /Collection/Sampling	: Batch No: Not Specified : DOS: 06/07/2020		

PART B: *SUPPLIMENTARY INFORMATIONS*

a) Reference to sampling by lab/submitted by party : Sample submitted by SCS Enviro Services, Jaipur, Rajasthan
By Lab: i) Location : ----------
ii) Date & time of collection : ----------
iii) Name of lab representative (Wherever applicable) : ----------
b) Supporting documents like graphs, tables, Sketches for the measurements taken and The results derived, if any to be attached : ---------
c) Deviation from the test methods as Prescribed in relevant ISS / Work Instructions, if any : No deviation
d) Deviation from environmental condition, if any : No deviation

PART C: *TEST RESULTS*

Sl. No	Parameter	Specified value maximum as per IS 10500:2012	Result
1	Beta Emitters	1 $Bq.l^{-1}$	BDL
2	Alpha Emitters	0.1 $Bq.l^{-1}$	BDL

N.B:- BDL is below detection limit of the detector.
The DL for Beta Emitters is 0.134 $Bq.l^{-1}$
The DL for Alpha Emitters is 0.007 $Bq.l^{-1}$

PART D: *REMARKS*

1) The results stated above relates to the sample tested only.
2) This report in full or in part shall not be published, advertised, used for any legal action unless prior permission has been secured from the competent Authority of the laboratory.
3) The sample shall be kept for three month after the test and can be returned on request or shall be destroyed. Any customer complain or by regulatory authority shall be entertained, if and only if the complain is registered within one month from date of report.

For Modern Test Centre
Shankar Khatri
Signature with seal
Authorised Signatory
21402

Original

ULR NO: TC531220000000850F TC-5312

Modern Test Centre

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- (Accredited To NABL through ISO/IEC 17025:2017)
- (Recognized by BIS vide OSL Code-5123116)

Off:-Gandhi Nagar 5th line Extn. East, Berhampur-760001, Dist-Ganjam (Odisha)
Lab:-Neelanchala Nagar 3rd lane, Berhampur-760010, Dist-Ganjam (Odisha), Phone:-0680 2403321-22
Visit us: www.moderntestcenter.com Mail: - moderntestcenter@gmail.com
Ref: - 26307/MTC/LF/7.8/14/2020 DATE: 20/07/2020

TEST CERTIFICATE

Issued to: M/s. Hindustan Zinc Limited, Zawar Mines
PO: Zawar Mines
Udaipur, Pin: 313901.

LOCATION: ZAWARMALA MINE

Customer Reference No: Nil Dt. 08/07/2020
Date of Receipt: 20/07/2020

Date of Initiation of Test : 20/07/2020
Date of Completion of Test: 20/07/2020

TEST CERTIFICATE NO: 2113 18895 **DATE: 20/07/2020**

TEST CERTIFICATE AS PER IS 14194 (PART- 1& PART-2): 2013

PART A: *PARTICULARS OF SAMPLE SUBMITTED*

a) Nature of sample	: Dewatering Water	f) Quantity	: 1 No's
b) Grade / Variety/ Type/Class/Size etc	: 1 lit bottle	g) Mode of packing	: Packed in Carton
c) Brand Name, if any	: Not available	h) Condition of Seal of Certifying Body Or the Regulatory authority	: Not applicable
d) Name of the test suggested	: Beta Emitters & Alpha Emitters	i) Any other information	: No Specific Observation
e) Batch No. & Date of Manufacture /Collection/Sampling	: Batch No: Not Specified : DOS: 06/07/2020		

PART B: *SUPPLIMENTARY INFORMATIONS*

a) Reference to sampling by lab/submitted by party : Sample submitted by SCS Enviro Services, Jaipur, Rajasthan
By Lab: i) Location : ----------
ii) Date & time of collection : ----------
iii) Name of lab representative (Wherever applicable) : ----------
b) Supporting documents like graphs, tables, Sketches for the measurements taken and The results derived, if any to be attached : ---------
c) Deviation from the test methods as Prescribed in relevant ISS / Work Instructions, if any : No deviation
d) Deviation from environmental condition, if any : No deviation

PART C: *TEST RESULTS*

Sl. No	Parameter	Specified value maximum as per IS 10500:2012	Result
1	Beta Emitters	1 $Bq.l^{-1}$	BDL
2	Alpha Emitters	0.1 $Bq.l^{-1}$	BDL

N.B:- BDL is below detection limit of the detector.
The DL for Beta Emitters is 0.114 $Bq.l^{-1}$
The DL for Alpha Emitters is 0.007 $Bq.l^{-1}$

PART D: *REMARKS*

1) The results stated above relates to the sample tested only.
2) This report in full or in part shall not be published, advertised, used for any legal action unless prior permission has been secured from the competent Authority of the laboratory.
3) The sample shall be kept for three month after the test and can be returned on request or shall be destroyed. Any customer complain or by regulatory authority shall be entertained, if and only if the complain is registered within one month from date of report.

For Modern Test Centre
Shankar Khatai
Signature with seal
Authorised Signatory

21390

Annexure - 7

DAINIK BHASKAR, Udaipur Edition 10.01.2017 Page 4

राजस्थान

हिन्दुस्तान ज़िंक लिमिटेड

पर्यावरण स्वीकृति प्राप्ति बाबत सूचना

RAJASTHAN PATRIKA, Udaipur Edition 10.01.2017, Page 7

राजस्थान पत्रिका, उदयपुर मंगलवार 10.01.2017

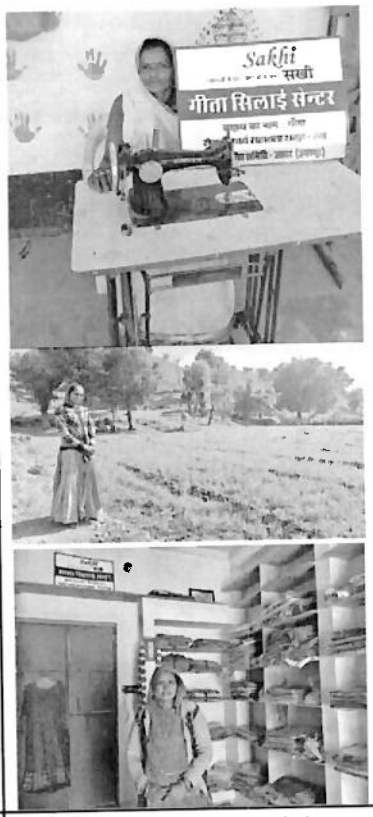
हिन्दुस्तान ज़िंक लिमिटेड

पर्यावरण स्वीकृति प्राप्ति बाबत सूचना

ANNEXURE-8

Compliance status of Commitments made during previous public hearing

S. No.	Issues	Action taken
1	Appreciation for education especially Girls education.   	• 56 meritorious girls from our nearby villages supported in 2024-25 for higher education by getting them enrolled for post-graduation at Ringus College. • HZL is lending support in improving the board results of 1200+ students under Shiksha Sambal Project in 10 Govt Schools and as a part of which 3 camps were organized bringing together 600+ students of these Schools (Summer Camp, Diwali Learning Camp & Winter Camp) for better coverage and preparation of the exams • Three students of Newatalai and Tidi villages have been selected under Unchi Udaan Project and are carrying out their coaching for engineering competitive exams in Udaipur with CSR Project Partner 'Resonance'. • Till date, nearly 200 youth have benefitted through two batches of coaching for govt. competitive exams in partnership with Anushka Academy. • Zinc Kaushal Kendra inaugurated at Zawar Mines. 100+ youth trained on two trades—Unarmed Security Guards and Food & Beverage Service Management trainees placed at renowned organizations including TCS, Taj Hotels and Club Mahindra with average salary of more than Rs 13,000/-.

S. No.	Issues	Action taken
2	Demand for set-up of more industries in the area for employment generation. 	1. 500+ Rural Women supported to start generating livelihood through micro-enterprise activity under Sakhi Project, today they run their own small kirana stores, flour mill, stitching, beauty parlour etc. 2. Zawar Mata Farmer Producer Company (established through project support under CSR) recorded an Annual Business Turnover of Rs. 23 Lakhs in FY 2024-25, earning a gross profit of Rs. 1 Lakh. 3. Sakhi Namkeen Unit set up in Paduna, directly employing 6 Rural Women for manufacturing & packaging unit and supporting 15 women as Business Sakhis. The unit did sales worth Rs. 20.2 lakhs in the year 2024-25. Photos attached*
3	Appreciation for maintaining good environment and plantation in the area.	1. We are regularly carrying out plantation in and around our mine operations. Over last 5 years, we have completed planation in 225 ha area through forest department under RDF scheme-1&2. In 2021, also planted in 75 ha through forest department under RDF scheme-1&2 and 100 Ha in RDF scheme in 2024 Planted 2500 nos. of plantation at tailing storage facility and 1000 nos. as gap plantation in mine area.
4	Chances of dust generation from Tailing Dam.	Various dust control measures like water sprinkling is being done continuously and same will be continued. Compaction of tailing after disposal is being done.
5	General problem of tree felling by villagers in the area.	1. Plantation of 500+ Fruit bearing & medicinal plants at Newatalai site with the support of Panchayat

S. No.	Issues	Action taken
		2. Distribution of 2000+ Fruit & Medicinal Saplings to the Community members , schools, women, farmers etc.
		
		 
6	Improvement of road network in the area. (Maintenance and augmentation of Tidi Zawar Road) 8	• 6.75 km road developed (including development of 5.5 Km of road on the Tidi-Zawar Mines route. • 305 LED street lights installed in the Tidi-Zawar road connecting the region to Udaipur NH  

S. No.	Issues	Action taken
		 
7	Water conservation and harvesting measures.	New Rain water harvesting structures (39 structures) along with deepening / de-silting of existing rain water harvesting structures for the period of FY 17 to FY 22
8	Drinking water problem- Kanpur village	Regular supply of drinking water to the villagers of Kanpur has been ensured through tankers.  

ANNEXURE-9

AQUATIC LIFE
&
ECOLOGICAL SURVEY STUDY

OF

Zawar Group of Underground Lead- Zinc Mine

within ML Area of 3620 ha (ML No. 03/89)

Near
Village: Zawar, Tehsil: Girwa & Sarada,
District: Udaipur (Rajasthan)

HINDUSTAN ZINC

Hindustan Zinc Limited

Registered Office:
Yashad Bhawan,
Udaipur (Rajasthan)
Pin Code- 313 004

CONSULTANT

J.M. EnviroNet Pvt. Ltd.

(Registered EIA Consultant Organization from NABET-QCI)
Certificate No.:NABET/EIA/2326/RA 0308 valid upto 7th August, 2026
Emaar Digital Greens, Tower – B, Unit No. 1S17,
Golf Course Ext. Road, Sector – 61, Gurugram (Haryana) – 122 011
E-mail: jmenviron@hotmail.com
NABL Approved Lab: JM EnviroLab Pvt. Ltd.
(Certificate No.:TC-6821)

March, 2025

ANNEXURE-9

TABLE OF CONTENTS

INDEX

CHAPTER – 1

INTRODUCTION

1.0 About Hindustan Zinc Limited (HZL)

Hindustan Zinc Limited (HZL), after its inception in the year 1966 as a public sector undertaking is engaged in mining of base metals and its smelting activities. HZL has been a leading producer of Zinc in India with its own captive four underground mines located at Tehsil Sarada & Girwa, district Udaipur, Rajasthan and is the world's second largest integrated producer with a global share of approximately 6.0% in Zinc.

Project Details

Hindustan Zinc Limited has Group of Underground Lead- Zinc Mine with Ore Production capacity as 4.8 Million TPA and Beneficiation plant (4.8 Million TPA) (ML Area: 3620 ha) located at Tehsil Sarada & Girwa, District Udaipur (Rajasthan).

Zawar mines, comprising four underground mines, i.e. Mochia falls in Girwa and Sarada Tehsil, Balaria falls in Sarada Tehsil, Zawarmala and Baroi are fall in Girwa Tehsil. A 12-km black top road connects it with Tiri village situated on National Highway No. 76 at a distance of about 32 km from Udaipur. The area is covered in Survey of India Topo Sheet No. 45 H/11 and 45 H/15 of 1:50,000 scale. The total lease area covers 3620 hectares and is divided in to two blocks i.e. Block 1 and Block 3. The block 1 constitutes main Zawar group of mines that are under active exploration and exploitation in above stated four underground mines. The Block 3 comprising of Bara prospect is situated near Bara village about 12 kilometers from Tiri village on National Highway No. 76. This area is under detailed exploration for testing suitability for its mineral potentials. The two blocks lie between following longitudes and latitudes:

Block 1	Longitude	73 40' 25" to 73 45'35"
	Latitude	24 17' 50" to 24 22' 40"
Block 3	Longitude	73 40' 22" to 73 41' 40"
	Latitude	24 12' 50" to 24 22' 47"

The Zawar Group of Mines Udaipur, Rajasthan is the oldest Lead-Zinc mines in India. The Zawar Mine Lead-Zinc deposit and ore beneficiation commenced in the year 1950.

Environmental Clearance (EC) for increase in production was obtained from MoEF&CC, New Delhi. Details of the same are tabulated as under:

Table 1.1:
Details of capacity for previous EC

S. No.	ML Area	Mining capacity along with beneficiation capacity	Details of EC
1.	3620 Ha	4.0 million TPA to 4.8 million TPA	Letter No. J-11015/259/2012-IA-II(M) dated 16.10.2020. Enclosed as Annexure -I
2.	3620 Ha	1.5 million TPA to 4.0 million TPA	Letter No. J-11015/259/2012-IA.II (M) dated 05.01.2017. Enclosed as Annexure –II

1.1 *Purpose of the Project*

While issuing the Environmental Clearance (EC) for enhancement of production capacity from 1.50 MTPA to 4.00 MTPA of Lead-Zinc ore and expansion of ore beneficiation from 1.50 MTPA to 4.00 MTPA (ROM) from four underground mines of Zawar group of mines (ML area: 3620 ha) located near village Zawar in Tehsils Girwa and Sarada, district Udaipur, Rajasthan, vide letter no. J-110015 /259/2012-IA (M) dated 5th January, 2017; MoEFCC, New Delhi laid down three conditions (from vii to ix) under Specific conditions for compliance.

Therefore, HZL has carried out the following studies in the month of October, 2024 and Report has been prepared for further submission to MOEFCC, New Delhi as a part of Compliance Report.

(vii) The reclamation at waste dump sites shall be ecologically sustainable. Scientific reclamation has been followed. The local species may be encouraged and species are so chosen that the slope, bottom of the dumps and top of the dumps are able to sustain these species. The aspect of the dump is also a factor which regulates some climatic parameters and allows only species adopted to that micro climate. This may be recommended to be studied by hiring Expert Ecology Group

(viii) There is need for regular monitoring of invertebrates and aquatic life of water bodies including the reservoir located close to the mining lease to establish that fish and other animals including the water is not contaminated with heavy metal. There could be research on "bio accumulation of heavy metals in invertebrates" to completely establish that there in not impact of mining.

(ix) A specialized Institution may be hired to carry out ecological survey on the plant species to evaluate their growth in terms of stunted, deformed and seed viability. The sensitive species and indicator species to heavy metal pollution may be screened out and plantation accordingly designed. Similarly, uptake of Zinc, Cadmium and Lead etc. by crops and vegetables grown in the crop lands around the mining lease may be studied. Bottom sediment analysis of ponds, wells and rivers to ascertain the level or accumulation of heavy metal may be done.

It was mentioned in the EC letter of MoEF&CC that there is need for regular monitoring of pertaining to (condition No. viii) invertebrates and aquatic life of water bodies including the reservoir located close to the mining lease to establish that fish and other animals including the water is not contaminated with heavy metal. There could be a research on "bio accumulation of heavy metals in invertebrates" to completely establish that there is no impact of mining. Bottom sediment analysis of ponds, wells and rivers to ascertain the level or accumulation of heavy metal may be done. Accordingly, it was decided by HZL that regular monitoring for condition No. viii pertaining to invertebrates and aquatic life may be done every year so this assignment was issued for the post-monsoon period, 2024 to J.M. EnviroNet Pvt. Ltd. (JMEPL), who has carried out the studies by having experts on aquatic Ecology, Forestry and Hydrology and Hydrogeology.

JMEPL carried out comprehensive studies engaging the same experts on aquatic ecology and Water regime and collected the samples of aquatic life from the water bodies including the reservoir located close to the mining lease, bottom sediments and surface water samples and got all the samples chemically analyzed by a NABL accredited Laboratory and interpreted the Lab results so that the impact of mining of Lead-Zinc and likely release of contaminates like Lead, Zinc, Cadmium and other heavy metals may be known on the aquatic life of the surrounding ponds, its sediments and quality of surface water.

During the studies, samples were collected including surface water samples, bottom sediment samples, fish & invertebrates samples and samples of crops and vegetables including 1 sample each of Wheat and Tomato Crop) and were analyzed by NABL accredited Lab (i.e. J.M. EnviroLab Pvt. Ltd) for the physico – Chemical parameters as well as toxic and heavy metals including Lead, Zinc, Cadmium, Chromium, and Manganese etc. All these samples were collected during the month of October, 2024. This report is based on the findings of field studies done by team of experts, interpretation of heavy metal and physico-chemical analysis of the samples collected during site visit and concludes if any contamination has taken place by the mining in its surrounding area.

CHAPTER –2

DESCRIPTION OF MINE SITE AND ITS HYDROGEOLOGICAL FEATURES

2.1 LOCATION & ACCESSIBILITY DETAILS

The location map of the study area is given in figure 2.1. The corner coordinates of the project site are marked in the google earth map and same has been given in figure 2.2. The Salient features of the project is given in the table 2.1

Table 2.1

Salient Features of the Project

Sl. No.	Particulars	Details
1	District and State	Udaipur, Rajasthan
2	Tehsil/Taluka	Sarada & Girwa
3	Villages	• Sarada - Bhaldia • Bara • Chanawada • DhavadiTalai • Kanpur • NewaTalai • Padla • Parsad • Krishnapura • Singhatwara • Girwa- Barothi • KodiyaKhet • Nayakheda • Rawa • Tidi • UdiyaKheda • Zawar
4	Project Area	3620 ha
5	Toposheet Number	45H/11,45H/12,45H/15&45H/16
6	Extent of Geographical coordinate	**Block I** • Latitude: 24 17' 50" to 24 22' 40" • Longitude: 73 40' 25" to 73 45'35" **Block III** • Latitude: 24 12' 50" to 24 22' 47" • Longitude: 73 40' 22" to 73 41' 40"
7	Nearest Town	Udaipur City ~ 18.6 Km, North (aerial distance)
8	Nearest Railway Station	• Zawar Railway Station on Udaipur -Ahmadabad MG train route. • Udaipur 44 km North (by road)
9	Nearest Airport	Maharana Pratap Airport, Udaipur ~65 Km by road, NE

Sl. No.	Particulars	Details
10	Nearest Highway	NH- 927 Connecting – Udaipur – Dungarpur (Passing through the lease area)
11	Nearest Water Body	• Jamri Nadi • Daiya Nadi • KhanthariyaTalav • ManasTalav • Manasi Nadi • Sari Nadi • Gomti Nadi • Pratap Sagar • Gargal Nadi • Bhawara Nala • ThorghadTalav • Parei Nadi • Koel Nadi • AmarsagarTalav • Naya Talav • Tidi Nadi
12	Seismic Zone	Zone – III as per IS – 1893 (Part-1) -2002

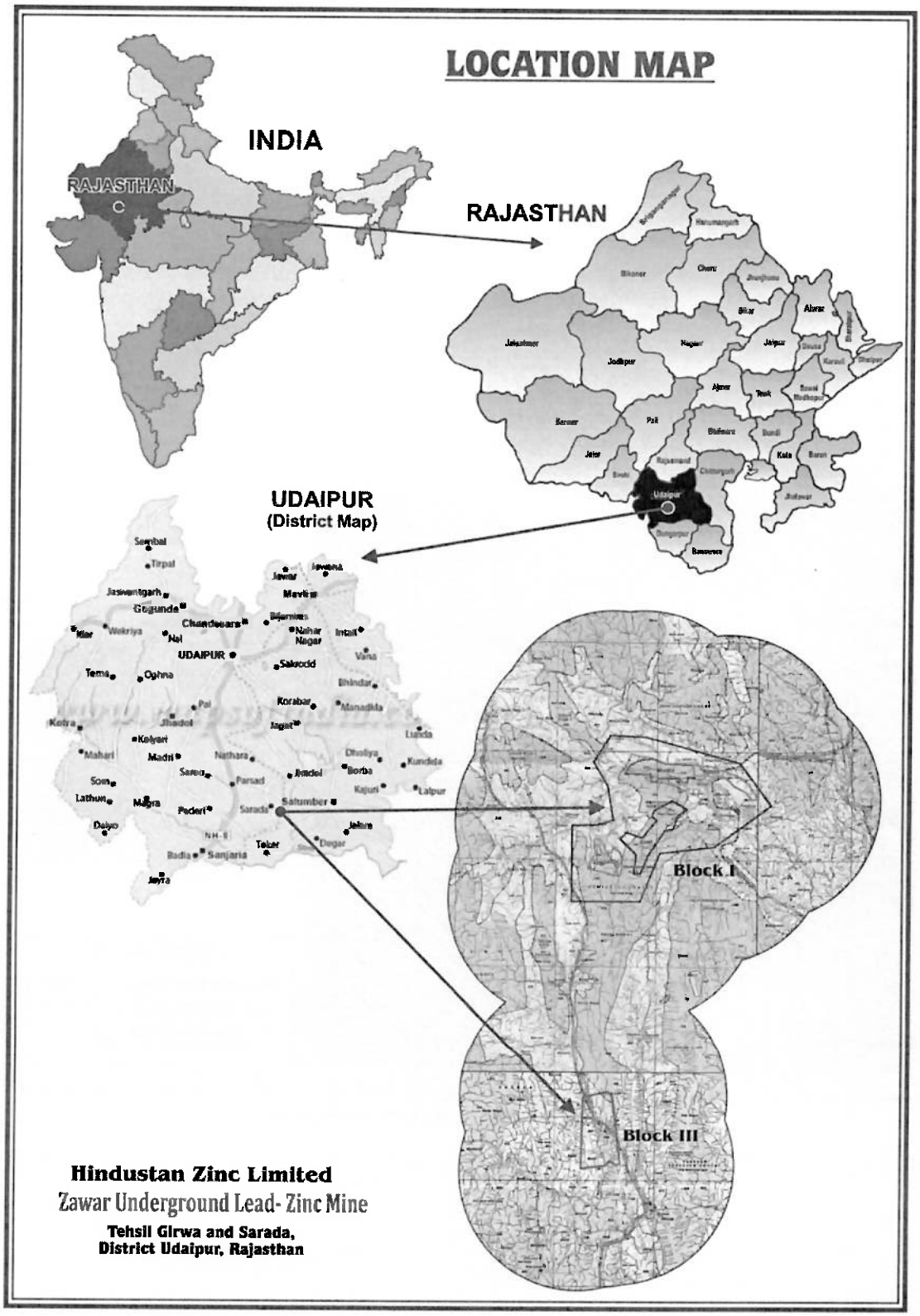


Figure 2.1: Location Map

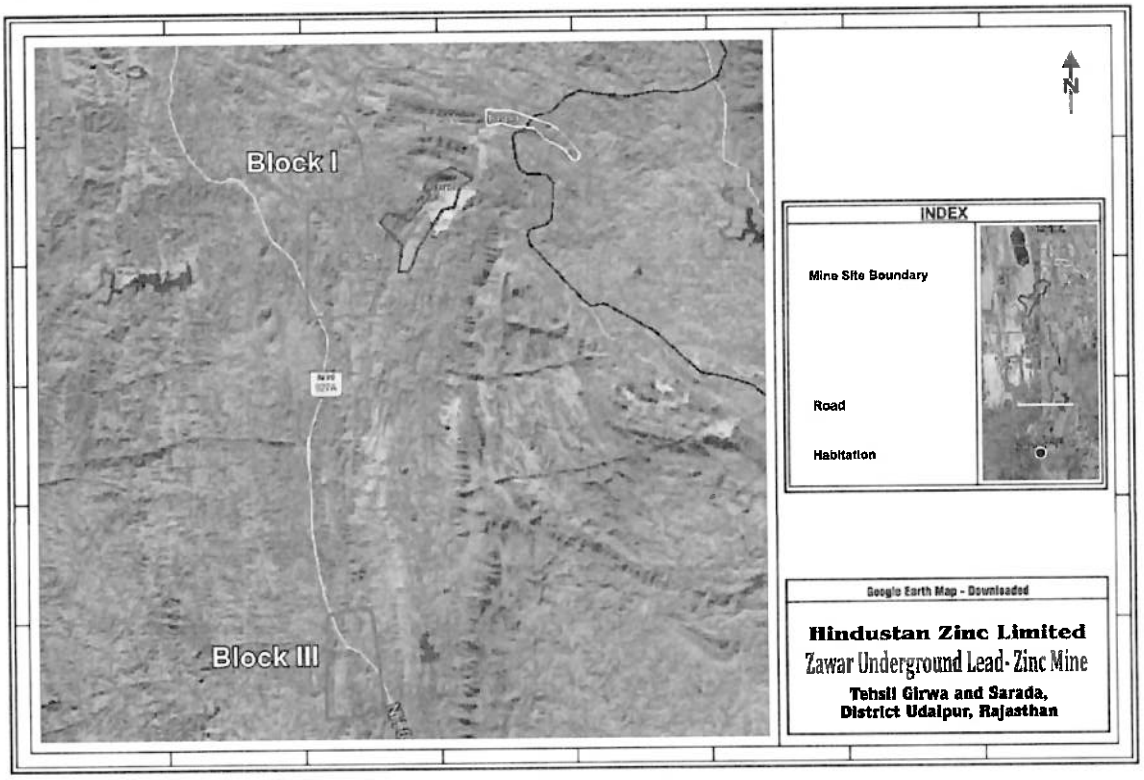


Figure 2.2: Google Earth Map showing the mine lease area

2.2 HYDROGEOLOGY OF THE AREA

The occurrence of ground water in the district is mainly controlled by the topographic and structural features present in the geological formations. Its occurrence is controlled by topography, physiography and structural features of the geological formations. The movement of the groundwater in hard rock areas is governed by size, openness, interconnection and continuity of structurally weak planes while in unconsolidated formations, ground water movement takes places through pore spaces between grains.

2.2.1 AQUIFER DESCRIPTION

Groundwater in Bhilwara Super Group: The eastern part of the district is underlain by the rocks belonging to Bhilwara super group. Few intrusive are also found which have low permeability. Ground water in these rocks occurs under water table conditions in the zone of weathering and fracturing, joints and foliation planes. The rate of recuperation is slow in gneisses and schists while it is comparatively faster in granites. The depth of dug wells ranges from 15 to 35 metres and the Yield varies from 20 m^3/day to 60 m^3/day. The depth to water level in the area tapping this aquifer ranges from 3m to 35m.

Groundwater in Aravalli Formation: Aravalli Supergroup consisting of Phyllites, Quartzites and dolomite form important aquifer especially around Jharol, Udaipur and Barapal. Ground water occurs in weathered zones like schistosity, joints, fissures and bedding planes. Quartzites generally occur intercalated with phyllites and are well jointed. Ground water in phyllites occurs mainly in fractured cleavages. Carbonate formations are cavernous, wherever calcium content is high. The depth to water level varies from 5 to 20 meter below ground level whereas depth of wells varies from 8 to 30 metres below ground level. The average yield of wells is around 40 m^3/day. In carbonates, the yield of wells varies from 20 to 200 m^3/day.

Groundwater in Delhi super group: The formations belonging to Delhi super group are exposed in the western part of the district. Ground water in Quartzites occurs in the joints and fractures. Depth to water level is generally shallow. The yield of wells averages 50 m^3/day. Ground water in biotite schist and hornblende schist occurs in joints and fractures. The depth to water level ranges from 5 to 20 metre below ground level and yield of wells varies from 12 to 250 m^3/day. In Calc schist and Calc gneiss, the yield of dug wells varies from 10 to 100 m^3/day. The yield is high when the lenticular cavities along Calc bands are saturated and interconnected.

Groundwater in Alluvium: Ground water occurs under unconfined condition in the unconsolidated formations consisting of sand, gravel, pebbles, cobles and boulders in areas close to river courses near Kanpur area.

2.2.2 GROUNDWATER FLOW AND AQUIFER INTERACTION

Ground water occurs under water table (phreatic conditions) in crystalline metamorphic, mostly dolomite and mica schist. Metamorphic are impervious in nature and ground water is held and moves through secondary openings like foliations, fractures, joints etc. Fracture

porosity and hydraulic conductivity of metamorphic is very low. The elevation range is 420-706 and flow of water from North to South direction. The ground water movement follows the natural topography and general slope of the lease area. The general slope of the lease area is towards SE following the natural drainage pattern. Water level of the area is 7-10 m deep in pre-monsoon and 3-5 m in post-monsoon season Present depth of mine working is from minimum 30m to maximum 600 m depth. The water quality is potable in nature in the study area; hence there is no contamination in ground water.

2.2.3 HYDROLOGY OF BUFFER ZONE OF ZAWAR MINES

2.2.3.1 Tidi River Basin

Tidi river, a tributary of Mahi River, originates in the south western part of Debari hills which takes southerly course and joins Gomti river near village Jharol. Tidi river has other catchment area in the hills on the western side of village Tidi. The catchment area of Tidi river up to Tidi dam is 105 km^2. There is another Tidi river water shed on the northern side of Zawar hills having catchment area of 265 km^2. Tidi river after flowing through Zawar valley, takes southerly course and meets Gomti river, just after Jaisamand dam which is getting flow of Gomti, Godi and Vagruva rivers. Jaisamand is a major irrigation project with live storage of 296 Mm^3 and command area of 15,993 hectares with catchment area of 1648 km^2.

2.2.3.2 Watersheds of Buffer zone of Zawar Mines

The buffer zone (5 km radius area from lease boundary of lease) covers an area of about 240 km^2 and has two water sheds (Figure -2.1). One and the major water shed is formed by Tidi river which is a tributary of Gomti river. Gomti river joins Som river and Som river, after meeting Jakham, joins Mahi river. Som river has been harnessed near Jai- Samand forming Jai – Samanad lake, a largest fresh water lake of the state. The other water sheds Pareli river water shed cover small area in the buffer zone. Pareli river joins Som River.

2.2.3.3 Tidi River Watershed and its Hydrology

The Tidi water shed in Zawar buffer zone covers an area of 225 km2 and flows mostly in hilly terrain with average elevation of 835 to 370 metres above msl. There is very limited cultivable land in this water shed and does not any irrigation facility. With a view to harness the surface runoff generated in the western catchment of Tidi water shed, a captive dam was constructed by HZL in the year 1976 near village Amarpura, about 13 km from Zawar mines. Water from this dam is taken to the mines by a pipe line for beneficiation and drinking water supply of mines and village Zawar. The catchment area of Tidi dam is 106.70 km2 with live storage of 8.38 million cubic metres.

2.2.3.4 DRAINAGE PATTERN

The buffer zone Zawar group of mines is drained by Tidi River, a tributary of River Mahi originates in the south western part of Debari hills which takes southerly course and joins Gomti River near

village Jharol. Tidi River after flowing through Zawar valley takes southernly course and meets Gomti River, just after Jaisamand dam which is getting flow of Gomti, Godi and Vagruva rivers. The western catchment area of Tidi River up to Tidi dam covers 105 km² and the northern catchment area of Tidi River, when it enters within lease area is 265 Km² with total catchment area of the river before it enters Zawar valley is 370 km². Out of the catchment area of 105 km² of Tidi River up to Tidi dam, the catchment yield has been estimated as 10.16 mcm during a normal a rainfall year. Of this 7.18 mcm (the present storage capacity due to silt accumulation in the dam with storage capacity of 8.49 mcm) has been harnessed by Tidi dam and rest overflows through the Tidi River downstream. It means 70% of the catchment yield has been harnessed by Tidi dam and rest flows downstream.

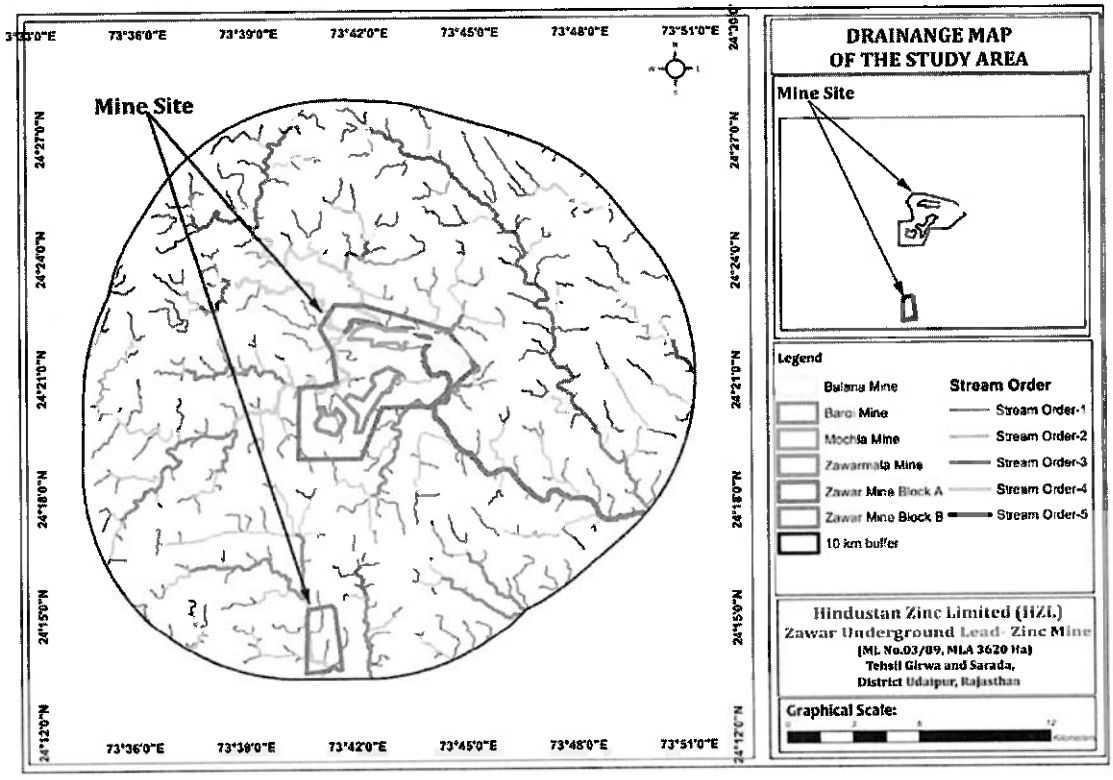


Figure 2.3: Drainage Pattern of M/s Hindustan Zinc Ltd. Zawarmala Mines (3620 ha) (Source: USGS)

2.2.4 CLIMATE & RAINFALL

There is an IMD meteorological station located at Udaipur which is 30 km in north of Zawar mines and meteorological data recorded at Udaipur can be considered as applicable to Zawar mines except rainfall which is being recorded at Zawar mines by HZL.

The Indian Meteorological Department (IMD) has divided Rajasthan in two meteorological sub-divisions, i.e., west Rajasthan and east Rajasthan and the sub-basin falls in east Rajasthan sub-division.

Based on Koppen classification of climatic pattern, Debari buffer zone may be classified as tropical steppe, semi-arid and hot. The year is divided in to four seasons. The winter season is from mid-December to February and is followed by the hot summer season from March to mid-July, including the pre-monsoon season from April to June. The period from July to mid-September constitutes the south west monsoon season and the period from the latter half of September to mid-December as post monsoon season. The southern part of the district receives slightly more rainfall. The climate of the district is dry except SW monsoon season. The cold season is from December to February and is followed by summer from March to June. Period from mid of September to end of November constitutes post monsoon season. The droughts are in general of mild or normal type. However, severe type of droughts has been recorded at Udaipur, Gogunda, Kherwara, Jharol, Kotra and Vallabhnagar. Very severe type of drought has been recorded in the year 1987 at Kotra. The average annual rainfall of the district for the year 2012-2024 is 757.64 mm.

Table 2.2
Rainfall Statistics of Udaipur District

S. No	Year	Rainfall (mm)
1.	2012	756.74
2.	2013	631.43
3.	2014	548.7
4.	2015	558.31
5.	2016	886.06
6.	2017	790.07
7.	2018	512.69
8.	2019	934.5
9.	2020	915.26
10.	2021	704.38
11.	2022	840.36
12.	2023	1013.25
13.	2024	775.86
Average		**757.64**

(**Source:** NASA Power)

2.2.5 HUMIDITY:

Relative humidity during the south west monsoon is generally over 60%. During the rest of the year, air is normally dry. Relative humidity during summer afternoon is as low as 20% while during monsoon, it does not go more than 80 %. The mean annual humidity values in the morning are 65.4 % and in the evening 37.6%.

The annual average rainfall in the region is around 589.79 mm (average of 11 years rainfall data from 2012-2022) varying from minimum 508.64 mm in 2018 to maximum 654.44 mm in 2019.

CHAPTER-3

WASTE MANAGEMENT AT MINE

3.1 NEED FOR WASTE MANAGEMENT AT MINE SITE

As per the Environmental Clearance (EC) issued by Ministry of Environment, Forests and Climate Change (MoEF&CC) to the Hindustan Zinc Limited, vide letter no. J-110015 /259/2012-IA (M) dated 5th January, 2017 from four underground mines of Zawar group of mines, covering an area of 3620 hectares located near village Zawar in Tehsils Girwa and Sarada, district Udaipur, Rajasthan, laid down three conditions (from vii to ix) under Specific conditions for compliance.

Condition vii of the EC pertains to reclamation at waste dump site to be ecologically sustainable, details of which are given as follows-

"(vii) The reclamation at waste dump sites shall be ecologically sustainable. Scientific reclamation has been followed. The local species may be encouraged and species are so chosen that the slope, bottom of the dumps and top of the dumps are able to sustain these species. The aspect of the dump is also a factor which regulates some climatic parameters and allows only species adopted to that micro climate. This may be recommended to be studied by hiring Expert Ecology Group."

The waste generated during excavation will be utilized for backfilling in underground voids and tailing dam embankment.

Additionally, provision of waste hauling to surface is kept considering operational flexibility. The waste hauled to surface will be dumped to existing earmarked area acting as buffer storage area for further utilization in backfilling and tailing dam embankment.

3.2 EXISTING WASTE MANAGEMENT PRACTICES ADOPTED

During mining and beneficiation process, two types of waste are generated: -

(A) Solid Rock waste (Waste Barren Dolomite, Phyllites, Greywacke etc.)

(B) Tailings from beneficiation plant

3.2.1 Solid rock waste from mine development

During the process of mine development for access and stope preparation, waste rock is generated. Majority of the excavations at all the mines is in dolomite. All the mines have facilities for handling of waste for dumping into exhausted stope voids. Required part of waste is brought to the surface for strengthening and stabilizing slopes of tailing storage facilities.

There is no fresh dumping of waste rock at surface, therefore there is no creation of waste dump at surface.

Previously dumped waste rock area has been stabilized using plantation. A "rock garden" has been developed with dense plantation on the waste dump area. Photographs have been as depicted below:

Fig-3.1: Plantation at the Waste Dump Area

3.2.2 Tailings from beneficiation

- Zawar mines have a beneficiation plant. Tailing's slurry generated from beneficiation plant contains about 50-65% water. It is possible to extract excess water (recirculation for mill operation) from tailings by introducing filtration plants to transform solid fractions into dry cake containing about 15% moisture.
- Zawar Mines have installed and commissioned "Dry tailing plant (DTP)" in the year 2019-20. Tailing slurry is fed to this DTP whereby water is recovered from tailing slurry and tailings are disposed in the form of dry cake with moisture content around 15% and then compacted using roller.
- The Dry Tailing plant (DTP) is a one-of-its-kind technology that involves processing of tailings in the most sustainable and eco-friendly manner.

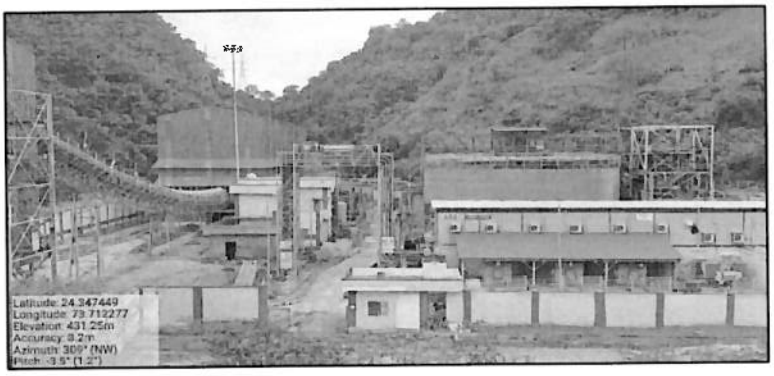


Fig-3.2: Photograph of Dry Tailing Plant

Fig-3.3: Photograph Compacted tailing after disposal

3.2.3 Existing waste management practices

- All the mines have facilities for handling of waste and dumping into exhausted stope voids, therefore no permanent solid waste rock dumping area is proposed on surface inside the lease area.
- Required quantum of waste rock for tailing storage facility construction is being hoisted to surface to temporary dumping storage area and further transported for tailing storage facility construction. Temporary waste storage area has been constructed at Central Mochia, Mochia Decline, Central Baroi and North Baroi.
- Some of the waste shall be used for leveling and creating base for new infrastructure site development, which shall be compacted and green belt shall be developed.
- Tailing disposal is planned over existing tailing storage facility in lease area, which shall be rehabilitated later after completion of life. However, new sites are planned for tailing disposal in conceptual period of Mining Plan.

3.3 Environmental Considerations in Tailing Disposal Closure Planning:

After tailing storage facility reaches to its ultimate height, then rehabilitation measures will be undertaken over the disposed area as per approved mining plan. Suitable plantation will be developed over the tailing storage facility (TSF).

The measures proposed to be taken are as follows:

- The total area of the tailing disposal area will be 120.68 Ha. This area covers a safe belt of hill side, which may be utilized for fencing purpose.
- Since the tailings don't have organic material and other elements/nutritive components, which are essential for plant Maintenance of plantation. To overcome this, organic material along with soil will be spread and the density of heavy foliage plants will be maintained to have humus layer development.

CHAPTER-4

STUDY OF ZOOPLANKTONS AND PHYTOPLANKTONS AT SITE

4.0 Introduction:

Planktons are the forms which are found in all aquatic ecosystems except for fast moving rivers. They are small plants and animals whose powers of self-locomotion are so limited that they cannot overcome currents in their ecosystem. Phyto planktons are mostly free-floating unicellular algae of the freshwater bodies which are either solitary or colonial. These are the "autotrophic" organisms responsible for photosynthesis.

Planktons respond quickly to environmental changes because of their short life cycle; hence, their species composition are more likely to indicate the quality of the water which they are found.

All the animal components of the plankton are called Zooplankton. Zooplanktons are exceedingly active and move relatively great distances. They float and move at the will of the waves and other water movements Zooplankton are myriads of diverse floating and drifting animals with limited power of locomotion. It includes microscopic, unicellular or multi-cellular invertebrate animals with size ranging from a few microns to a millimeter or more. While most zooplankton are "heterotrophs" – that is they obtain their energy from consuming organic compounds, such as algae or other zooplankton - some zooplankton, such as the dinoflagellates, may also be fully or partially photosynthetic - gaining their energy, as plants do, from sunlight. In order to study the Phytoplankton and Zooplankton in the aquatic habitat of Zawar Lead-Zinc mine in the buffer zone 06 sites were identified namely- (i) Zawar Mata Dam, (ii) Tidi dam, (iii) Chandani Nalla, (iv) Daiya Nadi, (v) Tiri Nadi, and (vi) Rawa (West Mochia).

Table: 4.1

Sampling Locations

Sl. No.	Sampling sites	Latitude	Longitude	Aerial distance from the Mine site
1	Zawar Mata Dam	24°20'40"	73°40'59"	-
2	Tidi Dam	24°19'42"	73°38'28"	3.28 km in ENE Direction
3	Chandani Nalla	24°24'17"	73°40'6"	3.38 km in SSE Direction
4	Daiya Nadi	24°19'52"	73°48'22"	5.98 km in WNW Direction
5	Tiri Nadi	24°20'16"	73°44'3"	0.19 km in NNW Direction
6	Rawa (West Mochia)	24°22'13"	73°41'30"	0.55 km from Mochia Mine in SE Direction

Source: *SOI Toposheet and Field Survey*

4.1 Collection of Plankton:

In order to study the Phyto plankton and the Zooplankton, the samples were collected from surface water, by towing the standard plankton net with uniform speed. The net was made of no.25 bolting silk. The sample thus collected was fixed in 10% formalin. In the Lab, the samples were transferred in to a Petri dish and Phyto plankton and Zooplankton were separated. Both Phyto plankton and Zooplankton were identified by observing them under inverted microscope by using Edmonson (1992), Needham and Needham (1992), Tonapi (1980), R. Sharma et al, (2011), Ruksana and D. Srivastava (2015) and Vijay Kumar Balai et al. (2014).

4.2 Phytoplankton - Observation and Results:

Table 4.2

Phytoplankton from different sites in Zawar Lead-Zinc mine

S. No	Different site Phytoplankton	Zawar mata Dam	Tidi Dam	Chandani Nalla	Daiya Nadi	Tiri Nadi	Rawa (West Mochia)
A	Chlorophyceae						
1	*Pleodorina sp*	+	+	+	+	+	+
2	*Tetraspora sp*	+	+	+	+	+	+
3	*Palmella sp*	+	+	+	+	-	+
4	*Eudorina sp*	+	+	-	+	-	+
5	*Scenesdemus sp*	+	+	-	+	-	-
6	*Coelastrum sp*	+	+	+	+	+	+
7	*Spirogyra sp*	+	+	-	+	+	+
8	*Ulothrix sp*	+	+	-	+	+	-
9	*Oedogonium sp*	+	+	-	+	+	+
10	*Chlamidomonas sp*	+	+	-	+	+	+
11	*Zygneama sp*	-	+	-	+	-	-
12	*Schizomeris sp*	+	+	-	+	+	+
13	*Microspora sp*	+	+	+	+	-	+
14	*Spaerocystis sp*	+	+	-	+	+	+
15	*Zygnemopsis sp*	-	+	-	+	+	+
16	*Pleodorina sp*	-	+	+	+	-	+
17	*Oocystis sp*	-	+	-	+	-	+
18	*Closterium sp*	-	+	-	+	+	+
19	*Nephrocytium sp*	+	+	+	+	-	+
20	*Actonostrum sp*	+	+	+	+	+	+
21	*Cholrella sp*	-	+	+	+	-	+
22	*Sprolaenia sp*	+	+	+	+	+	+
23	*Cladophora sp*	-	+	-	+	-	+
24	*Penium sp*	+	+	-	+	-	+
25	*Protoccus sp*	-	+	-	+	+	+
B	Desmidiaceae						
1	*Desmidium sp*	+	+	-	+	-	+
2	*Spaerozosma sp*	+	+	-	+	+	+
C	Myxophyceae						
1	*Nostoc sp*	+	+	+	+	+	+

S. No	Different site Phytoplankton	Zawar mata Dam	Tidi Dam	Chandani Nalla	Daiya Nadi	Tiri Nadi	Rawa (West Mochia)
2	*Oscillatoria sp*	+	+	-	+	-	+
3	*Microcystic sp*	+	+	+	+	-	+
4	*Candelabrum sp*	+	+	-	+	-	+
5	*Merismopedia sp*	-	+	-	+	-	+
6	*Phormidium sp*	-	+	+	+	-	+
7	*Gomphospaeria sp*	-	+	-	+	+	+
8	*Anabaena sp*	+	+	+	+	+	+
9	*Lyngbya sp*	+	+	-	+	+	+
10	*Rivularia sp*	+	+	+	+	-	+
D	**Xanthophyceae**						
1	*Botrydiopsis sp*	+	+	+	+	-	+
2	*Chlorobotrys sp*	+	+	+	+	+	+
E	**Bacillariophyceae**						
1	*Bscillaria sp*	+	+	+	+	+	+
2	*Synedra sp*	+	+	-	+	+	+
3	*Navicula sp*	+	+	-	+	-	+
4	*Nitzschia sp*	-	+	-	+	-	-
5	*Amphora sp*	+	+	-	+	+	+
6	*Cymbella sp*	-	+	+	+	+	+
7	*Pinnularia sp*	-	+	+	+	-	-
8	*Fragilaria sp*	+	+	+	+	-	+
9	*Asterionella sp*	-	+	-	+	-	+
10	*Cyclotella sp*	+	+	-	+	+	+
11	*Gomphonema sp*	+	+	-	+	+	+
12	*Surirella sp*	-	+	-	+	-	+
13	*Melosira sp*	-	+	-	+	-	-
Total		**35 species**	**52 species**	**21 species**	**52 species**	**26 species**	**46 species**

"+" indicates the presence and "-" indicate the absence of species

Phytoplankton communities are sensitive to alterations in their habitats, and thereby, Phyto-Plankton total biomass and many phytoplankton species are utilized as indicators of aquatic habitat qualifications (Chellappa et al., 2009).

The factors regulating growth and succession of planktons are light, temperature, inorganic, organic micro-nutrients, biological factors like competition and predation Aquatic environment depicts ecological features that lead to the establishment of a very dynamic system in which the plankton community plays an important role. According to Olaniyan C.I.O., (1969) The planktons are the heterogeneous assemblage of suspended microscopic materials, minute organisms and detritus in water which wander at the mercy of winds, currents and tides. The planktons have been intimately connected directly or indirectly with human beings as a source of food, fodder, manure and many other types of uses e.g. algae as medicines and antibiotics, water purification, water pollution control, land reclamation, deleterious industrial uses and indicators of water quality. The total number of phytoplankton species found at different sampling locations are

shown below in figure 4.1.

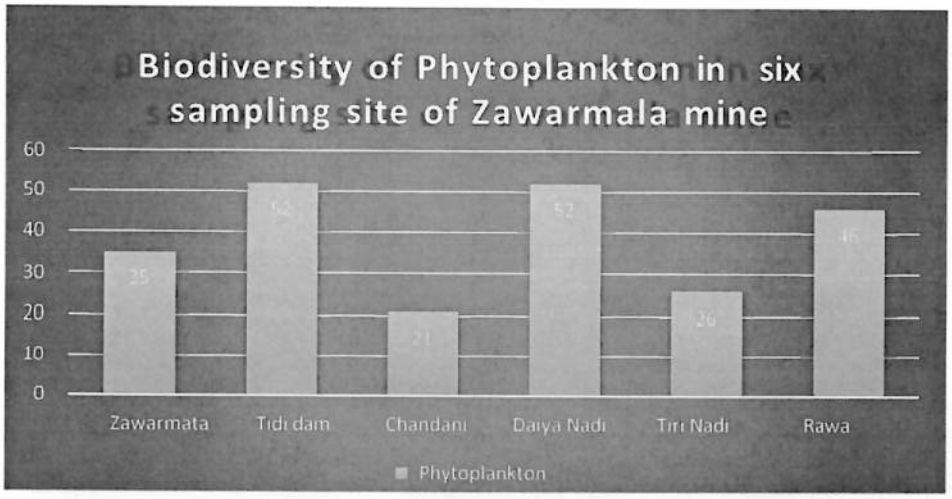


Fig.-4.1: Total number Phytoplankton species found in different sampling locations of Zawar mine

4.2.1 DISCUSSION OF RESULTS- Phytoplankton of Zawar mine

The total number of phytoplankton collected in the study area were 52 species and it includes the following groups namely, Chlorophyceae - 25 species, (48%), Bacillariophyceae – 13 species, (25%) Myxophyceae 10 species, (19%) Desmidiaceae - 2 species (3.84%) and Xanthophyceae 2 species (3.84%.). Among the six sites studied, two sites namely, Tidi Dam and Daiya Nadi are rich with phytoplankton. These two sites are very big in terms of water spread area and also in depth. Generally, the water was very clear with isolated patches of Hydrilla plants. From the present study it can be inferred that the diversity of phytoplankton is indicative of good productivity. The abundance of phytoplankton in the lake was in the order of-: Chlorophyceae >Bacillariophyceae>Myxophyceae>Xanthophyceae and Desmidiaceae

- **The Zawar Mata Dam** is smaller than the Tidi dam and Daiya Nadi in both terms –water spread area and depth wise but it supports good diversity of Phytoplankton. This dam is located adjacent to the human settlement Hence it is rich in nutrients and organic matters. The Chandani nalla and Tiri Nadi are small running water bodies with considerable water in the check dams. The biodiversity of phytoplankton in these sites are very limited.
- **Rawa (West Mochia)** is the sixth site we have studied and it is located right at the edge of village and agricultural land. This pond is also had a lot of vegetation at the margin which sustain the aquatic life in the aquatic system. Due to limited amount water and the lake was little reddish in colour. With reference to the number of phytoplankton, this site ranks third in position among the six sites studied.
- Fig.4.2, 4.3, 4.4, 4.5, 4.6 and 4.7 shows the % different type of Phytoplankton diversity at different sampling locations of buffer zone of Zawar Lead- Zinc mine

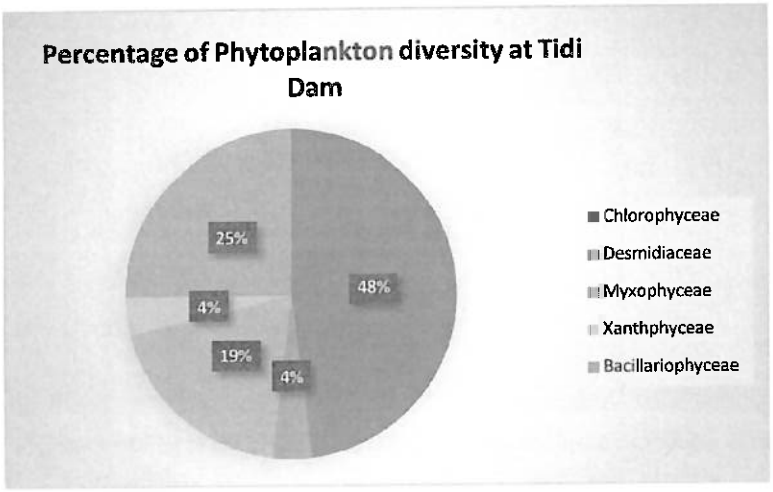


Figure - 4.2: Percentage of Phytoplankton diversity at Tidi Dam

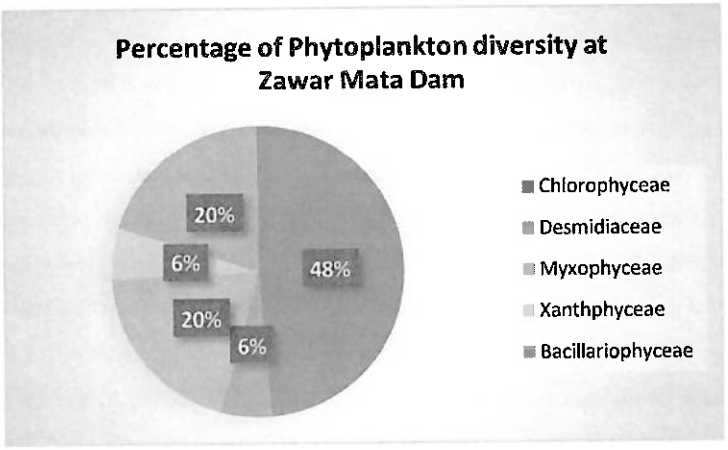


Figure - 4.3: Percentage of Phytoplankton diversity at Zawar Mata Dam

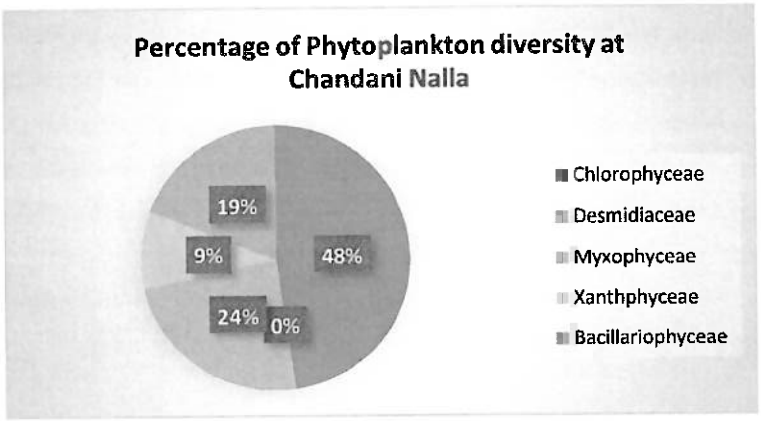


Figure - 4.4: Percentage of Phytoplankton diversity at Chandani Nalla

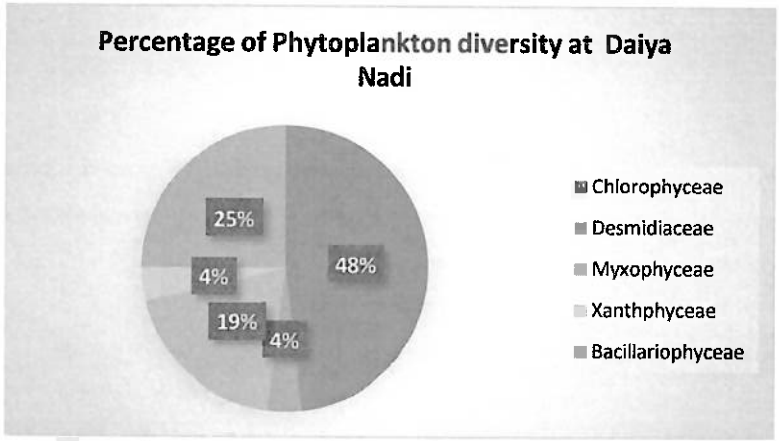


Figure - 4.5: Percentage of Phytoplankton diversity at Daiya Nadi

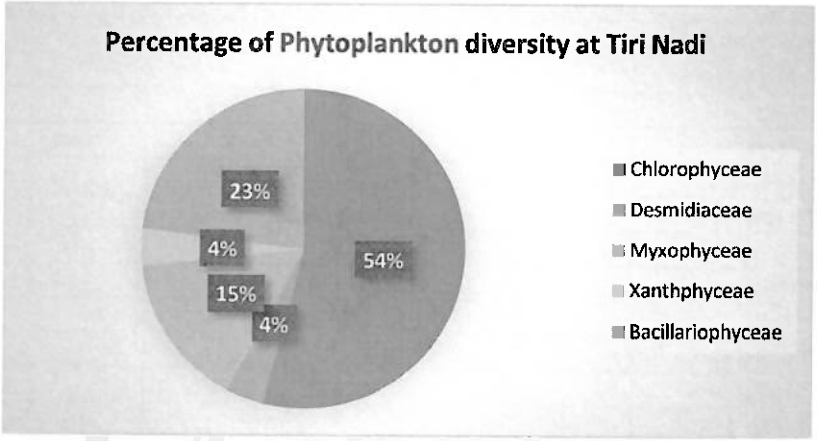


Figure - 4.6: Percentage of Phytoplankton diversity at Tiri Nadi

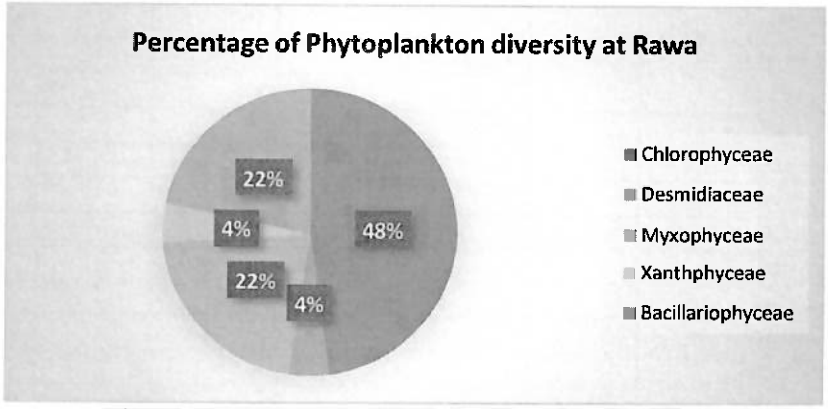


Figure - 4.7: Percentage of Phytoplankton diversity at Rawa

4.3 ZOOPLANKTON– Observation and Results:

Zooplankton of Study Area

Zooplankton are organisms that have animal-like traits. They float, drift or weakly swim in the water. Zooplankton encompass a wide range of both unicellular and multicellular animals. Zooplankton plays very important role in freshwater food webs. Zooplankton biodiversity serves

as an ecological indicator of aquatic environment due to their rapid response according to environmental change, Herbivorous zooplankton graze on phytoplankton or algae, and help maintain the natural balance of algae

Table 4.3

Zooplankton from different sampling locations of Zawar Lead- Zinc mine

"+" indicates the presence and "-"indicates the absence of species

S. No.	Zoo plankton	Zawar mata Dam	Tidi Dam	Chandani Nalla	Daiya Nadi	Tiri Nadi	Rawa (West Mochia)
A	**Phylum Protozoa**						
I	**Class: Mastigophora**						
1	*Euglena sp*	+	+	+	+	+	+
2	*Peranema sp*	+	+	-	+	-	-
II	**Class: Ciliata**					-	+
1	*Paramecium sp*	+	+	+	+	-	+
2	*Coleps sp*	+	+	+	+	-	+
3	*Cyclidium sp*	-	+	+	+	-	-
4	*Stentor sp*	-	+	-	+	-	-
5	*Chaetospira sp*	-	+	-	+	-	+
6	*Chilodonella sp*	+	+	-	+	-	+
7	*Dileptus sp*	-	+	-	+	-	-
B	**Phylum: Rotifera**						
	Class: Monogonota						
1	*Keratella sp*	-	+	+	+	-	+
2	*Brachionus sp*	+	+	+	+	-	-
3	*Filinia sp*	-	+	-	+	-	-
4	*Trichocerca sp*	-	+	+	-	-	-
5	*Lecane sp*	-	+	+	-	-	+
6	*Teratell sp*	+	+	-	+	-	-
C	**Phylum: Arthropoda**						
I	**Class: Crustacea**						
1	Cyclops sp	+	+	-	+	-	+
2	Daphnia sp	+	+	-	+	+	+
3	Diaptomus sp	-	+	+	+	-	+
4	Eucyclops sp	-	+	+	+	-	+
5	Cyclocypris sp	+	+	-	+	-	+
6	*Bosmina sp*	+	+	-	+	+	+
7	*Stenocypris sp*	-	+	-	+	-	+
8	*Dadya sp*	+	+	+	+	-	-
9	*Macrothrise sp*	+	+	+	+	-	-
10	*Cypris sp*	+	+	+	+	-	-
II	**Class: Insecta ***						
1	*Notonecta sp*	+	+	-	+	-	+
2	*Corixa sp*	+	+	-	+	-	+
3	*Microveli sp*	-	+	-	+	-	+
4	*Mesoveli sp*	-	+	-	+	-	+

S. No.	Zoo plankton	Zawar mata Dam	Tidi Dam	Chandani Nalla	Daiya Nadi	Tiri Nadi	Rawa (West Mochia)
5	*Gerridae sp*	+	+	+	+	-	+
6	*Hydrophilus sp*	+	+	-	+	-	+
Total		18 spp.	31 spp.	14 spp.	29 spp.	3 spp.	21 spp.

*Even though insects are not included under Zooplankton we have encountered during our collection. Hence, they are included.

The total number of zooplankton species found at different sampling locations are shown below in figure 4.8.

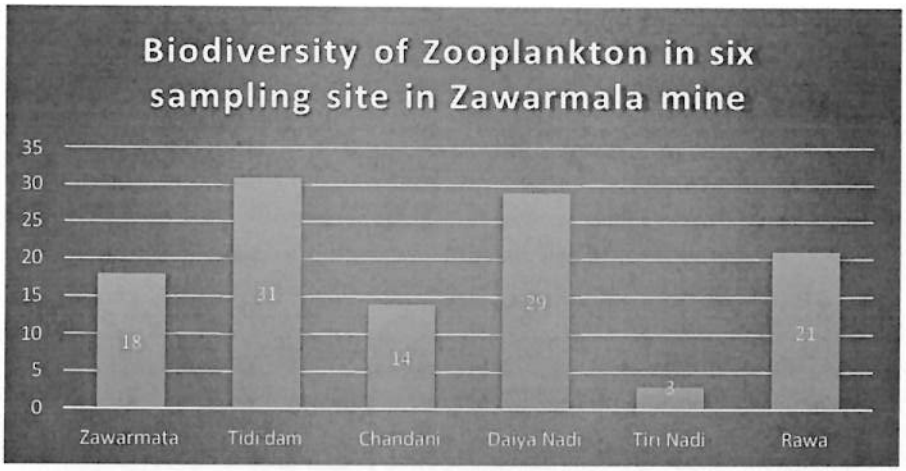


Fig. - 4.8: Total number Zooplankton species found in different sampling site of the Zawar mine

The Zooplankton biodiversity observed in the study area was 31 species and belong to the following group namely, Protozoa, Rotifer, Crustacean and Insecta. Class Crustacean forms a major group with - 10 species, (32.25%), Protozoa 9 species (29%) Rotifera – 6 species, (19.35%) and Insecta 6 species.(19.35%) . Among the six sites studied, two sites namely, Tidi Dam and Daiya Nadi are rich with Zooplankton. These two sites are very big in terms of water spread area and also in depth. The abundance of Zooplankton in the lake was in the order of Crustaceans>Protozoa>Rotifera and Insecta.

4.3.1 DISCUSSION OF RESULTS-Zooplankton of Zawar mine

Zooplankton biodiversity is one of the important ecological indicators of the aquatic environment. Biodiversity of zooplankton is essential to keep aquatic ecosystem healthy because each species plays a specific role (recycling of nutrients, food for another and maintaining of soil fertility) in the ecosystem and some species may allow natural ecosystem to function in a healthy manner (Jeelani, Kaur, & Kumar, 2008). , Zooplankton communities are sensitive to anthropogenic impacts and their study may be useful in the prediction of long-term changes in lake ecosystems, as these communities are highly sensitive to environment fluctuations (Ferrara, Vagaggini, and Margaritora, 2002; Jeppesen et al., 2011; Kehayias, Chalkia ,and Doulka, 2014; Preston and Rusak, 2010). Changes in Zooplankton abundance, species diversity and community

composition can indicate the change or disturbance of the environment.

In any aquatic ecosystem various factors specially limnological characteristics can affect the flora and fauna. The diversity of both Phyto and Zooplanktons play a vital role in the heath of an aquatic ecosystem.

A change in the physico-chemical conditions in aquatic systems brings a corresponding change in the relative composition and abundance of organisms thriving in the water; therefore, they can be used as a tool in monitoring aquatic ecosystems, hence, zooplankton have been considered as ecological importance organisms (Gatdula, and Santos, 2015; Smitha, Shivashankar, and Venkataramana, 2013).

In general all the six sites found in the buffer zone of Zawar Lead and Zinc mine is represented by the major phytoplanktons namely Chlorophyceae, Bacillariophyceae, Myxophyceae, Xanthophyceae and Desimidiaceae.. Sunder Singh (2015), Vijay Kumar Balai et al, (2015) Sharma Riddhi (2011), have also recorded the presence of the following group of phytolanktons namely Chlorophyceae, Chyanophyceae, Eugalenophyceae, Bacillariophyceae and Dianophyceae.

In the present study the phylum Arthropoda (Crustacea 10 sp) represented while the phylum protozoa represented only 9 species and Rotifer 6 species. Among the phylum Arthropoda the class crustacean dominates the entire population and Similar observations were also made by Sharma Riddhi et al, (2011), Sharma vipul (2012), Tak A.S. and Srivastava (2014) Ruksana and D.Srivastava(2014).

Fig.4.9, 4.10, 4.11, 4.12, 4.13 and 4.14 shows the percentage diversity of Zooplankton in different sites of buffer zone of Zawar Lead and Zinc mine site

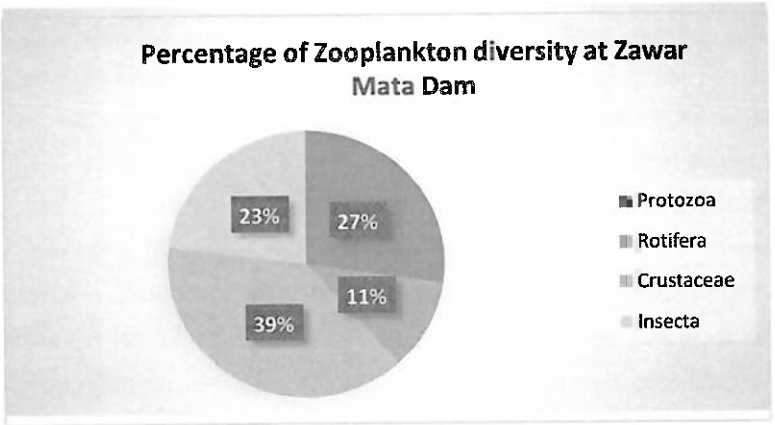


Figure - 4.9: Percentage of Zooplankton diversity at Zawar Mata Dam

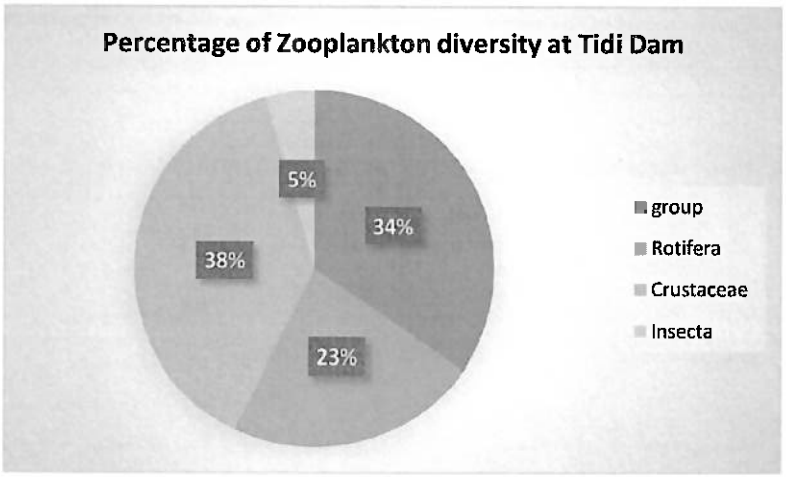


Figure - 4.10: Percentage of Zooplankton diversity at Tidi Dam

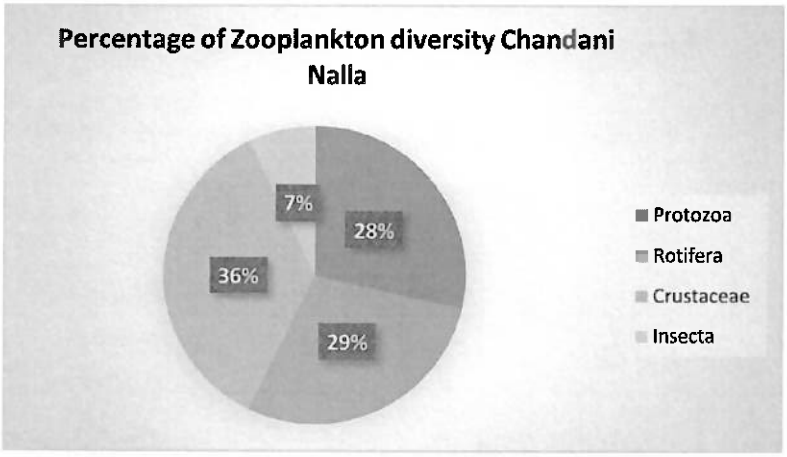


Figure - 4.11: Percentage of Zooplankton diversity at Chandani Nalla

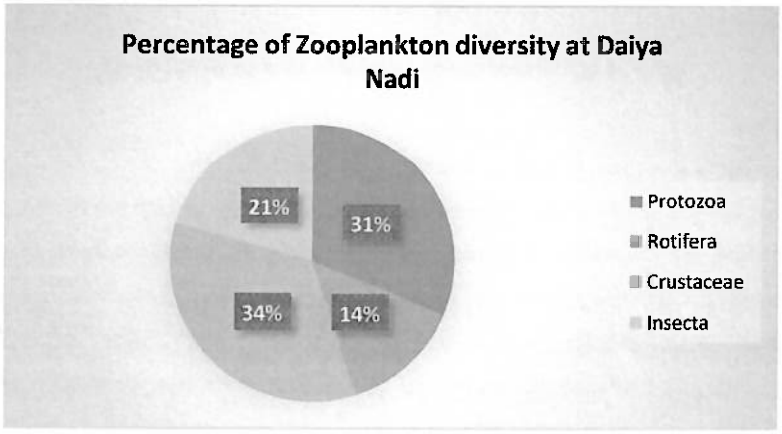


Figure - 4.12: Percentage of Zooplankton diversity at Daiya Nalla

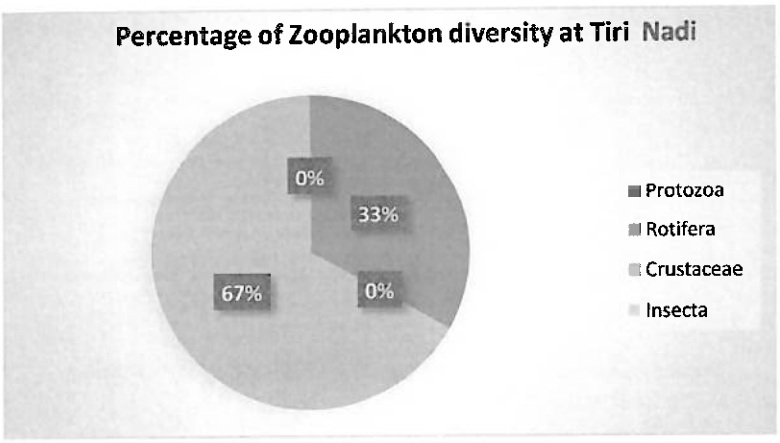


Figure - 4.13: Percentage of Zooplankton diversity at Tiri Nadi

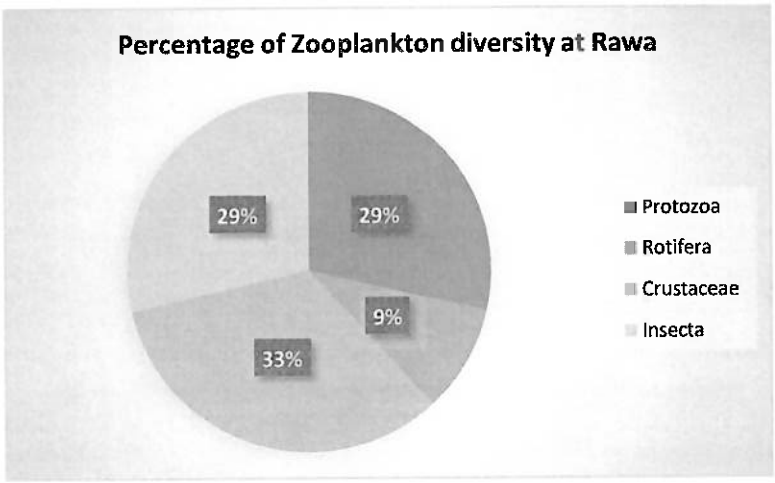


Figure - 4.14: Percentage of Zooplankton diversity at Rawa

4.4 Conclusion:

In the present study (all the sites) in the Zawar Lead and Zinc mine, the number of Phytoplankton and Zooplankton species collected are more or less similar to the number of species collected by the earlier Researchers in Udaipur and adjacent districts of Rajasthan state (Sharma Riddhi et al., 2011, Ruksana and D. Srivastava, 2014,2017, Vijay Kumar Balai et al.,2015, Tak and Srivastava,2015). Thus, it shows that the aquatic ecosystems in the buffer zone of Zawar Lead and Zinc mine are well represented by Phyto planktons and Zooplanktons and the ecosystems are healthy and sustainable.

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CHAPTER – 5
IMPACT OF MINING ON AQUATIC LIFE

5.1. IMPACT OF MINING ON AQUATIC LIFE IN SURROUNDING VILLAGE PONDS

With a view to find out whether the water accumulated in the village ponds, nallahs and rivers has not affected the aquatic life due to any contamination from toxic elements like Lead, Cadmium, Zinc, Chromium and Manganese by mining of base metals of Zawar mines, 06 aquatic life samples were collected from the village water bodies. The location from where aquatic life samples were collected are shown in Figure-5.1.

Table 5.1

Locations of Aquatic Life samples

S. No	Name of Sampling Location	Location Coordinates		Approx. Distance from Mine site	Aquatic Life Sample collection	
					Fish Sample	Invertebrate sample
1.	Zawar Mata Dam	Latitude	24°20'40"	0.6 Km SSW	√	×
		Longitude	73°40'59"			
2.	Tidi Dam	Latitude	24°19'42"	3.2 km in WSW Direction	√	×
		Longitude	73°38'28"			
3.	Chandani Nalla	Latitude	24°24'17"	3.3 km in NNW Direction	×	√
		Longitude	73°40'6"			
4.	Rawa Near West Mochia	Latitude	24°22'13"	0.5 km from Mochia Mine in WNW Direction	×	√
		Longitude	73°41'30"			

Source: *SOI Toposheet and Field Survey*

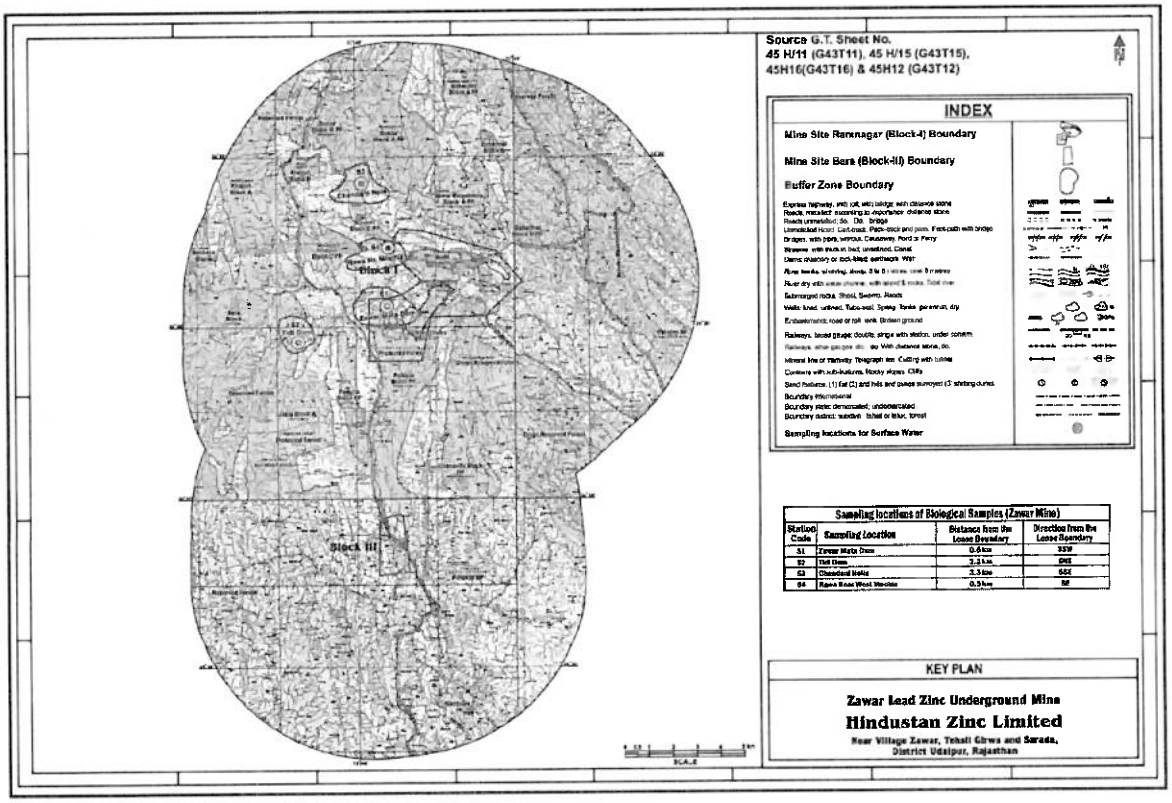

Figure 5.1 Map showing locations of Aquatic life sampling

5.2. ANALYTICAL PROCEDURE FOR THE ANALYSIS OF AQUATIC LIFE PARTICULARLY THE FISHES

Out of the total 09 sampling locations visited, 03 of them which are Gosiya nadi, Tiri nadi upstream and sampling location near Central Baroi mines were found to be dry at present whereas no fishes were observed at 02 sampling location namely, Tiri Nadi downstream and Daiya Nadi. The aquatic life sample preparation and analysis were made according to FAO technical paper No. 212. For heavy metal analysis, fish samples were collected using fishing net and each fish was dissected using stainless steel instrument. The muscles, livers & grills were taken out and fixed using 70% alcohol. All the biological samples were neatly labelled and sent to the laboratory for analysis.

In the laboratory, composite samples of 2-5 gm were used for subsequent analysis. The samples were digested with ultra-pure nitric acid and perchloric acid (4:1) at 10°C until the solution became clear. The solution was made up to known volume with de-ionized water and analyzed for heavy metals like Pb, Cd, Zn, Cr, Mn, using atomic absorption photometer.

5.3. RESULTS OF AQUATIC LIFE SAMPLING

Table-5.2.
Results of Heavy metal analysis of Aquatic Life Samples Collected from existing water bodies

S.No	Sample Location/ Sample ID	Sample wt.	Parameters	Concentration (PPM)	Acceptable limit	Standards
1	Zawar Mata Dam JME/SW/210317013	4.4438	Zinc	5.63	40.0	WHO/FAO 1989
			Lead	0.059	0.5	FAO/WHO 2008
			Manganese	0.007	0.01	WHO 1995
			Cadmium	0.014	0.05	FAO/WHO 2008
2	Tidi Dam JME/SW/210317014	0.5594	Zinc	4.23	40.0	WHO/FAO 1989
			Lead	0.11	0.5	FAO/WHO 2008
			Manganese	0.0087	0.01	WHO 1995
			Cadmium	0.02	0.05	FAO/WHO 2008
3	Chandani Nala JME/SW/210317015	0.1919	Zinc	1.02	40.0	WHO/FAO 1989
			Lead	0.086	0.5	FAO/WHO 2008
			Manganese	0.009	0.01	WHO 1995
			Cadmium	0.027	0.05	FAO/WHO 2008
4	Rawa (West Mochia) JME/SW/210317016	1.0798	Zinc	3.02	40.0	WHO/FAO 1989
			Lead	0.098	0.5	FAO/WHO 2008
			Manganese	0.0089	0.01	WHO 1995
			Cadmium	0.018	0.05	FAO/WHO 2008

5.4. DISCUSSION ON QUALITY OF AQUATIC LIFE

The invertebrates observed during sampling belong to the macroinvertebrates including- the larval forms of stonefly (Plecoptera), Mayfly (Ephemeroptera), Caddisfly (Trichoptera) and flat worms (Platyhelminthes). Other invertebrates include insects like Notonecta sp. Gerrids, Corixa fly, coleoptera insects, water beetle (Hydrophilidae) and diving beetle (Cybister chinensis)

The fish and invertebrate samples were collected from four sites in Zawar mine site namely Zawar Mata Dam, Tidi Dam, Chandani Nala and Rawa (West Mochia). Four heavy metals were estimated which are Zinc, Lead, Manganese and Cadmium. Lead and silver are co product of zinc mining. Zinc is one of the essential metals for fish. The consumption of fish is recommended because it is a good source of omega-3 fatty acids, which have been associated with health benefits due to its cardio-protective effects.

The two main ways by which heavy metals enter the aquatic food chain are by direct consumption of water and food through the digestive tract and non-dietary routes across permeable membranes such as the muscle and gills. Therefore, levels in fish usually reflect levels found in sediment and water of the particular aquatic environment from which they are sourced. Fish have the ability to accumulate heavy metals in their tissues by absorption along gill surface and kidney, liver and gut tract wall to higher levels than environmental concentration. Accumulation of heavy metals by organisms may be passive or selective; and differences in accumulation of heavy metals by organisms could be as a result of differences in assimilation, egestion or both. Entry of heavy metals into the organs of a fish mainly takes place by adsorption and absorption; the rate of accumulation is a function of uptake and depuration rates.

After observing the results of chemical analysis of fish samples collected from the water bodies surrounding the Zawar mines, it was observed that all the fishes were surviving in the water bodies which is suitable for fishes and other aquatic life. These fishes, if captured by the villagers could be safely consumed by the human beings just like the fishes collected from fresh water lake of nearby Jaisamand Lake in Udaipur district which meets the major requirement of fishes of the State.

While correlating the heavy metals in the fishes, which can be used for human consumption, within the prescribed standards, it is observed that these fishes do not have the heavy metals more than the permissible limits.

CHAPTER-6

IMPACT OF MINING ON SURFACE WATER QUALITY

6.1 IMPACT OF MINING ON SURFACE WATER QUALITY

With a view to find out the quality of surface water which might have been affected by mining in an area of 10 km radius from the boundary of the mining lease area, 06 surface water samples were collected from the streams and nallahs and Dam sites, three water bodies named as the location from where surface water samples were collected is shown in **Figure-6.1.**

Table 6.1
Sampling sites of Surface water locations

S. No	Name of Sampling Location	Location Coordinates		Approx. Distance and direction from Mine site
1.	Zawar Mata Dam	Latitude	24°20'45"	-
		Longitude	73°40'52"	
2.	Tidi Dam	Latitude	24°19'42"	3.2 km in WSW Direction
		Longitude	73°38'28"	
3.	Chandani Nalla	Latitude	24°23'57"	3.3 km in NNW Direction
		Longitude	73°40'53"	
4.	Tiri Nadi	Latitude	24°21'44"	0.2 km in SSE Direction
		Longitude	73°43'44"	
5.	Daiya Nadi	Latitude	24°17'50"	5.98 km in ESE Direction
		Longitude	73°49'49"	
6.	Rawa Near West Mochia	Latitude	24°21'36"	0.5 km from Mochia Mine in WNW Direction
		Longitude	73°41'47"	

Source: *SOI Toposheet & Field Survey*

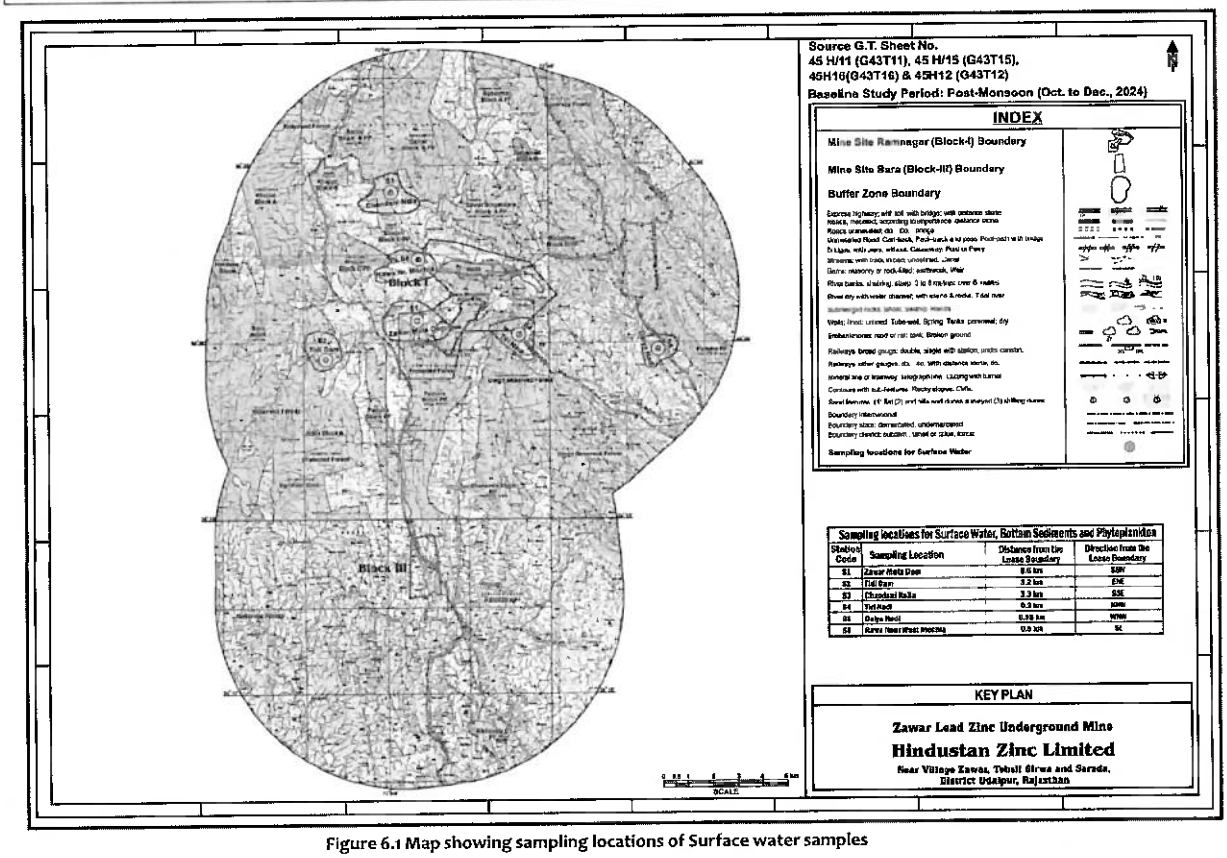

Figure 6.1 Map showing sampling locations of Surface water samples

6.2 SAMPLE COLLECTION AND ANALYSIS

All the surface water samples were analyzed for physico- chemical parameters, toxic and heavy metals, by J.M. EnviroLab Pvt. Ltd., an NABL accredited Lab. While analyzing the samples, the LAB followed the analytical protocol prescribed by IS-10500-2012, IS:3025 and APHA 4500 O-C. Table-6.2 shows the parameters and its protocol followed by the Lab for the different constituents /parameters analyzed by the LAB in the surface water samples.

Table-6.2.

Analytical Protocol Followed for Water Quality Analysis

S. No.	Parameter	Protocol Followed	Detection Limit
1.	pH	IS:3025 (Part-11)	2.0
2.	Total Hardness (as CaCO3), mg/l	IS:3025 (Part-21)	6.6
3.	Iron (as Fe), mg/l	IS:3025 (Part-53)	0.3
4.	Chlorides (as Cl), mg/l	IS:3025 (Part-32)	1.0
5.	Fluoride (as F), mg/l	IS:3025 (Part-23)	0.1
6.	Total Dissolved solids, mg/l	IS:3025 (Part-16)	25
7.	Magnesium (as Mg), mg/l	IS:3025 (Part-46)	10
8.	Calcium (as Ca), mg/l	IS:3025 (Part-40	1.0
9.	Copper (as Cu), mg/l	IS:3025 (Part-42)	0.01
10.	Manganese as Mn, mg/l	IS:3025 (Part-35)	0.01
11.	Sulphate (as SO4), mg/l	IS:3025 (Part-24)	1.0
12.	Nitrate (as NO3), mg/l	IS:3025 (Part-34)	1.0
13.	Cadmium (as Cd), mg/l	IS:3025 (Part-41)	0.002
14.	Lead (as Pb), mg/l	IS:3025 (Part-47)	0.01
15.	Zinc (as Zn), mg/l	IS:3025 (Part-49)	0.2
16.	Alkalinity (as CaCO3), mg/l	IS:3025 (Part-23)	0.5
17.	Dissolved Oxygen, mg/l	APHA 4500 O-C	0.1

6.3 Surface Water Analysis Results

Table-6.3
Surface Water Analysis Results

S. No.	Parameters	Unit	Zawar Mata Dam	Tiri Nadi (Down Stream)	Chandani Nala	Tidi Dam	Daiya Nadi	Rawa (West Mochia)
1.	pH (at 25°C)	–	7.51	7.68	7.71	7.98	7.74	7.97
2.	Colour	Hazen Unit	BDL (DL 1.0)	BDL (DL 1.0)	BDL (DL 1.0)	BDL (DL 1.0)	BDL (DL 1.0)	BDL (DL 1.0)
3.	Turbidity	NTU	BDL (DL 1.0)	BDL (DL 1.0)	8.0	BDL (DL 1.0)	BDL (DL 1.0)	BDL (DL 1.0)
4.	Total Hardness as CaCO3	mg/l	230.5	142.2	234.6	294.0	253.5	318.7
5.	Calcium as Ca	mg/l	49.09	33.39	41.17	65.17	46.77	58.92
6.	Alkalinity as CaCO3	mg/l	206.2	129.4	193.1	253.1	174.4	208.1
7.	Chloride as Cl	mg/l	82.48	92.49	79.98	96.98	127.48	87.47
8.	Magnesium as Mg	mg/l	26.22	14.29	32.0	31.85	33.18	41.69
9.	Total Dissolved Solids	mg/l	412.0	380.0	475.0	496.0	476.0	525.0
10.	Sulphate as SO4	mg/l	31.33	38.38	55.32	61.18	39.62	92.11
11.	Fluoride as F	mg/l	0.33	0.65	0.61	0.45	0.65	0.28
12.	Nitrate as NO3	mg/l	6.42	9.47	11.52	8.11	9.2	12.12
13.	Iron	mg/l	0.28	0.25	0.19	0.38	0.40	0.38
14.	Phosphate as Po4	mg/l	0.05	0.09	0.21	0.03	0.15	0.08
15.	Total Suspended Solid	mg/l	6.2	BDL (DL 1.0)	5.2	3.1	4.2	2.2
16.	Biochemical oxygen Demand	mg/l	2.0	3.0	2.0	2.0	3.0	3.0
17.	Chemical oxygen demand	mg/l	10.0	10.3	11.0	17.6	11.4	14.3
18.	Sodium as Na	mg/l	30.0	24.0	33.0	45.0	37.0	32.0
19.	Potassium as K	mg/l	3.0	4.0	5.0	4.0	3.0	6.0
20.	Zinc	mg/l	0.26	0.24	0.22	0.22	0.23	0.24
21.	Conductivity	µS/cm	667.0	601.0	750.0	780.0	755.0	841.0
22.	Dissolve Oxygen	mg/l	6.9	7.1	6.8	6.8	6.9	6.7
23.	Lead as Pb	mg/l	0.08	0.07	0.09	0.09	0.08	0.1

Source: *Surface Water Analysis Results*

Various parameters viz. Residual free Chlorine (DL 0.20 mg/l), Cyanide as CN (DL 0.02 mg/l), Aluminum as Al (DL 0.03 mg/l), Phenolic Compounds (DL 0.001 mg/l), Selenium as Se (DL 0.005 mg/l), Silver (DL 0.05 mg/l), Cadmium (DL 0.002 mg/l), Arsenic as As (DL 0.002 mg/l), Mercury as Hg (DL 0.001 mg/l), Anionic Detergents as MBAS (DL 0.02 mg/l), Hexa Chromium as Cr+6 (DL 0.03 mg/l), Copper (DL 0.02 mg/l), Manganese (DL 0.10 mg/l), Nickel (DL 0.005 mg/l), were analysed and not detected in the water samples.

6.4 INTERPRETATION AND CONCLUSION OF SURFACE WATER

Interpretation:

- The pH of the surface water samples was observed to be 7.51 at Zawar Mata Dam to 7.98 at Tidi Dam. This indicates that the water is slightly alkaline in nature.
- The color is found to be BDL at all the sampling locations. The odour was observed agreeable at all the sampling locations. Turbidity was observed to be BDL (DL 1.0) at Zawar Mata Dam and 8 NTU at Chandani Nala
- The surface water quality indicators were observed to be varying from: Total hardness as CaCO3 142.2 mg/l at Tidi Dam to318.7 mg/l at Rawa (West Mochia); alkalinity CaCO3 129.4 mg/l at at Tidi Dam to 253.1 mg/l at Tidi Nadi ; Total dissolved solids 380 mg/l at Tidi Dam to 496.0 mg/l at Tidi Nadi ; BOD 2 mg/l at Zawar Mata Dam to 3 mg/l at Rawa (West Mochia); COD 10 mg/l at Zawar Mata Dam to 17.6 mg/l at Tidi Nadi. The level of DO varies from 6.7 mg/l at Rawa (West Mochia) to 7.1 mg/l at Tiri Dam.
- The concentration of other chemical parameters was found to be: Chlorides: 79.98 mg/l at Chandani Nala to 127.48 mg/l at Daiya Nadi; Sulphate: 31.33 mg/l at Zawar Mata Dam to 92.11 mg/l at Rawa (West Mochia), Magnesium: 14.29 mg/l at Tidi Dam to 41.69 mg/l Rawa (West Mochia); Calcium: 33.39 mg/l at Tidi Dam to 65.17 mg/l at Tidi Nadi ; Fluoride: 0.28 mg/l at Rawa (West Mochia) to 0.65 mg/l at Daiya Nadi and Tidi Dam.
- The concentration of heavy metal i.e. Lead was 0.07 mg/l at Tidi Dam to 0.1 mg/l Rawa (West Mochia. Various heavy metals viz. Cadmium (DL 0.002 mg/l), Arsenic as As (DL 0.002 mg/l), Mercury as Hg (DL 0.001 mg/l), Hexa Chromium as Cr^{+6} (DL 0.03 mg/l), Copper (DL 0.02 mg/l), Manganese (DL 0.10 mg/l), Nickel (DL 0.005 mg/l) etc., were analyzed and not detected in the water samples.

Conclusion:

Based on the Surface water quality criteria for different uses (specified by CPCB, 1979 and the Bureau of Indian Standards, 1982) standards, the surface water can be classified into five classes depending on their best uses of water. The monitoring results of each location were analyzed and compared to identify the class they fall into and thereby to identify the best use of existing surface water.

As observed the pH, DO and BOD of all the sampling locations have alkaline pH and Dissolve oxygen of min approx. 6.7 mg/ml and BOD ranging from 2 mg/l to 3 mg/l. Thus, it can be said that the surface water of Zawar Mata dam, Tiri Nadi, Chandani Nala and Tidi dam falls under the category A which can be used as Drinking water source without conventional treatment but after disinfection whereas the surface water of Daiya Nadi and Rawa (West Mochia) falls under Category B which can be used for Outdoor bathing (organized).

Most of the heavy metals were not detected in the surface water samples except Iron and Lead, which were found within the permissible limit prescribed by CPCB, 1979 and the Bureau of

Indian Standards, 1982 standards.

Thus, From the above study and discussions, it can be concluded that the surface water available within the study area is fit for the aquatic life and no adverse impact on the surface water quality of the nearby area has been there due to the mining activities.

CHAPTER - 7
IMPACT OF MINING AS REVEALED BY DEPOSITED BOTTOM SEDIMENTS CROPS ANALYSIS

7.1 IMPACT OF MINING ON BOTTOM SEDIMENTS

One of the compliances to be undertaken while issuing the EC by the MoEF&CC was pertaining to find out regularly the impact due to mining on the accumulation of heavy metals in the bottom of ponds, wells and rivers surrounding Zawar mines. It was indicated that it may be ascertained every year by collecting the bottom sediments and its chemical analysis for heavy metal concentration. There is possibility that if any heavy metals are released in the surrounding area, they may get collected in the bottom of the nearby water bodies as a part of surface runoff generated during the rains.

Keeping this in view, 06 samples of sediments were collected from nearby surface water bodies, by using manual augers from bottom of the water bodies. The sampling location are shown in the Figure-7.1. All these samples were analyzed by a NABL accredited Lab using standard methods of chemical analysis of soils including physico-chemical parameters as well as heavy metals.

Table 7.1

Sampling locations of Bottom Sediments

S. No	Name of Sampling Location	Location Coordinates		Approx. Distance and direction from Mine site
1.	Zawar Mata Dam	Latitude	24°20'45"	0.6 Km SSW
		Longitude	73°40'51"	
2.	Tidi Dam	Latitude	24°19'41"	3.2 km in WSW Direction
		Longitude	73°38'28"	
3.	Chandani Nalla	Latitude	24°23'57"	3.3 km in NNW Direction
		Longitude	73°40'54"	
4.	Tiri Nadi	Latitude	24°21'44"	0.2 km in SSE Direction
		Longitude	73°44'44"	
5.	Daiya Nadi	Latitude	24°17'51"	5.98 km in ESE Direction
		Longitude	73°49'49"	
6.	Rawa Near West Mochia	Latitude	24°21'36"	0.5 km from Mochia Mine in WNW Direction
		Longitude	73°41'48"	

Source: *SOI Toposheet & Field Survey*

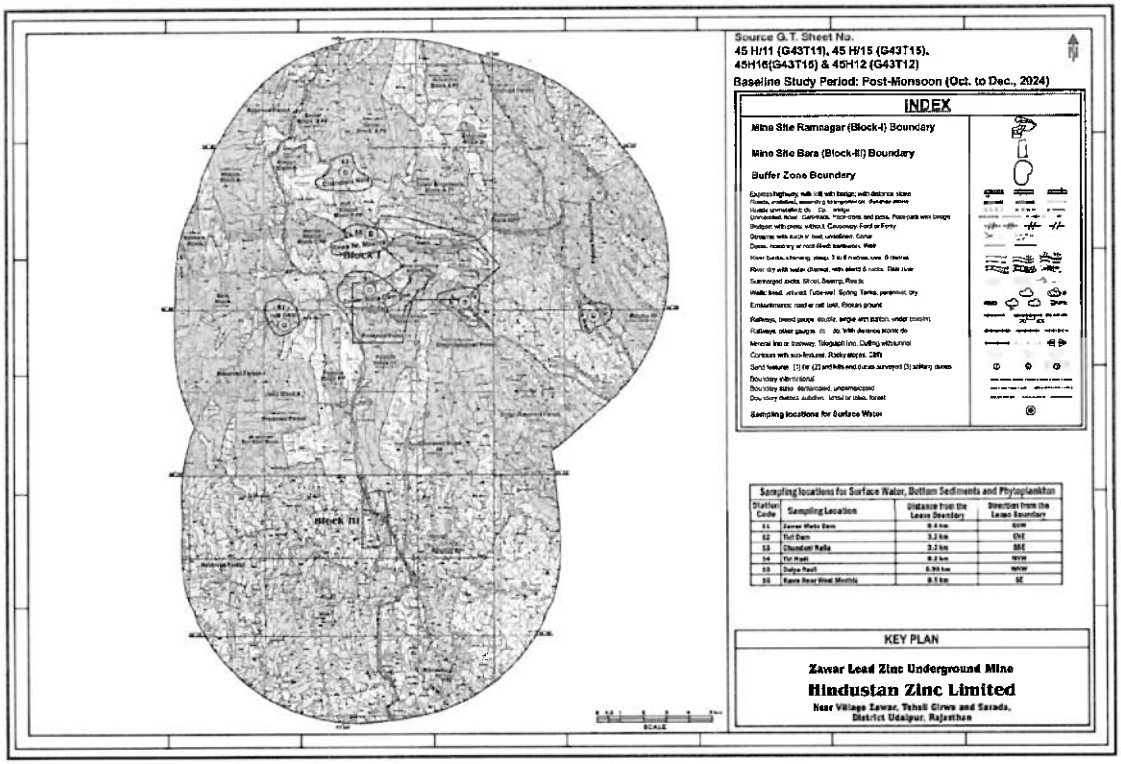

Figure-7.1. Map showing locations of bottom sediment samples

7.2 ANALYSIS RESULTS OF SEDIMENT SAMPLES COLLECTED

The results of the chemical analysis of sediment samples are shown in Table-7.2

Table-7.2

Results of the chemical analysis of sediment samples

S. No.	Parameters	Unit	Sampling Locations					
			Zawar Mata Dam	Tidi Dam	Chandani Nala	Tiri Nadi (Downstream)	Daiya Nadi	Rawa (West Mochia)
1.	pH (at 25°C) (1:2.5 soil water sus.)	-	7.87	8.22	8.15	8.30	8.79	8.94
2.	Conductivity (1:2 soil water sus)	mS/cm	0.19	0.23	0.24	0.31	0.20	0.13
3.	Organic matter	%	0.41	1.23	0.83	1.46	0.43	0.41
4.	Sulphate	mg/kg	201.87	81.88	123.22	273.03	118.51	135.17
5.	Available Phosphorus	mg/kg	16.07	22.26	20.66	27.08	20.14	15.54
6.	Chloride	mg/kg	937.77	557.45	937.08	1216.99	1122.1	687.92
7.	Calcium	mg/kg	926.5	1364.02	1088.89	767.81	969.1	886.99
8.	Organic Carbon	%	0.24	0.72	0.48	0.85	0.25	0.23
9.	Available Nitrogen as N	mg/kg	205.68	246.19	230.38	264.63	202.69	193.34
10.	Silver (as Ag)	mg/kg	BDL (DL 5.0)	BDL (DL 5.0)	BDL (DL 5.0)	BDL (DL 5.0)	BDL (DL 5.0)	BDL (DL 5.0)
11.	Cadmium (as Cd)	mg/kg	BDL (DL 5.0)	BDL (DL 5.0)	BDL (DL 5.0)	BDL (DL 5.0)	BDL (DL 5.0)	BDL (DL 5.0)
12.	Chromium (as Cr)	mg/kg	13.82	16.28	7.7	26.96	8.7	11.69
13.	Copper (as Cu)	mg/kg	37.5	28.72	20.22	36.59	19.32	34.09
14.	Iron (as Fe)	mg/kg	3385.31	3159.41	2917.39	3030.59	2975.85	2902.22
15.	Manganese (as Mn)	mg/kg	359.26	656.77	608.51	1517.43	237.68	333.07
16.	Nickel (as Ni)	mg/kg	34.93	16.09	41.93	40.84	25.01	10.63
17.	Lead (as Pb)	mg/kg	139.16	122.55	109.76	304.56	174.88	131.48
18.	Zinc (as Zn)	mg/kg	87.84	39.25	31.77	370.14	41.55	75.96

BDL – Below Detection Limit, DL - Detection Limit

Source: *Sediment Analysis Results*

Table 7.3

Results of the heavy metal analysis of sediment samples

Parameter	Zawar Mata Dam	Tidi Dam	Chandani Nala	Tiri Nadi	Daiya Nadi	Rawa (West Mochia)	Soil Remediation Intervention values as per Dutch Standards (mg/kg dry matter)
Cd (mg/kg)	BDL (DL 5.0)	BDL (DL 5.0)	BDL (DL 5.0)	BDL (DL 5.0)	BDL (DL 5.0)	BDL (DL 5.0)	12
Cu (mg/kg)	37.5	28.72	20.22	36.59	19.32	34.09	190
Ni (mg/kg)	34.93	16.09	41.93	40.84	25.01	10.63	210
Pb (mg/kg)	139.16	122.55	109.76	304.56	174.88	131.48	530
Zn (mg/kg)	87.84	39.25	31.77	370.14	41.55	75.96	720

7.3 DISCUSSION OF THE QUALITY OF SEDIMENTS

In the aquatic ecosystems, sediments play the key role in the transportation and storage of heavy metals. On one hand, sediments are the sink of heavy metals, which deriving from both the atmospheric deposition and terrestrial runoff, via strong binding with organic and inorganic ligands on sediment particles. In water, insoluble heavy metals may be bound to small silt particles. Metals and other fluvial contaminants in suspension or solution, do simply flow down the stream, they form complexes with other compounds settle to the bottom and ingested by plants and animals or adsorbed to sediments.

The above table shows the availability of different heavy metals in the sediments of different sites studied. Cadmium was analyzed but not detected in any site. Other metals Cu, Ni, Pb and Zn were recorded at all the six sites studied and are present below permissible values a per the Dutch standards. For bottom sediment analysis, the physico-chemical analysis of results reveals that the pH value ranging from 7.587to 8.94. The organic matter was observed to be 0.41% at Rawa (West Mochia) to 1.46% at Tidi Nadi; Available Nitrogen 193.34 at at Rawa (West Mochia) to 264.63 at Tidi Nadi and phosphorus was observed to be 15.54 at Rawa (West Mochia) to 27.08 at Tiri Nadi.

It is therefore concluded that sediments deposited in ponds, streams and in Tiri Nadi and Tidi Dam have heavy metals either below the detection level as per the Indian Standards (Table-7.3) or within permissible limits of Dutch Standards.

Sediments serve as both sink and source of heavy metals, releasing them into the water column. The sediments are settled at the bottom of the pond and it accumulates over many years. Hence the metal concentrations more than the surface water. The adsorption, desorption, and subsequent concentrations of heavy metals in sediments are affected by many physicochemical factors such as temperature, hydrodynamic conditions, redox state, content of organic matter and microbes, salinity, and particle size. Sediment also serves as reservoir for pollutants and therefore a potential source of pollutants to the water column, organisms, and ultimately human consumers of those organisms.

Iron is the fourth most abundant element in the earth's crust and may be present in natural waters. It is an essential micronutrient for all organisms. Iron has a low BCF because in the sediment it originates from the decomposition of rocks. The iron content in the sediment is linearly correlated to its presence in the plant organs and roots show very high values. These aquatic habitats are very old and they have

collected huge amount of running water over the period of time and hence, large number of heavy metals deposited.

Metal uptake by plants depends on the bioavailability of the metal in the water phase, which in turn depends on the retention time of the metal, as well as the interaction with other elements and substances in the water. Furthermore, when metals have been bound to the soil, the pH, redox potential, and organic matter content will all affect the tendency of the metal to exist in ionic and plant-available form. Plants will affect the soil through their ability to lower the pH and oxygenate the sediment, which affects the availability of the metals increasing the bioavailability of heavy metals by the addition of biodegradable physicochemical factors, such as chelating agents and micronutrients.

Currently, In India, there are no specific concentration based on soil contamination standards. In absence of any Indian Standards for soils, Dutch standards have been considered for purpose of interpretation of soil quality or sediment quality with respect to heavy metals. The observed values for heavy metals have been observed to be much below the soil or sedimentation remediation intervention values. However, for reference Soil Remediation Intervention values as per Dutch Standards are presented in Table-7.3.

7.4 RESULTS OF QUALITY OF CROPS AND VEGETABLES

Table 7.4
Showing Heavy metal analysis of Wheat and Potato Sample

Heavy metals in vegetable samples (crop sampling)				*Permissible value of heavy metals in plant (mg/kg)
S.No.	Sample Location/Sample ID	Parameters	Concentration (mg/kg)	
1	Wheat Sample	Nickel	BDL (DL 2.0)	67.97
		Lead	BDL(DL-0.1)	0.3
		Copper	6.8	73.3
		Cadmium	BDL (DL 0.1)	0.2
		Chromium	BDL (DL 2.0)	2.30
		Manganese	41.59	500
		Zinc	74.0	99.4
2.	Tomato Sample	Nickel	BDL (DL 2.0)	67.97
		Lead	BDL(DL-0.1)	0.3
		Copper	2.3	73.3
		Cadmium	BDL (DL 0.1)	0.2
		Chromium	BDL (DL 2.0)	2.30
		Manganese	23.8	500
		Zinc	35.8	99.4

*WHO (2008)

7.5 DISCUSSION OF THE QUALITY OF CROPS AND VEGETABLES

Figure 7.1 showing Wheat Crop and Tomato vegetable samples collected near mine site.

WHEAT CROP AND TOMATO VEGETABLE SAMPLING

Wheat sample collected

Tomato samples collected

7.6 CONCLUSION

The above table shows the availability of different heavy metals in the tomato and wheat samples. The observed value of heavy metals concentration of Cadmium, Zinc, Copper, Chromium, Lead, Manganese and Nickel in the case of Wheat crop as well Tomato is within the permissible limits according to the WHO (2008) standards and Safe for human Consumption.

CHAPTER –8
CONCLUSION AND RECOMMENDATIONS

8.1 CONCLUSION

In the present study at the Zawar Lead and Zinc mine, the number of Phytoplankton and Zooplankton species collected are more or less similar to the number of species collected by the earlier researchers in Udaipur and adjacent districts of Rajasthan state. Thus, it shows that the aquatic ecosystems in the buffer zone of Zawar Lead and Zinc mine are well represented by Phyto planktons and Zooplanktons and the ecosystems are healthy and sustainable.

After observing the results of chemical analysis of fish samples collected from the village ponds surrounding the Zawar mines, it was observed that all these fishes, if captured by the villagers could be safely consumed by the human beings and when correlated with the heavy metals in the fishes, which can be used by human consumption, with the available W.H.O. standards, it is observed that these fishes do not have the heavy metals more than the permissible limits.

For Surface water quality values in the study area, it can be concluded that they are within the acceptable limits, therefore, the surface water available within the study area is fit for the aquatic life and no impacts in future is envisaged by both the plant site and the baseline surface water quality will be maintained.

Sediments deposited in ponds, streams and in Tiri Nadi and Tidi Dam have heavy metals either not detected or are present within permissible limits of Dutch Standards. The observed value of heavy metals concentration of Cadmium, Zinc Copper, Chromium, Lead, Manganese and Nickel in the case of Wheat crop as well Tomato is within the permissible limits according to the WHO (2008) standards.

8.2 RECOMMENDATIONS

Being an underground mine, all the blocks have been provided with the facilities for handling of waste for dumping into exhausted stope voids. Required part of waste is brought to the surface for strengthening and stabilizing slopes of tailing storage facilities. There is no fresh dumping of waste rock at surface, therefore there is no creation of waste dump at surface. Tailing disposal is planned over existing tailing storage facilities in lease area, which shall be rehabilitated later after completion of life. However, new sites are planned for tailing disposal in conceptual period of Mining Plan.

Therefore, no such contamination of nearby surface water bodies is envisaged due to the mining activities at site. However, regular periodical monitoring as recommended by MOEFCC, New Delhi will be carried out time to time to keep a check on the water quality, aquatic life and to maintain ecological balance at the Mine site.

It has been indicated by MoEF&CC in its EC that regular monitoring of invertebrates and aquatic life of water bodies including the reservoir located close to the mining lease may be done to

establish that fish and invertebrates, etc., is not contaminated with heavy metals and aquatic life is sustained. This is being done by the Environment Division of Zawar mines every year during pre-monsoon season by engaging the services of consultants who are collecting fish samples from the village ponds and get them analyzed by a NABL Lab or the entire study, which has been done for the year 2024 by the team experts on Aquatic life and water regime.