

A REPORT ON METAL MINE EXCURSION



BY – SIDDHARTH SINGH

22JE0953

BACHELOR OF TECHNOLOGY

IN

MINING ENGINEERING

**INDIAN INSTITUTE OF
TECHNOLOGY**

(INDIAN SCHOOL OF MINES)

DHANBAD, JHARKHAND

MINE VISITS: Noamundi and Katamati

VISIT DATE: 27/12/2023

VISIT DURATION: For 6 hours

BRIEF ABOUT LOCATION: Noamundi Mines lies in Noamundi village of West Singhbhum District in Jharkhand while Katamati Mines lies in Deojhar village of Keonjhar District in Odisha. The sites were present in the Eastern Joda Keonjhar Horseshoe Belt making it viable site for excavations.

MINE EXCURSION DISCUSSION :

The Mega Centre visit began around 9 am with Mr Saurav and Mr Vikram taking us to the Workshop area where they elaborated on the HEMM Maintenance caused in basic surface mining operations that is Drilling and Blasting, Loading and Haulage. The discussion advanced further with the process flow of the maintenance department by differentiating between Breakdown maintenance and Shutdown maintenance. They mentioned one of the key stark features in Tata operative mining was operator safety, effective modifications along working in different zones. Then we went to the maintenance area where saw features of 100 tonnes dumper. Some of these were suspension cylinders along with Hydraulic cylinders which contain a mixture of hydrogen and nitrogen gas,

Parking brakes, 850 horsepower engine, turbochargers, 140mm bore hole etc. Even encountered with a modified sprinkler from dumper chassis and tyre handler. Then saw a partial locking operation which is done as part of maintenance. To avoid punctures the inflating partial pressure was maintained around 140 Pa.

Travelled to reach Pit Office in the near vicinity and saw 5s working rule based on Sustain, Sort, Setting in order, Standardize and Shine. Saw the Fleet Management System (FMS) office where we were informed of the current working capacity, and production rate with 8 shovels and 28 dumpers collectively used in both the Noamundi as well as Katamati mines. Observed how the Key Performance Index(KPI) plays a crucial role in fleet management. Terms like trip i.e. combined cycle time for both shovels as well as dumpers were discussed along with increasing turns per hour (TPH) by decreasing waiting time, auxiliary equipment like drills, water sprinklers, trailers, and dozers hinder production. Wrapped up this by 10:30 am.

After Pit Office, went to Visit Viewpoint assisted by Mr. Murmu, the chief geologist. He briefly explained the geological setting of the mines and how the presence of the Eastern Joda Keonjhar Horseshoe

belt enhances excavation possibilities for ferrous metal. Due to the absence of structural disturbance, the quality of the deposit is considered for excavation. While Noamundi Mines lies in noamundi village of West Singhbhum District in Jharkhand, katamati Mines lies in Deojhar village of Keonjhar District in Odisha. The iron deposits in both mines belong to the pre-Cambrian era. It consists of weakly metamorphosed sedimentary formations and lithology comprising interbedded shales, banded hematite jasper, limonite, canga, soil, etc.

Canga are some pieces of boulders separating two geological sections. The 60 – 75 percentage of iron content gives the upper hand in extraction. Saw ongoing operations from the viewpoint by 11:30 a.m.

Went to visit LRP(Long Range Planning Control Room), where Mr Kashyap explained to us further phases of ongoing operations. Mined material contains 50-60 per cent of the required material, so it has to be processed to get the material. The processing phase is contained among Wet plants which process material with good alumina content while Dry plants process material with good ferrous content. Discussed further through flow map. ROM material goes to gyratory Crushers. The purpose of those crushers is to reduce the size of big boulders to the secondary crusher level. Secondary crushing involves Screening along with Beneficiation. Jigging is done to reduce the percentage of alumina from

iron ore. Then visited the control room where saw screening operations within various circuits. To achieve targets, materials are fed and the logistics circuit signifies that. Then went for lunch at 1 pm.

By 2:30 p.m. Entered Bottom Bin, assisted by Mr Satyam where a brief about safety, deviations and final feeding was discussed followed by a tour. Saw secondary as well as tertiary crushers with various particle sizes. For the final optimal size of yield of less than 10mm Stacker cum reclaimer (SCR) was used to spur. It was over by 4 p.m. and went to visit Solar Plant.

ENVIRONMENT IMPACT ASSESSMENT :

Impact on water: The Karo River in West Singhbhum is polluted with red oxide from the iron ore mines of Noamundi, Gua and Chiria. The Subernrekha river shows a different type of pollution which is even more hazardous in nature.

Metallic and dissolved toxic wastes from TISCO, Jamshedpur and HCL Ghatsila and radioactive wastes from the uranium mill and tailings ponds of the Uranium Corporation of India Limited at Jaduguda flow into Subernrekha and its tributaries.

Impact on air: In the existing scenario, concentrations of PM10 and PM2.5 are higher than the NAAQS in most of the monitoring locations in

the region. Transportation of iron ore by trucks on roads is found to be the major source of airborne particulate matter emission in the region. In order to control and minimize the PM10 and PM2.5 concentrations in the region, transportation of ore by conveyor belts and rail has to be deployed to reduce PM10 and PM2.5 concentrations in the region for better health.

Impact on forest: In Singhbhum district a similar devastation of forest lands happened for extracting iron ore. According to the Forest Survey of India

State of Forest Report, during an assessment published in 1997, Jharkhand had 2.6 million ha of forest. In 1999, it had 2.2 million ha, a loss of 0.4 million ha of forest cover. The forest cover in the Damodar Valley coalfield, once 65 per cent, stands at only 0.05 per cent today. Saranda, once so dense that even the sun's rays couldn't penetrate it, has

Asia's largest sal forests and is an important elephant habitat. Today, uncontrolled mining for iron ore, both legal and illegal, is destroying not just the forest, but also the wildlife, apart from the livelihoods of the local tribal communities. The impact on the forests has been significant.

According to the state of forest reports, between 1997 and 1999, about 3,200 ha of forest was lost in the Singhbhum region. Between 2001 and 2003 some 7,900 ha of dense forests were lost in the East and West Singhbhum districts. Saranda too has

been affected, and further degradation will have serious consequences for its considerable biodiversity.

SUMMARY: This excursion to mechanised opencast mines operated by TATA highlighted the continuous modifications and technological upgrades adopted by the companies to cope with sustainable resource extraction. With the advancing needs of the present population formulation of various methods of fuelling production without hindering environment was a key point of concern.



Available HEMM

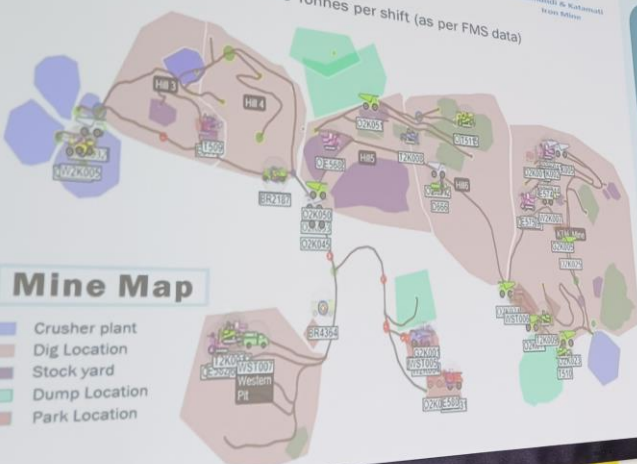
Fleet Type	Make	Model	Specification	Noamundi	Katamati	Total
Dumpers	Komatsu					
Drill	Atlas Copco	HD785-7	Capacity ~ 91.7 T	13	10	23
	Epiroc	ROC L8	Hole Diameter ~ 6 inch	0	2	2
	Atlas Copco	SmartRoc D65	Hole Diameter ~ 9 inch	1	2	3
Shovel	Tata Hitachi	IDM45	Hole Diameter ~ 6 inch	1	0	1
Loader	Tata Hitachi	EX1200-5D	Capacity ~ 5.9 CuM	3	4	7
Graders	Komatsu	EX1200-6	Capacity ~ 9.1 CuM	1	0	1
Water Sprinklers	Komatsu	WA900-3E0	Blade Length ~ 4.88m	2	1	3
	Komatsu	GD-825A-2	Capacity ~ 50 KL	2	1	3
Dozer	Caterpillar	HD465-7E0	Capacity ~ 13.5 CuM	2	1	3
	Komatsu	D9R	Capacity ~ 13.7 CuM	2	1	3
	Komatsu	D275-SR				



About Noamundi & KTM Iron Mines

- Lease area: Noamundi: 1160.06 hectares
Katamati: 403.32 hectares
- Production Target: 30,000 Tonnes per shift (as per FMS data)

TATA
HYDRA
Noamundi & Katamati
Iron Mines



Types of materials

- Blue Dust
- Hard Rock
- Flaky
- OB
- BHU

Material Properties

- Wet Feed 1
Fe - 39.28%
SiO₂ - 1.96%
Dry Feed
Fe - 41.44%
SiO₂ - 1.76%
Wet Feed 2
Fe - 39.28%
SiO₂ - 1.96%

Crushing Plants

- C&S Plant
- Wet Primary plant
- 500 TPH plant
- New Dry Circuit Plant

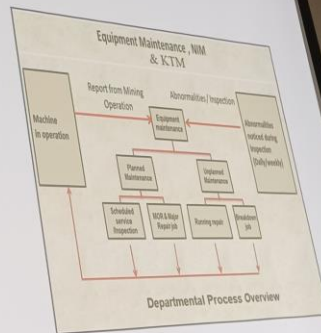
Dig Locations

- Hill 3,4,5,6
- Western Pt
- KTM Mines

BACKGROUND – EQUIPMENT MAINTENANCE, NIM & KTM

Noamundi & Katamati Iron Mines has annual Excavation Target of 19.3 MT in FY-21. To achieve this Target, Equipment Maintenance department's role is to provide maintenance services for upkeep of Heavy earth moving machinery (HEMM) used by our internal customers, Mining Operation Noamundi and Katamati, for mining operations. The Figure below shows the details of Equipment Maintenance, Noamundi.

Product and Services	Maintenance Services for upkeep of HEMM
Internal Customers	Mining Operations, Noamundi and Katamati
Departmental Objective	Maximize Uptime of equipment at optimum maintenance cost
Fleet under Ownership	Shovel, Dumpers, Loaders, Dozer, Grader, Mobile Crane, Drills, Weigh Bridge, Mine Illumination



CONTENT

Noamundi and Katamati Iron Mines process Flow

Safety Features as per DGMS guidelines

Background Equipment Maintenance, NIM & KTM

Present Safety Features in HEMM

Brief introduction to Tyres

Tyre maintenance practices

Key Initiatives in Tyre