



Research Paper

Minerals survey of Rajasthan((particularly reference of Zn) (A review study)

Dr. Juzar Hussain Bohra

Lecturer

Govt. Girls College Kherwara (Rajasthan)

ABSTRACT

Minerals are valuable natural resources being finite and non-renewable. They constitute the vital raw materials for many basic industries and are a major resource for development. The history of mineral extraction in India dates back to the days of the Harappan civilization. The wide availability of the minerals in the form of abundant rich reserves made it very conducive for the growth and development of the mining sector in India. Zinc lead siler and sulphuric acid are main chemicals to cater most of the industries. Fortunately India has sufficient deposits of zinc lead and siler and by product of these smelter is sulphuric acid.

I. INTRODUCTION

Zinc was made and used at a much earlier date in the East than in Europe. A preliminary survey has been made of the extensive remains of the ancient zinc mines and smelting remains at Zawar, Rajasthan. From the survey and the preliminary investigation, some attempt is made to reconstruct the original process.¹

Archaeological explorations and excavations at Zawar have revealed sufficient evidence to enable us to reconstruct the technology that was used in the production of zinc in ancient India. Radiocarbon assay of two wood samples, one of them obtained from a launder and the other from a scaffold, both found at a depth of 100 m in the galleries of old sphalarite mines at Zawar, has given dates of 2120±60 bp and 1920±50 bp. Production of zinc presents special problems because the boiling point of the metal is lower than the minimum temperature necessary for extraction of zinc from zinc oxide.²

Distillation of zinc in CHINA

It is difficult to distill metal zinc partly due to the reduction temperature of zinc oxide ores close to the boiling point of metallic zinc. The treatment of zinc sulfide ores is more complicated since they have to be roasted before smelting. Previous archaeometallurgical studies on zinc smelting technology in China mainly focus on the distillation of zinc oxide ores. This paper, for the first time, presents analytical results of archaeological evidence about the distillation of zinc sulfide ores in Guiyang in southern China dated back to the Qing Dynasty (CE 1636–1912). The smelting remains including ores, distillation retorts and slags, especially the roasting hearths and zinc calcine firstly discovered and confirmed in zinc smelting sites were characterized comprehensively by p-XRF, OM, SEM-EDS and XRD. It was revealed that the zinc smelting technology in the Tongmuling site and the Doulingxia site was mainly based on the distillation of zinc sulfide ores, which should be oxidized by a lengthy roasting processing at the lower temperature before the distilling. In order to enhance the condensation efficiency, the height of the condensers in the distillation retorts has been significantly increased. Most of the zinc products were ordered by the Minting sub-Bureau of Baonan in Changsha.

Rajasthan is considered as a museum of minerals, both metallic and non-metallic including renowned building stones. It has a vantage position in having significant resources of Radioactive minerals, Lignite, Petroleum and Natural Gas. Rajasthan is the richest state in terms of availability and variety of minerals in the country and produces about 57 different minerals. Rajasthan is the sole producer of lead & zinc ores, selenite and wollastonite. Rajasthan was the sole producer of garnet (gem) till 2004-05. Almost entire production of calcite, natural gypsum and silver in the country comes from Rajasthan. The State is a major producer of ball clay, calcite, clay, copper ore/conc., feldspar, fireclay, limestone, ochre, phosphorite/rock phosphate and steatite. The State is also an important producer of marble, granite, sandstone & Kota stone of various shades. Makrana area is the world famous centre for marble mining. The State possesses substantial share of the total resources of potash (94%), lead & zinc ore (89%), wollastonite (88%), silver ore (88%), gypsum (82%), ochre (81%), bentonite (75%), fuller's earth (74%), diatomite (72%), feldspar (66%), marble (63%), asbestos (61%), copper

ore (54%), calcite (50%), talc/steatite/soapstone (49%), ball clay (38%), rock phosphate (31%), fluorite (29%), and tungsten (27%). The State contributed about 12% to the total value of mineral production in the country and occupied second position among the States in 2014-15. It was the sole producer of lead and zinc ores and concentrate, selenite and wollastonite. Almost entire production of silver in the country was also reported from the State. Rajasthan was the leading producer of gypsum accounting for 99%, calcite 96%, phosphorite 95%, ball clay 92%, ochre 89%, talc/soapstone/steatite 82%, fireclay 36% and limestone 21% of the total production of respective minerals in the country. Besides, it was the second leading producer of copper concentrates contributing 41%, petroleum (crude) 24% and kaolin 16% of the nation's output.

Mining belts :-

1. Zawar mines

Zawar Mines consists of four mines namely Mochia, Balaria, Zawar Mala and Baroi with average zinc-lead reserve grade of 4.6%. Zawar group of mines are a symbol of the Company's legacy with constant addition to its reserve and resource base. Access to the mines as well as ore hoisting hauling is through shaft decline. The mine produced 3.3 million MT of ore. It has a reserve of 14.2 million MT and mineral resource base of 82.2 million MT.

Mining:

Lead-Zinc ore is divided into stope blocks which are drilled and blasted using long hole open stoping mining method. Ore is either crushed to underground or at surface to feed mill. A backfill and a paste fill plants were recently completed to use tailings from ore beneficiation plants. The mine also has a dry stack tailing plant, the first of its kind in India.

2 Rampura Agucha mines

Rampura Agucha is a zinc and lead mine located on a massive sulfide deposit in the Bhilwara district of Rajasthan, India.^{[1][2]} Rampura Agucha is located 220 km from Jaipur. It is north of Bhilwara, and northwest of Shahpura. Rampura Agucha is 10 km southeast of Gulabpura on NH 79.^[1] The mine is owned by Hindustan Zinc Limited (HZL), and has the world's largest deposits of zinc and lead.^[1]

Rajsamand district came into existence as 30th district of Rajasthan on 10th of April 1991. It was named after Rajsamand lake, an artificial lake created in 17th century by Rana Raj Singh of Mewar. Rajsamand as a new district was carved out from Udaipur district by transferring by seven entire tehsil area namely Bhim, Deogarh, Amet, Kumbhalgarh, Rajnagar, Nathdwara, and Reimagra. The district is famous for historical importance and religious shrines.

Rajsamand is situated 67 Km. north of Udaipur and 352 Km. south of state capital Jaipur on NH-8. Rajsamand is located between latitudes 24°46'to 26°01'N and Longitudes 73°028'to 74°18' east. The district has an area of 4655sq. Km 1.36 percent of total area of state.

2. Dariba mines

Ancient mining for metal lead-zinc is known in Dariba-Rajpura area where indications of underground mining were observed up to 100 m below ground level. The area is well-known for the occurrence of lead, zinc and silver since the time immemorial. The presence of typical gossans zone and old working has attracted the attention of geologist as early as 1934. GSI has carried out systematic exploration for base metal in this belt from the year 1963 to 2004 dividing the area into 19 blocks. Most part of the area is leased out to HZL which is engaged in mining of lead-zinc ore. Rajsamand district is very well known for marble block mining as the largest producing district in the whole country. Besides marble and ore of lead-zinc mining of other minerals such as granite, phyllite-schist, Patti-katla, quartz, feldspar, mica, soapstone, dolomite, masonry stone, are going on. At present 4 mining leases of major mineral and 2049 mining leases of minor minerals are sanctioned in the district besides three LOI of bajri. From administration point of view following offices of Department of Mines and Geology are working. Rajpura Dariba Mine is an underground lead-zinc mine with reserve grade of 6.8% and is one of our oldest mines where mining operations began in 1983. The mine produced 1.1 million MT of ore in FY 2020. Mine is presently accessed via decline and main shaft

Plant Locations & Installed Capacity

- Dariba, Rajasthan – 0.6 Million Tonnes annually.
- Chanderiya, Rajasthan – 0.6 Million Tonnes annually
- Debari, Rajasthan – 0.3 Million Tonnes annually

Products:

(i) zinc Concentrate and lead Concentrate

special High Grade zinc products are LME registered products under the brand names

- HZL SHG 99.995
- HZL Zn SHG 99.995
- Vedanta SHG 99.995
- Vedanta Zn SHG 99.995

(ii) Silver

Hindustan Zinc Ltd is India's largest and one of the world's leading integrated silver producer. HZL produce refined silver; recovered as a by-product of zinc-lead facility. Our high quality silver bullion having a minimum purity 99.9% of silver is listed on LBMA Good delivered List (LGD) – Hindustan Zinc Pantnagar Unit. We supply Silver in following forms:

- Standard 30 kg bars
- 1 kg bars
- Silver Powder

Silver metal has been known since ancient times for its brilliant white metallic lustre with high ductility and malleability properties. The precious metal has varied uses backed by its excellent heat and electrical conductivity levels.

In India, the highest usage of silver is in jewellery, followed by coins & bars silverware and industrial fabrication. With growing Indian economy, silver demand especially in the industrial sector is expected to follow a healthy growth in the coming years with an increased off take especially in electrical and electronics as well as brazing alloys and solders.

(iii) produce Lead ingots with min 99.99% purity which are registered with LME under following brand names:

- Vedanta 99.99
- Vedanta Pb 99.99

Lead metal is used in a number of applications including battery segment, lead-based pigments and cathode ray tubes. Our refined lead metal is available in standard 25 kgs ingots.

Lead metal is used in a number of application with primary being Lead Acid Battery and others include pigments and chemicals.

(iv) **Sulphuric Acid**

HZL produce 98 % concentrated Sulphuric Acid at our production facilities in Chanderia, Debari and Dariba in the state of Rajasthan. Sulphuric Acid is used in production of Single Super Phosphate Fertilizers/Zinc Sulphate/Phosphoric Acid/LABSA for detergent/Chemical Gypsum for Cement Industries/Metal Industry/Speciality Chemicals/ Dyes etc. for all spectrum of Industries

II. CONCLUSION

Zinc and lead are explored in Rajasthan from ancient times. Major demand of Zinc in India is met by zinc smelters of Rajasthan. Deposits of high quality of zinc and lead are sufficient in Zawar and Dariba area for a long period to cater.

REFERENCES

- [1]. W. Arch. Pub. online 2010
- [2]. **Zinc and Brass Production in Ancient India** *Inert.disc. sc. Rev.* 2013
- [3]. **district survey report - the official portal of Rajsamand District ...**
- [4]. **Ancient Lead and Zinc Mining in Rajasthan, India –jstlr**
- [5]. **History Of Zawar Mines, Zinc Smelter, Udaipur** www.mines.rajasthan.gov.in > ...
- [6]. **Rampura Agucha – Wik**
- [7]. **Contact Information - Department of Mines & Geology**
www.mines.rajasthan.gov.in > ...