



CHAPTER 2: REFINERY AND MINES



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The Alumina Refinery (Refinery) was commissioned (February 1987) with a



Picture 2: Alumina Refinery at Damanjodi

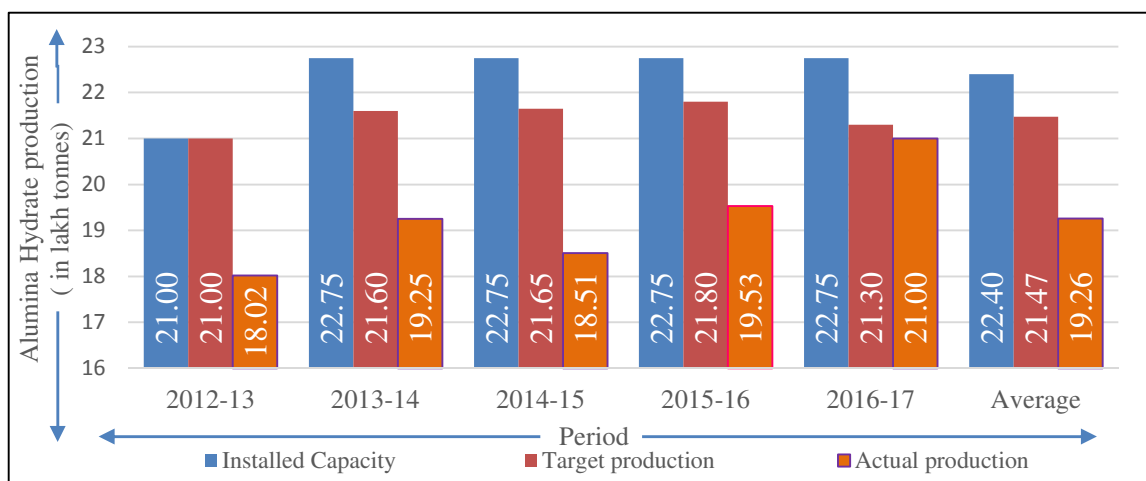
production capacity of 8 lakh tonnes per annum (TPA) of Alumina Hydrate and the same was gradually increased to 22.75 lakh TPA. The Bauxite Mines (Mines) at Panchpatmali, Damanjodi was commissioned (November 1985) with a production capacity of 24 lakh TPA. The capacity of the Mines was

gradually increased to 68.25 lakh TPA in line with the enhanced capacity of the Refinery. The governing factor for mining of Bauxite ore was the content of Aluminium and Silica therein. The quality of Bauxite is directly related to the content of Aluminium and inversely related to the Silica content. As per the Mining Plan of the Company submitted to the Indian Bureau of Mining (IBM) the mineable Bauxite deposit as on 31 March 2014 in Panchpatmali has an average Aluminium content of 42.65 per cent and Silica content of 3.82 per cent.

2.1 Production performance of the Refinery

The installed capacity of the Refinery, target fixed for production of Alumina Hydrate and the actual production during the period 2012-13 to 2016-17 are indicated in the following chart.

Chart 1: Target and Actual production of Alumina Hydrate



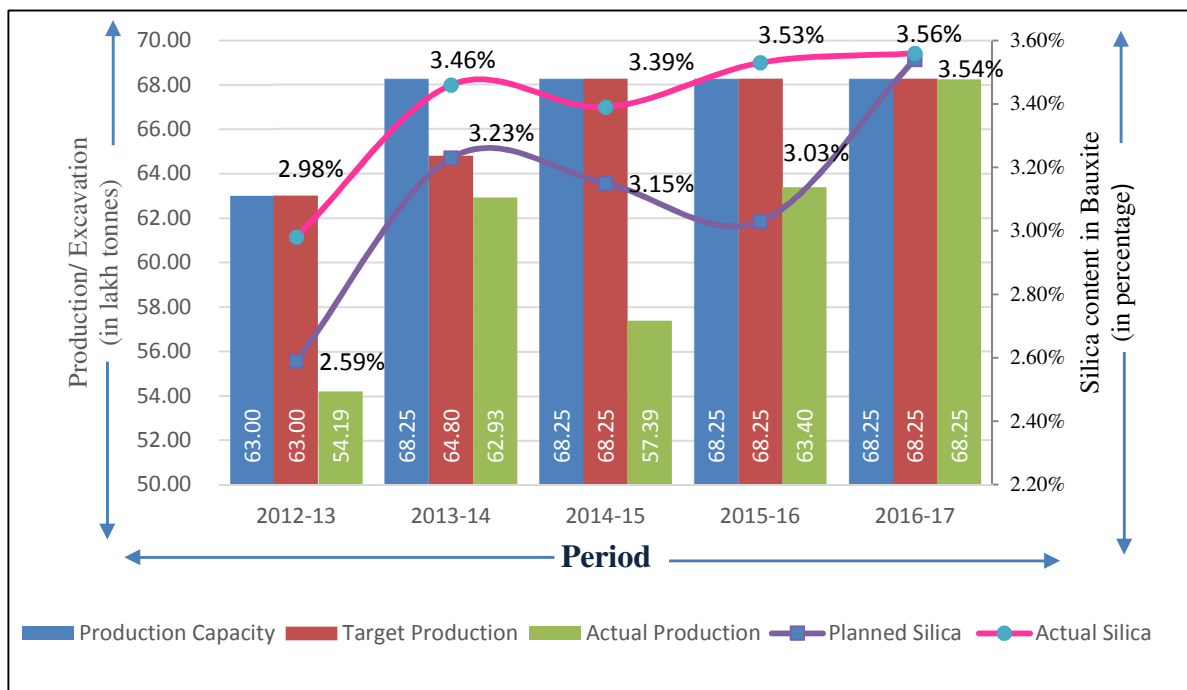
It may be seen that during the period 2013-14 to 2016-17 the Company fixed the annual production target of Alumina Hydrate lower than the installed capacity. This was considering the rising trend of silica content in the Bauxite received from the Mines. Even then the targeted production for the respective years could not be achieved. The actual production of Alumina Hydrate during the period 2012-13 to 2016-17 was 96.31 lakh tonnes against the target of 107.35 lakh tonnes, resulting in shortfall of 11.04 lakh tonnes.

Audit further observed that the shortfall in production of Alumina Hydrate in the Refinery was primarily due to under-performance of Mining and allied activities. The delay in carrying out processability study and upgradation of mud handling equipment in the Refinery for processing of higher silica content in Bauxite also contributed to lower production of Alumina Hydrate. These findings are enumerated below:

2.1.1 Under-performance of Mining and Allied activities

The Company, in its Annual Mine Production Plan, brings out the quantity of Bauxite to be excavated along with the total silica content therein, and mining is conducted accordingly. It may be seen from the chart below that actual production of Bauxite from the Mines during the period 2012-13 to 2016-17 was lower than the targets fixed, both in terms of quantity and quality (in terms of silica content).

Chart 2: Target and actual production of Bauxite



The reasons for non-achievement of the production target in terms of quantity and slippage in the quality of Bauxite are brought out in the Paras No. 2.1.2 and 2.1.3 respectively.

2.1.2 Non-achievement of production target of Bauxite

The primary reasons for the lower production of Bauxite during the period 2012-13 to 2016-17 are discussed in the following paragraphs:

2.1.2.1 Inordinate delay in appointment of HEMM operators

The Mines of the Company were fully mechanised open cast Mines wherein mining operations were carried out by deployment of various types of Heavy Earth Moving Machineries (HEMM) brief description of which is given in **Appendix**.

The Company carried out the excavation of Bauxite and transportation of the same to the Refinery in A and B shifts⁶. It was decided (March 2010) to recruit 58 HEMM



Picture 3: Dumper and Wheel Loader in operation

operators by March 2011 to start Night shift (C Shift) operation to facilitate transportation of crushed Bauxite from Mines to Alumina Refinery. However, only 12 operators were recruited till April 2011. C Shift operation (transportation only) was commenced from September 2011 by diverting operators from A and B Shifts. The

requirement of operators increased to 64 by December 2012 against which 53 operators were recruited in two batches in October 2016 and July 2017. The delay in inducting HEMM operators affected the excavation of Bauxite and removal of overburden during the period 2012-13 to 2015-16.

The Management while accepting the audit observations stated (April 2018) that there was a proposal to induct Substantially Affected Persons (SAPs) since 2011-12. However, the same got inordinately delayed due to some unavoidable reasons, specifics

⁶ A Shift operates from 6 am to 2 pm and B Shift operates from 2 pm to 10 pm.

of which were, however, not elaborated by the Management. The Ministry also endorsed the reply of the Management.

2.1.2.2 Inadequate availability as well as under-utilisation of HEMM

The Company fixed the norms for availability of HEMM for each year in its ‘IMS Objectives and Targets’⁷. Audit, however, observed that the Company did not consider such norms while evaluating the actual availability of HEMM in its Monthly Progress Report (MPR).

Norms vis-a-vis actual availability of major HEMM used for excavation of Bauxite and overburden for the last five years are as follows (Table 7):

Table 7: Actual Availability of HEMM

Type of HEMMs ⁸	Norms for availability (as percentage of total hours)	Actual availability of HEMM (as percentage of total hours)					
		2012-13	2013-14	2014-15	2015-16	2016-17	Average
Dumpers	70	70	56	58	66	67	63
Wheel Loaders	80	80	80	77	67	82	77
Ripper Dozers	80	77	68	49	44	62	60
Back Hoe Excavators	80	82	77	81	90	79	82
Blast Hole Drills	70	72	64	57	74	66	66
Exploratory Drills	75	90	70	68	79	84	78

Source: IMS Objectives and Targets and Monthly Progress Reports

As illustrated in the Table above, scrutiny of Monthly Progress Reports for the period 2012-13 to 2016-17 revealed that out of six types of HEMMs operated by the Company for Bauxite mining, the actual average availability of four types of HEMMs were lower than the respective norms as per ‘IMS Objectives and Targets’.

Further, scrutiny of records revealed that the actual average utilisation of all the six types of HEMMs ranged from 14 per cent to 57 per cent only during the period

⁷ An Integrated Management System or IMS integrates all of an organisations’s systems and processes like Quality Management System (ISO 9001), Environment Management System (ISO 14001), Safety Management System (OHSAS 18001), Information Security Management System (ISO 27000) etc. into one complete framework, enabling an organisation to work as a single unit with unified objectives.

⁸ Dumpers-used for haulage of excavated overburden and Bauxite; Wheel Loaders-used for loading of overburden and Bauxite on Dumpers; Ripper Dozers-used for loosening of overburden and Bauxite; Back Hoe Excavators-used for excavation and loading of Bottom Bauxite; Blast Hole Drills-used for drilling and blasting for loosening of overburden and Bauxite and Exploratory drills-used for drilling of pre-production boreholes.

2012-13 to 2016-17. Audit observed that lower availability of such HEMMs coupled with under-utilisation of the same adversely affected the production of Bauxite from Mines.

The Management while accepting non-considering of norms for availability of HEMM



Picture 4: Back hoe and Dumper in operations

for evaluation in MPR stated the same was being revised accordingly. The Management while accepting under-availability and under-utilisation of HEMM stated that under-availability of HEMM had not affected the quality or quantity of Bauxite production. The Ministry also endorsed the

views of the Management.

The contention of the Management and the Ministry with regard to the under availability of Dumpers not affecting the production of Bauxite needs to be seen in the light of the position that under-availability of Dumpers was indicated as one of the constraints for excavation of Bauxite in the MPRs of 15 months, out of 60 months reviewed by Audit.

2.1.2.3 Under-utilisation of Semi Mobile Crusher Plant and Fixed Long Distance Conveyor

Semi Mobile Crusher Plant (SMCP) along with Fixed Long Distance Conveyor (FLDC) was installed (January 2015) in the Mines to transport Bauxite from North Block Mines to the Primary Crusher & Conveyor. SMCP was not operating at its targeted capacity due to constraints such as slow loading of Bauxite, oversized boulders, late start and early stoppage of loading. Audit observed that the actual utilisation of SMCP-FLDC during the period 2014-15 to 2016-17 ranged from 45 per cent to 68 per cent of the target fixed. As a result, during the above period, 19.74 lakh tonnes of excavated Bauxite had to be transported through Dumpers from the various faces of the Mines to the Primary Crusher, covering an additional lead distance ranging from 3.17 km to 3.9 km. Further, due to travelling of extra distances by the Dumpers, the Company had to incur additional expenditure of ₹8.26 crore towards cost of diesel during the above period, which adversely impacted the production activity of Bauxite.

The Management stated (April 2018) that it took two years to stabilize a plant which was normal in any bulk material handling system. The Ministry also endorsed the views of the Management.

The above reply of the Management may be viewed in light of the position that the performance of SMCP-FLDC was evaluated by Audit with reference to the target fixed by the Company itself. Further, the Management had fixed these target already lower than the installed capacity considering constraints associated with operation of SMCP-FLDC.

2.1.2.4 Delay in adopting the IBM guidelines regarding revision in cut-off grade of Bauxite

The Company estimated Bauxite reserve considering cut-off grade of total Silica⁹ content at four *per cent* (maximum). In the meantime, Indian Bureau of Mines (IBM) notified (October 2009) revised threshold value¹⁰ of Bauxite wherein cut-off grade of reactive Silica was fixed at five *per cent* (maximum) for mining, beyond which the Bauxite obtained after mining could be discarded as waste. In pursuance of the above IBM guidelines the Company determined the cut-off limit of total Silica at seven *per cent* for mining considering past performance. The Company, however, initiated the proposal to change the cut-off grade of total Silica at seven *per cent* (maximum) in May 2011 and switched over to mining as per the aforesaid cut-off grade only from October 2015, i.e. after a delay of about six years from the IBM notification.

Audit, therefore, observed that due to delay in switching over to mining as per the revised threshold limit, the Company treated the Bauxite having total Silica content between four *per cent* and seven *per cent* as non-ore grade and backfilled the mined-out areas with the same, leading to wastage of natural resources during the intervening period between October 2009 and October 2015. Audit also observed that implementation of the revised guidelines required only a change of value for cut-off grade from four *per cent* to seven *per cent* in the existing 'SURPAC' mining software for which the data was already available with the Company.

⁹ *The Silica in Bauxite is of two types-Reactive Silica and Non-Reactive Silica. Non-Reactive Silica is that which does not participate in the chemical process during processing of Bauxite and it only adds to the waste burden as red mud. Reactive Silica is that which participates during the chemical process and forms a compound with Alumina, soda and silica. This Compound also forms a part of red mud reject and causes loss of recovery of Caustic soda and Alumina.*

¹⁰ *'Threshold Value of Minerals' is the limit prescribed by the IBM from time to time based on the beneficiability and/or marketability of a mineral for a given region and a given time, below which a mineral obtained after mining can be discarded as waste.*

The Management stated (April 2018) that the IBM guidelines could not be implemented immediately as studies were to be conducted to exactly establish adverse impact on the Refinery as well as on the cost of production alongwith suggestions for necessary modifications in the Refinery Plant, which took time up to the middle of 2015 and the Company finally implemented and switched over to mining as per the IBM guidelines in October 2015. The Ministry also endorsed (July 2018) the above views of the Management.

The reply of the Management/ Ministry was not acceptable because the implementation of the revised IBM guidelines was not dependent on such studies as is evident from the fact the implementation of revised guidelines was started from October 2015, i.e. before the work for such study was entrusted to M/s RIO Tinto Alcan (February 2016).

2.1.2.5 Shortfall in production due to delay in filing application for renewal of Forest Clearance

As per the guidelines prescribed by the Hon'ble Supreme Court of India, application for renewal of Forest Clearance (FC) was to be made to the concerned State Government, 24 months prior to the expiry of the existing FC. It was also prescribed that in case FC got delayed for any reason, the user agency may apply for grant of a Temporary Work Permit (TWP). However, the said application can be made after the expiry of 13 months from the date of filing application for renewal of FC but not later than nine months prior to the expiry of existing FC.

It was seen that the Company applied for renewal of FC of Central-North Block Mine to the Government of Odisha in January 2011 which was 21 months and 18 days prior to the expiry of the existing FC. However, the renewal of FC got delayed and the Company had to apply (February 2012) for Temporary Work Permit (TWP) to run the Mines. Due to delay in filing application for renewal of FC, the application for TWP was also got delayed. As a result, the Company could not obtain TWP/FC within the validity of the lease period. In absence of TWP, the Company had to suspend all the mining activities from 17 November 2012, which commenced on 17 December 2012 only after receiving TWP.

Audit observed that due to delay in filing application for renewal of FC with consequential delay in applying for TWP, the mining activities of the Company was

suspended for a month resulting in lower production of Bauxite in the Mines with consequential loss of production of 1.06 lakh tonnes of Alumina Hydrate in the Refinery.

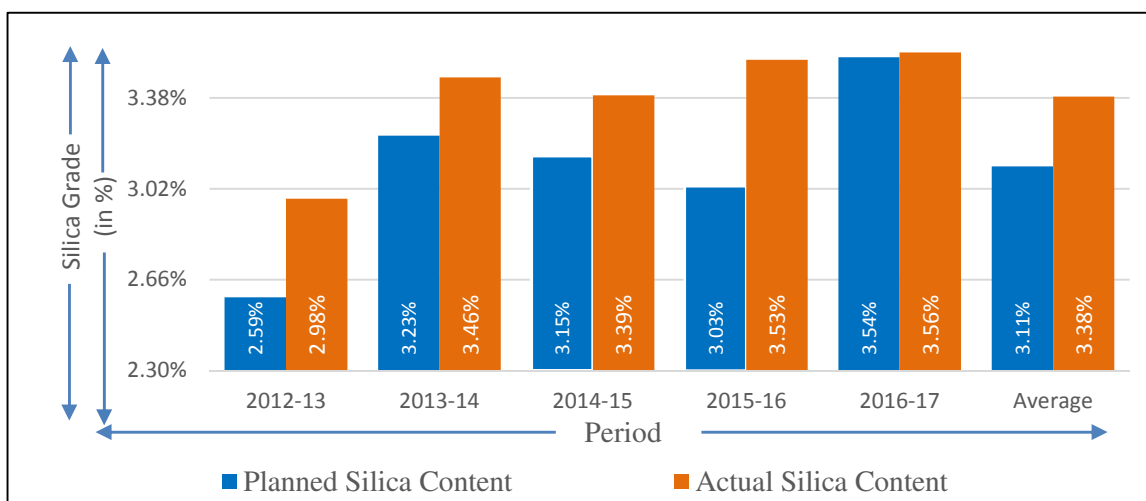
The Management stated (April 2018) that the Company filed applications for FC and TWP as per the timelines prescribed under Forest Conservation Act, Forest (Conservation) Rules and Guidelines issued by the Ministry of Environment, Forest and Climate Change (MoEF & CC) and not as per the guidelines prescribed by the Apex Court, as no notification/guidelines was circulated by the Government in this regard. Ministry also endorsed (July 2018) the views of the Management.

The reply of the Management/Ministry is not tenable because the Management was aware of the directions of the Apex Court since 2009, as it was conveyed to them while granting TWP for South Block of the Mines.

2.1.3 Slippage in Bauxite Quality

Presence of higher silica content in Bauxite was not desirable as it adversely affects the product (Aluminium) purity and causes higher consumption of Caustic Soda. The Company planned annually the quantum of Bauxite to be excavated along with the total Silica content in such Bauxite. The planned Silica grade and actual Silica grade in Bauxite so excavated during the period 2012-13 to 2016-17 were as follows (Chart 3):

Chart 3: Planned and Actual Total Silica content in Bauxite



It may be seen from the above that the actual silica content was higher than the planned in all the above five years. The salient reasons for non-achievement of planned Silica content are discussed in the succeeding paragraphs.

2.1.3.1 Non-compliance with Blending Scheme of Monthly Mine Production Plan

The Company prepared a 'Blending Scheme' in the Monthly Mine Production Plan indicating the quantum of Bauxite with varied Silica content from multiple faces to be mined, with the objective to produce Bauxite of desired Silica content. Audit observed that the Company did not follow such Blending Scheme while mining, during all the 60 months (2012-13 to 2016-17) covered in audit.

During Exit Conference with the Ministry, the Management, however, stated (August 2018) that corrective actions have been implemented.

2.1.3.2 Non-implementation of measures to improve Bauxite quality

The Company planned the following measures in its Mining Plan approved by the IBM with the objective to minimise mixing of extraneous materials in Bauxite ore and to ensure improvement in blending and grade control of Bauxite.

- Pre-production drilling at 25 metres interval with an average depth of 25 meters each to assess the quantum of overburden to be removed prior to extraction of Bauxite ore.
- Transportation and feeding of top Bauxite and bottom Bauxite in the crusher in the ratio of 3:1.

Scrutiny of records revealed that the Company deviated from the IBM approved mining plan as the Company drilled only 1,123 boreholes towards pre-production drilling against the target of 1,280 boreholes during the period 2012-13 to 2016-17. Moreover, the average depth of boreholes was about 22 meters against the required depth of 25 meters. The Company also neither planned nor adhered to transportation and feeding of top Bauxite and bottom Bauxite proportionately in the crusher as required in the IBM approved mining plan.

The Management contended (April 2018) that the progress of drilling drops drastically in clay zone which restricted the yearly performance in drilling and the extent of drilling would continue depending upon the extent of the ore body and not 25 meters.

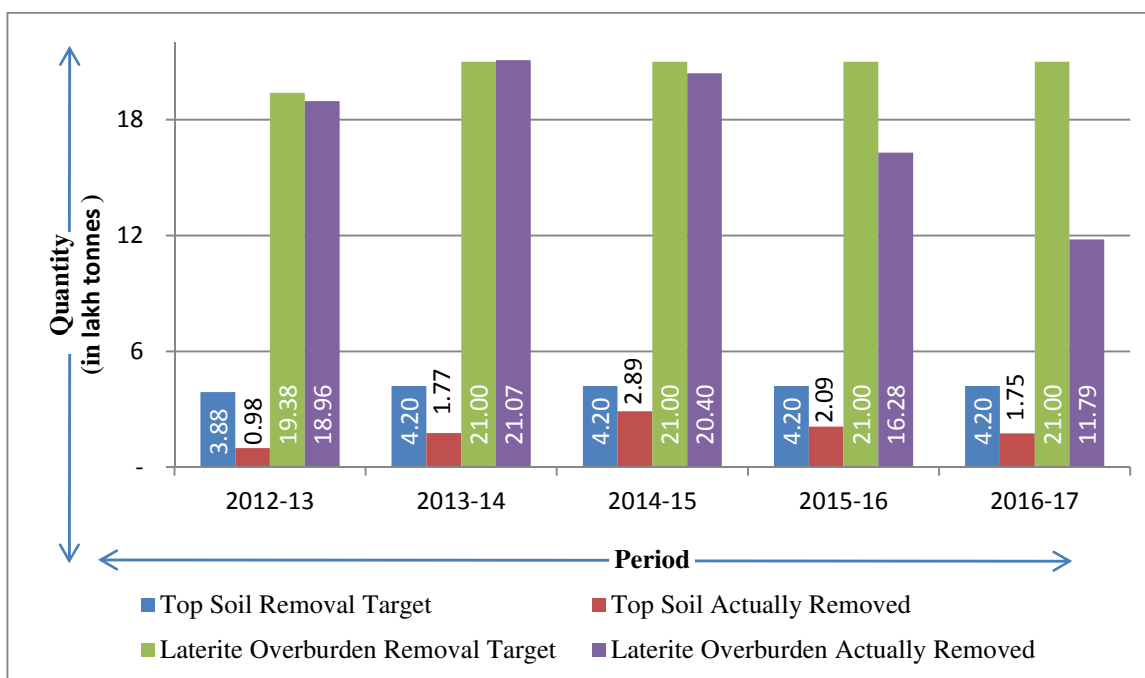
The Ministry further added (July 2018) that the apprehensions of shortfall in achieving pre-production drilling during the period 2012-17 would impact production quality and quantity in future years were not correct. The Management further stated (April 2018) that the ratio of 3:1 was a broad guideline and not a sacrosanct figure. The Ministry also endorsed (July 2018) the same view.

The above contentions of the Management/Ministry may be viewed in light of the position that as per Section 22A of the Mineral Conservation Rules, 1960 mining operations should be undertaken in accordance with the duly approved Mining Plan. Modifications of the same, if any, should also have been got approved by the IBM in advance.

2.1.3.3 Inadequate removal of overburden

As per the IBM approved mining plan, the Company was required to remove 20.68 lakh tonnes of Top Soil and 103.38 lakh tonnes of laterite overburden during the period 2012-13 to 2016-17. Audit, however, observed that the actual removal of Top Soil was only 46 per cent (9.48 lakh tonnes); and the same for Laterite Overburden was 86 per cent (88.51 lakh tonnes) of the required quantity during the above period. The position is depicted in the following chart.

Chart 4: Top Soil and Laterite Overburden Removal



The annual targets fixed by the Company for removal of Top Soil and Laterite Overburden were lower than the quantity required as per IBM approved Mining Plan.

Due to non-removal of adequate quantity of Top Soil and Laterite Overburden the Company could not expose sufficient area of top Bauxite which affected mine production quantitatively and also limited the options for grade control and blending of Bauxite. Further, there was also an instance (February 2016) where the Company was getting inferior quality Bauxite even from available good quality Bauxite faces/trenches because the Company carried out blasting of Bauxite in those trenches without removing full overburden or without maintaining the adequate gap between overburden and Bauxite faces.

The Management stated (April 2018) that the Top Soil and Laterite Overburden targets given in IBM approved Mining plan were based on 100 meters borehole drilling while the target for the same in the Annual/Monthly Mine Production Plans were based on 25 meters pre-production drilling. The Management further stated after increase in cut off Silica in threshold value of Bauxite by IBM, the quantity of Laterite Overburden became less and was now re-classified as ore. The Ministry further stated (July 2018) that there was no possibility of mining Bauxite ore without removal of adequate quantity of overburden.

The above contentions of the Management are not acceptable as the data of pre-production drilling were already available with the Management at the time of preparation of Mining Plan for submission to IBM. The further contention of the Management is also not acceptable as the Modified Mining Plan for the period 2014-15 to 2016-17 was prepared considering higher cut off silica in the revised threshold value of Bauxite as notified by IBM.

The reply of the Ministry is also not tenable as the Company removed only 46 *per cent* and 86 *per cent* of the required top soil and laterite overburden respectively during the period 2012-13 to 2016-17.

2.1.3.4 Discrepancy in Monthly Deviation Report of Mines

In order to monitor the actual mining, the Company prepared Monthly Deviation Reports, wherein trench-wise quantity of Bauxite planned to be excavated and actually

excavated was compared. Scrutiny of Monthly Deviation Reports of 53 months as available out of 60 months for the period 2012-13 to 2016-17 revealed the following discrepancies:

- Out of 53 months, data of 47 months for excavation of bauxite as per Monthly Deviation Report was not matching with the same as per Monthly Progress Report.
- In its Monthly Mine Production Plans, the Company indicated the trench-wise quantity and quality of Bauxite to be excavated. The Company, however, did not mention the trench-wise quality of Bauxite actually excavated in its Monthly Deviation Report. The Company was, therefore, was not in a position to ascertain the trench-wise deviations in quality of Bauxite excavated. Recording of trench-wise actual quality of Bauxite excavated would have also facilitated the Company in preparing more realistic blending schemes of Bauxite mining in the subsequent months for improvement of grade control.

The Management stated (April 2018) that:

- These differences were seen in the initial stages when the Deviation Report was introduced and over the months these were resolved and addressed.
- The Company had a set practice of collecting samples from blast hole drills and mine faces for quality control, but comparison of trench-wise quality of Bauxite excavated against the planned was technically not correct.

The reply of the Management may be viewed in the light of the position that:

- available data of all 41 months (for the period from 2013-14 to 2016-17, excluding the period of initial 12 months pertaining to 2012-13) did not match. Hence, the discrepancies were not addressed by the Management.
- the practice of collection of samples from blast hole drill/mine faces for quality control would be purposeful when the trench-wise sample so collected was compared with the trench-wise planned Bauxite quality data.

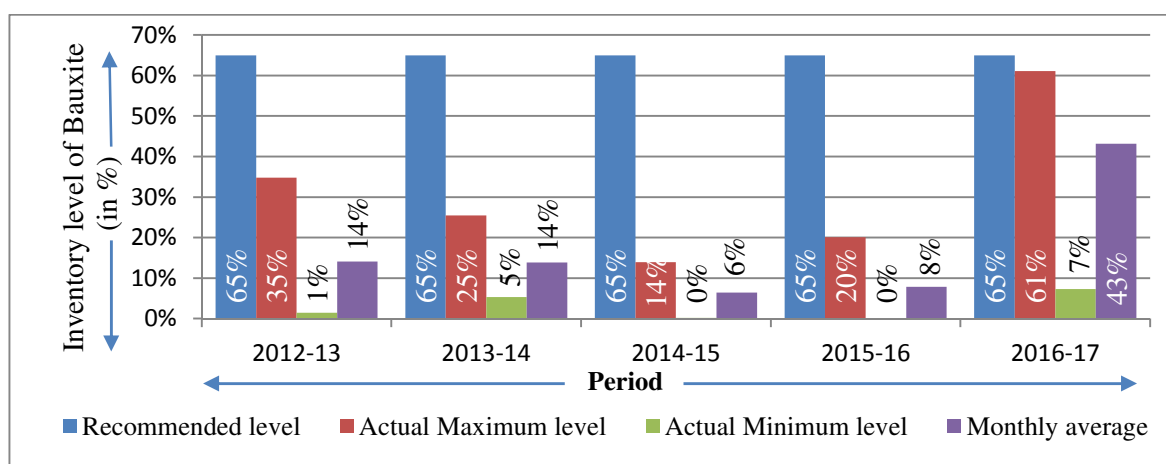
The Ministry further stated (July 2018) that these differences were due to unintentional wrong entry of the figures and informed that necessary care is being taken and figures are being cross checked to avoid aforesaid differences

2.1.4 Inadequate blending of Bauxite at Refinery

The stockyard of Bauxite at Refinery consisted of five stockpiles with a maximum capacity of 1.65 lakh tonnes each. The Bauxite with variant silica content received at Refinery from the Mines was stacked in the stockyard in horizontal layers. In order to minimise the variations in silica content in the Bauxite to be fed to the Refinery, the stacked Bauxite was reclaimed vertically for proper blending. An ideal stock of about 65 *per cent* of the stockpile capacity (1.07 lakh tonnes) was required to be maintained to facilitate the above process of blending.

Audit, however, observed that due to lower production of Bauxite in the Mines, the required stock level of 65 *per cent* could not be maintained in the Refinery stockyard during the period 2012-13 to 2016-17. The position of stock level at the Refinery end is depicted below:

Chart 5: Year-wise inventory level of Bauxite at Refinery stockyard.



The actual average stock level ranged from 6 *per cent* (2014-15) to 43 *per cent* (2016-17) only with the minimum monthly average stock level of only 41 tonnes (April 2015) in all the five stockpiles as a whole. Thus, the Company was unable to blend the Bauxite with variant silica content for feeding Bauxite to the Refinery with even silica content. As a result, the consumption of Caustic Soda during the period 2012-13 to 2014-15 ranged from 87.36 kg per tonne to 102.82 kg per tonne against the norms of 72 kg per tonne. The consumption of Caustic Soda during the year 2015-16 was 106.05 kg per tonne against the norms of 100 kg per tonne. This led to excess consumption of 1.46 lakh tonnes of Caustic Soda in the Refinery during the

period 2012-13 to 2015-16 for which the Company had to incur additional expenditure of ₹426.27 crore (**Annexure I**).

Moreover, such continuous feeding of Bauxite with variant silica content to the Refinery also resulted in lower extraction of Alumina Hydrate from the Bauxite than norms and the un-extracted portion of Bauxite was passed to the Red Mud pond. This led to higher consumption of 12.76 lakh tonnes of Bauxite in the Refinery for production of 96.31 lakh tonnes of Alumina Hydrate during the period 2012-13 to 2016-17. In this connection it is worth mentioning that the Process licensor had also indicated (November 2015) that non-maintenance of required stock level at the Refinery end resulted in almost zero blending. This caused continuously varying grade of Bauxite being fed to the Refinery and could be one of the main reasons for higher consumption of Bauxite and Caustic Soda.

The Management stated (April 2018) that blending of Bauxite at low stock situation was not a problem and moreover, the primary blending takes place before primary crushing at Mines itself. The Management further stated that the apprehension of high consumption of Caustic Soda and Bauxite as a result of improper blending was totally wrong and unfounded as there was no change in chemical composition of Bauxite during blending. The Ministry also endorsed (July 2018) the above views of the Management.

The reply of the Management/Ministry regarding blending of Bauxite in the Mines itself was not tenable because there was very limited blending capacity in the Mines and the Process Licensor (M/s RIO Tinto Alcan) had advised for achieving the blending in the Refinery. The Management's further reply on excess consumption of Caustic Soda and Bauxite was also not acceptable as the Process Licensor had already brought out that the main reason for higher consumption was non-maintenance of required stock level at the Refinery end.

2.1.5 Excess consumption of fuel oil in Calciners

The Aluminium Hydrate produced from the Bauxite was further processed in the Calciner Plant (Calciners) of the Refinery for production of Calcined Alumina¹¹. It was

¹¹ *Calcined Alumina is produced by heating Alumina Hydrate wherein it losses moisture to form Alumina crystals.*

seen that the Calciners were operated with lower load due to corresponding lower production of Alumina Hydrate in the Refinery. This low load operation of Calciners resulted in higher consumption of Fuel Oil than the norms. The actual consumption of Fuel Oil ranged between 77.56 litres per tonne and 78.88 litres per tonne against the norms of 77 litres per tonne. The excess consumption of Fuel Oil worked out to 11,719 kilo litres during the period 2012-13 to 2016-17, for which the Company incurred additional expenditure of ₹34.73 crore¹² (**Annexure II**).

The Management stated (April 2018) that reason for low capacity utilisation of Calciners was because of increased demand for Alumina Hydrate before calcination as well as unsteady off-take of Calcined Alumina leading to abrupt load restrictions and stoppages of Calciners. The Ministry also endorsed the above views of the Management.

The reply of the Management/ Ministry is not tenable as sale of Alumina Hydrate was negligible as it was ranging between 0.63 *per cent* (2013-14) and 1.11 *per cent* (2016-17) of the total production for the above period.

2.2 Delay in Technology Upgradation

In view of deteriorating Bauxite quality over the years, the Company felt (May 2011) that existing mud handling equipment of the Refinery were inadequate to meet the production requirement and thereby reducing the refining capacity. It was, therefore, envisaged (May 2011) to suitably upgrade the existing mud handling equipment with old ball mills and install High Rate Decanter and Deep Cone Washer (HRD&DCW). It was also proposed to carry out a detailed study/ re-engineering in this regard with the help of an engineering consultant to identify the upgradation required. The matter was discussed (November 2014) with the Process Licensor for a processability study with a view to assess the Refinery performance with the future Bauxite feed. The work order for such study was accordingly awarded to the Process Licensor in February 2016 and the study Report was submitted in December 2016. The Company in the meantime estimated (December 2015) that the proposed installation of HRD&DCW in the three out of four streams of the Refinery at an investment of ₹355 crore would accrue an annual savings of ₹75.45 crore. It was, however, seen that the order for consultancy

¹² On the basis of annual average purchase price of Fuel Oil per kilo litre.

services for installation of HRD&DCW was awarded in April 2017 with a completion schedule of 50 months.

Audit observed that the Management was well aware since May 2011 that installation of HRD&DCW was required in the three streams of the Refinery to overcome the problems associated with the mud handling activities in view of deteriorating Bauxite quality. However, the Company took 57 months¹³ for placement of order for processability study. Thus, there was inordinate delay in taking a final decision for carrying out processability study for installation of HRD&DCW and this was not justified considering the magnitude of financial savings that could have been accrued.

The Management stated (April 2018) that even without HRD&DCW, streams 1, 2 and 3 had exceeded the rated capacity in several years with the conventional settlers. It was also stated that there has been no delay and actions were taken with best economic interest and with minimum specific consumption of Caustic Soda and hence, the losses indicated did not actually occur.

The reply of the Management is not tenable as the Company itself felt and proposed (May 2011) for installation of HRD&DCW in the three streams of the Refinery which would have led to accruing of financial savings. The Process licensor had also opined (February 2014 and November 2014) for installation of HRD&DCW in the Refinery.

Audit Summation

The production of Alumina Hydrate in the Refinery was lower than the targets primarily due to corresponding lower production of Bauxite in the Mines. The Silica content in the Bauxite was higher than planned, which had adverse impact in the quality of Bauxite fed to the Refinery. The Company did not maintain required stock level of Bauxite at Refinery due to lower production of Bauxite at Mines. This led to inability of the Company to feed Bauxite with even Silica content to the Refinery and resulted in excess consumption of Bauxite as well as Caustic Soda. The Company also made inordinate delay in taking decision for carrying out processability study and technological upgradation.

¹³ May 2011 to February 2016