

**Report on Visit to Alumina Refinery of Vedanta Aluminium Ltd., Lanjigarh, Orissa**

Visited Alumina Refinery of Vedanta Aluminium Ltd. (VAL), Lanjigarh on 25<sup>th</sup> April 2011 to oversee the pollution control measures taken by the unit, and in particular, observe the compliance status of various directions issued by SPCB and MoEF from time to time in the recent past and to verify the allegations made in a section of the press about leakage from the Red Mud Pond. Dr. A. K. Swar, Sr. Environmental Engineer and Sri D. Sethi, Asst. Env. Engineer accompanied me during the visit. Dr. Mukesh Kumar, President, Shri B. Senapati, VP-Refinery, G. Venkat Reddy, AVP-CPP, D. Ravindranath, Head-Maintenance of Vedanta Aluminium Ltd., Lanjigarh and Sri S. K. Patel, Tahsildar, Lanjigarh were present on the site during the visit.

**Consent Status of the Industry:**

Consent to operate was granted to the industry for production of 1 Million TPA alumina and generate 75 MW electricity in its CPP, for which Environmental Clearance has been granted. Consent to Operate to the plant was given to the plant up to 31/3/2011 and consent for further period is under consideration.

**Present Status of Red Mud Pond**

The Red Mud Pond has two compartments; West Cell and East cell. West cell consists of one pond whereas the East cell has two ponds. Presently, the West cell is in use and is nearing its full capacity. High concentration slurry disposal system has been adopted for disposal of red mud in the pond and decanted water is immediately getting pumped out to Process Water Lake. Water collected in the Process Water Lake is getting recycled back in the plant for process use. A stone pitched toe drain along the outer periphery of the red mud pond has been provided to collect leachate, if any, which might percolate from the pond. The toe drain was found to be dry (Photograph-1). Central collection pit has been provided with a pumping arrangement for recycling water into the Red Mud Pond.

To prevent contamination of a pond adjacent to the red-mud pond, as an additional safety measure, another pit in the downstream of existing collection pit and overflow weir near culvert of the main road is now under construction. There was no sign of any breach in the Red Mud

Pond dyke and the pond is filled up with near solid Red Mud. Raising of the dyke wall of west cell by 3m was in progress as per the design approved by Indian Institute of Science, Bangalore. The increase in height of the dyke is expected to accommodate red mud that would be generated over a period of one year.

No discharge was observed from the red mud pond or the water pond or any outlet of the industry to Bamsadhara River during the visit. However, it may be possible that water collected in the centralized collection pit of the red mud pond during heavy rains might get in to the water pond located close to the Red Mud Pond if pumping arrangement for recycling fails. Sample of water collected from the water pond located downstream of red mud pond had a pH of 8.5 which is high but is below the prescribed threshold of 9. The rise in pH is attributable to overflow from the collection pit during the thunder storm that took place on 5<sup>th</sup> April 2011. The construction of additional pits and over flow weir which is now under progress would address such eventuality in future. There is reportedly a tectonic fault under the red mud pond, which could be responsible for some seepage to the toe drain. The unit has now taken steps to trap the leachate that might escape through the fault.

VAL has been advised to complete the dyke wall raising job of West cell at the earliest and definitely, before onset of the monsoon and always ensure that safety free board is available. The East cell also is nearing completion and it is observed that due to some land dispute issues a small portion of the wall has not been completed. Most of the works have been completed with bottom sealing by Bentonite and soil cover as per IISc design (Photograph 2) to make the pond impervious. The industry proposes to put HDPE lining only in water collection area portion of the east pond for which work is yet to be started. The industry was instructed by the Board vide its letter no. 3581, dated 25<sup>th</sup> Feb 2011 to make the east cell ready with HDPE lining with an objective to make the pond leak proof. Although this is not a part of the consent condition, but for abundant precaution they have been directed to do so.

VAL has been advised to make a presentation with all technical details and is required to obtain prior permission of the Board before use of the East Cell.

As the Collector, Kalahandi could not come due to her prior engagements she had deputed Tehsildar, Lanjigarh to represent her during the inspection. The Tehsildar informed that land

alienation for the small portion of the kuttcha road passing through East cell will take about a month to 45 days time as this was being used by adjacent village in the past and till that time no work can be taken up on the disputed portion of land located in the East cell.

Photograph 1: Toe drain around West cell of red mud pond dry.

Photograph 2: Bottom sealing by Bentonite and soil cover in East cell of red mud pond

### **Compliance to MoEF directions issued vide letter dated 20.10.2010**

1. Two piezometers have been installed.
2. VAL confirmed that all Bauxite is being procured from mines having all approvals in place. VAL was advised to submit a copy of Environmental Clearance of those mines to SPCB.
3. It was informed by the industry that 112 Ha areas have already been covered under plantation and balance 50 Ha plantation work is in progress to cover 25% plant area. The plantation area was visited near Red Mud Pond, Township and industrial premises. The industry has been asked to furnish a layout map showing plantation area/ green belt developed/ proposed.
4. VAL has taken initiatives to minimize dust emission by installing Bag-filters at the Calciner transfer points, fixed vacuum dust collection system at Bauxite and Alumina handling areas. Also mobile trucks fitted with vacuum dust collection system have been procured and were being used for cleaning major dust polluting areas. The approach road and the internal roads have been black topped/ most of them concreted and provided with concrete drains. Most of the roads are found to be clean and water sprinkling was being done on the roads wherever necessary.
5. One continuous Ambient Air Quality (AAQ) monitoring station and an online stack monitoring system for Calciner and Power Plant along with online digital display at the

factory gate have been installed and found to be operating. The industry is required to install another 3 online AAQ monitoring stations to cover all directions.

6. The following energy / raw material consumption data was reported by the industry. The industry has been advised to furnish a copy of the report to the Board on:
  - i. Energy consumption of 8.2 GJ/T of calcined Alumina which is much lower than industry average.
  - ii. Caustic consumption of around 100-105 Kg/T against 65kg/T recommended by MoEF. VAL clarified that 65 kg/T can be achieved only with East Coast Bauxite.
  - iii. Fuel oil consumption of 72 kg/T of Alumina against 90kg/T of Alumina as recommended by MoEF.

### **Other Observations:**

During visit to the plant the following observations were also made:

1. All the roads inside the process unit and Power Plant have been converted from bitumen to RCC. Major plant roads of about 8-10 km have been converted from bitumen to RCC.
2. Particulate emission from the stacks of CPP and Calciner was not visible.
3. The house keeping of the plant was satisfactory.
4. The industry has taken initiatives for providing acoustic enclosures for equipments, pipelines of vacuum pumps and blowers to minimize noise pollution.
5. Imported robotic machines are being used for cleaning of tanks, pipelines, heat exchangers to avoid any human exposure to caustic environment.
6. High efficiency bag filters are being used in Alumina handling areas.
7. Dry fog systems, vacuum cleaning systems and sprinklers are used in almost all the material handling areas.
8. VAL has started recovering vanadium sludge from the Red Mud Pond and informed that the same is being sold to authorized parties.
9. Dr. Mukesh Kumar, President apprised about the future road map of the industry for Zero Waste by utilizing Red Mud and Fly Ash for value added products. He informed that they have tied up with numbers of national laboratories of repute like IMMT,

Bhubaneswar, NIT, Rourkela, Kolkata University, JNARDC etc to work on various waste utilization projects.

10. Separate hazardous waste storage shed has been constructed for storage of used oils.
11. The dirty water collection pond made of RCC inside the plant is being used and no discharge of any water to outside water bodies has been observed.
12. It was informed that due to implementation of Zero discharge system, the water consumption in the plant has come down to 2.8-3.0T/T of Alumina which is lower than the benchmarked figures.
13. VAL is having very advanced process and environmental laboratory equipped with some of the State of the Art equipments like XRF, XRD, AAS, Laser instruments, C,H,N & O measurement instruments etc.

### **Conclusion**

The unit has adopted good environmental practices and is complying with most of the conditions of the Board in respect of Air and Water pollution and taken steps to make the East cell of red mud pond impervious. But as an abundant precaution to ensure no percolation from the red mud pond they have been asked to take up complete HDPE lining of the East cells. It must be ensured that under no circumstances any leachate/ water collected in the central collection pit is passed to the outside areas.

The unit must expedite completion of dyke wall raising at the west cell of red mud pond before onset of the coming monsoon. Safe free-board as per the design must be maintained in the West cell to prevent any overflow of red mud/ breach of the pond. The production level may be reduced level to match with the accommodation capacity of the west cell of the red mud pond.

Fool proof arrangement shall be made at the inlet weir of dirty water pond to ensure 100 % collection of caustic effluent/ spillage water from the process area in the dirty water pond for complete reuse in the plant.

**(Siddhanta Das)**

Member secretary

SPCB, Orissa