

Technical analysis of the 6-MTPA project

Key aspects

- **Internationally discredited:** The Norwegian government, decided to sell its shares of its pension fund from the Vedanta Resources Plc on account of environmental issues and human right violation in Lanjigarh, Orissa. The Norwegian pension fund hold largest position in Europe and second largest in the world with total worth of \$359 billion as of June 2007.
- **Legal turnarounds on linkage with mining project:** Vedanta's legal gymnastics on the matter have been remarkable. At CEC hearings, it first said mining on Niyamgiri was absolutely necessary for its project, then when questioned by CEC about starting work on the refinery without having mining clearance, it came out with the statement that the mines and refinery were separate projects and if the mines weren't approved it would ship in the bauxite from elsewhere. When CEC observed that if the mine wasn't absolutely necessary, approval could not be granted under FCA. Vedanta immediately performed a perfect back flip. It now insisted the Lanjigarh refinery could not function without the Niyamgiri mines.
- **Deliberate non-disclosure on environmental clearance form:** The company deliberately omitted the fact that the refinery project required diversion of 58.9 ha of forestland in its application for environmental clearance. It started construction without getting required clearance under FCA. The CEC expert committee found this out during its visit. When this was pointed to the ministry, it issued notice to the company to stop work. But the company then said in a new notice to the ministry that it no longer needed the forestland for the refinery project. This was accepted without any questioning by the Ministry and the ban was lifted the very next day of receiving the notice.
- **Clearance despite several objections by the CEC:** The CEC in its report was very critical of the project. It questioned why the MoEF had delinked both mining and refinery project. It said 'present practice of OMC getting into agreement for allotment of mining areas, in respect of which clearance under Forest (Conservation) Act, 1980 and Environment (Protection) Act has not been taken, is violative of the spirit of the aforesaid acts. Creation of infrastructure for processing the mineral without firm commitment of the availability of the mineral puts Government in awkward situation'. It also mentioned that the rehabilitation package was not in interest of the people (no grazing land, poor infrastructure facilities at rehab colony). The CEC fact finding committee also commented on the rich biodiversity of the region.
- **Clearance obtained by the mining project insufficient for expansion project:** The MoEF gave the final clearance to the mining project in April end 2009. This clearance however is for only 3 MT. If the proposed expansion project is cleared, the refinery would require atleast 15 MT of bauxite every year. This means that the total bauxite deposits of 75 MT will be used up only in 5 years instead of 25 years as earlier proposed. The whole Niyamgiri hills with its rich biodiversity and water resources will be completely **wiped out only in 5 years**. Moreover, since the company has obtained clearance for extracting only 3MT, will it reapply for more extraction? The EIA report for the proposed expansion has not mentioned anything from where it will source its additional requirement of bauxite.
- **Ecological hotspot:** The company in its original EIA report (1 million tonne) had indicated that though the secondary data showed a variety of faunal species under categories like endangered and vulnerable as per the Zoological Survey of India's Red Data, but primary survey did not show all of the mammalian species listed. The EIA report also described the

actual mining area on the plateau, which is open grassland, as not useful for wildlife and forests.

The WII report counters this. It notes, “These plateaus are very productive with high occurrence of several herbivore and carnivore species.” According the first report submitted by the Wildlife Institute of India (WII) to the Supreme Court, mine site preparation and access of road to hill would impact several wildlife of this habitat and also reduce the diversity of tropical moist deciduous forest. WII also stated that mining in Niyamgiri plateau would destroy a specialized kind of wildlife habitat, dominated by grasslands and sparse tree communities. These kinds of sites are breeding habitat of many herbivores such as barking deer and four horned antelopes. However, the institute later prepared a supplementary report that included an Rs 42-crore plan for mitigation of impact on wildlife.

Niyamgiri forests are historically recognised for its rich wildlife population. It was declared a game reserve by the ex-Maharaja of Kalahandi. It has also been proposed to notify it as a wildlife sanctuary in the Working Plan for Kalahandi Forest Division, which has been approved by the MoEF on 16th December, 1998. This area has been constituted as an Elephant Reserve by the State of Orissa vide Order N4643/WL(Cons)34/04 dated 20.8.2004.

- **Threatens existence of the Dongria Kondhs:** A highly endangered primitive tribe – the Dongria Kondhs whose population is less than 6000 reside in the Niyamgiri hills. They are dependent on farming and forests and have no other source of livelihood. Niyamgiri Hill is a sacred hill for the Dongria Kondhs tribe. They do not cultivate on the hilltop out of respect and the hill is worshipped as Niyam Raja. The entire tribe with its unique custom and practice will become extinct if Niyamgiri hills are diverted for mining. It can also be argued that by allowing mining, that is by transferring land to the non-advaitis in this area (Schedule V area) is in violation of the judgment of the Supreme Court in Samta Vs. Andhra Pradesh.

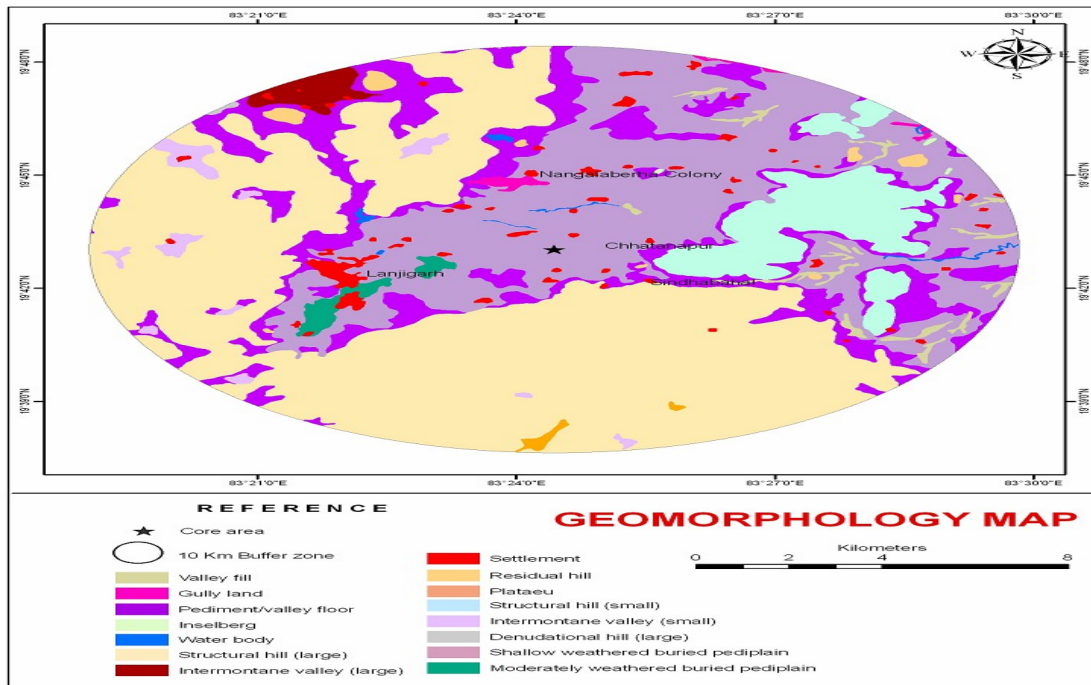
- **Poor compliance in existing 1 million tonne refinery project:** The Orissa Pollution Control Board has found the refinery to be non-complaint on several of the environmental conditions:
 - Emission from the boiler stack very high (i.e. 795 mg/Nm³ against standard 150 mg/Nm³, this is 5 times more than the existing standard)
 - Plant discharging alkaline water (i.e. high pH wastewater) into the Vamsadhara River
 - River Vamsadhara and nearby paddy land polluted due to seepage of fly ash from the ash pond. High concentration ash slurry disposal has not been followed
 - Construction of red mud pond inadequate.
 - HDPE lining materials in the process water lake (overflow from the red mud pond is diverted to the pond) in a bad shape. This increases the risk of contamination of groundwater.
 - Despite recommendations to operate the concentration of the red mud slurry at 55-60 per cent, the company is operating it at much lower concentration. It is unable to maintain the process parameters for doing so
 - Seepage management systems from alkaline wash storage tank inside the plant were not adequate and found non-compliant.
 - No actions were taken to check runoff from the bauxite storage area during rainy season

- On line pH monitoring system were supposed to be installed in the storm drain. But it was not installed till date.
- Construction of sewage treatment plant (STP) for plant and colony were not completed.
- On line monitoring system for dust monitoring in both calciner and boiler stacks were not installed yet.
- At coal and bauxite storage area, no water sprinkler system were installed

Even at 1 million tonne, the company has failed to meet the standards and provide for basic facilities to treat and manage its pollution load. But it still plans to expand its capacity to 6 million tonne, making it one of the world’s largest refineries. The question is will it be able to comply and manage the increased pollution load?

- **Location and its impact on air:** The inherent location of the project makes it very sensitive not only from the biodiversity point of view but also from the air pollution perspective. The existing plant is located in a valley, which is surrounded by mountains from three sides (see Figure 1). This makes the impact of the air pollution much more severe during the night. The cold air flows into valley in the night as a result it brings the pollutant plume back into the valley instead of dispersing it (see figure 2). Problem is acute particularly during the winter, when the air becomes stagnant due to the inversion condition.

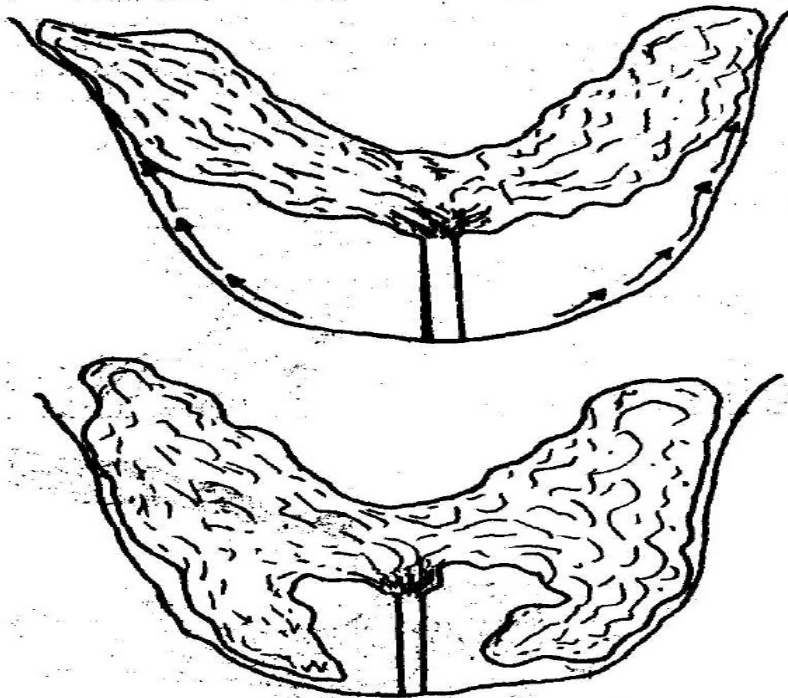
Figure 1: Geomorphology of the study area



Source: REIA & EMP Report of expansion of Alumina Refinery from 1 MMTPA to 6 MMTPA Capacity Of M/s Vedanta Aluminium Limited, Lanjigarh, Kalahandi, Orissa

Note: According to above figure, large hills are present in S, SW and NW from the plant. In the eastern part of the plant small hills range are present.

Figure 2: Effect of valleys on dispersion



Warmer air ascending along the slope forcing the plume to fan out during **DAY TIME**

Descending colder air bringing down the plume into the valley during inversion in **NIGHT TIME**

Effect of Valleys on Dispersion

Clearly, the ambient air in the area has deteriorated over a period of time on virtue of its location. According to the previous EIA report, prior to the commissioning of the refinery (1 MT), the ambient air quality met the standards prescribed for sensitive area (annual average 70 microgram/Nm³). However, the change in air quality is visible as is evident from the ambient air quality report as provided in the EIA report for expansion (see table 1).

The SPM and RSPM level in the study area has increased by as much as 230 and 300 per cent respectively. In Balahadrapur, prior to project, the average SPM level was around 47.8 microgram/Nm³, which has gone up to 172 microgram/Nm³ as reported in the second EIA report. The same is the case with Lanjigarj and Harikrishnappur. The Vedanta's refinery and its proposed mining are the only industrial activity in the area. This clearly shows that the ambient air quality in the region has been affected due to the project activities.

Table 1: Change in ambient air quality due to project activity

Location/ village	As per 1 MTPA EIA report		As per 6 MTPA EIA report		Percentage Increase	
	SPM	RSPM	SPM	RPM	SPM	RPM
Lanjigarh	58.7	21.8	97.8	46.2	67	112
Harikrishnapur	45.6	14.3	126.8	62.8	178	339
Balahadrapur	47.8	19.4	172.2	69.1	260	256
Overall ambient air quality in study area	51	19	170	76	232	301

The question is whether, the ambient air has enough assimilating capacity to bear the increase in the pollution load from 1 MT to 6 MT.

- **Increased air pollution load:** A large scale refinery project will not only lead to dust generation from both point source as well as non-point sources but will also significantly

increase the ambient SO₂ and NO_x levels in the surrounding area. Increasing the production at the refinery from 1 Mt to 6 MT, will add 2327 tonnes of dust, 6159 tonnes of SO₂ and around 2709 tonnes of NO_x every year. Even though, the project will contribute significantly to SO₂ and NO_x, no pollution control equipment has been suggested for these in the EIA report.

In addition to point source emissions, fugitive dust from storage of bauxite, coal, and lime (around 20 million tones of these materials are proposed to be stored in open) would be significant. Assuming an emission factor of 0.6 kg/tonne of bauxite¹, the total fugitive dust from the bauxite storage yard would be around 9288 tonne every year. Similarly, if emissions from the coal and lime storage yard were also added, then annual fugitive emission would be significant. This can have severe impact on the health of the workers and community if not properly controlled. The EIA report has failed to suggest sound mitigation option for controlling the fugitive dust.

- **No assessment of cumulative impact on water resources:** Considering the location of the project and the geographical contiguity of the refinery and mining (located at distance of 3.7 km) sites, it is clear that the environmental impact will be a cumulative for both the mines and the refinery. However, the EIA reports for both refinery and mines have failed to assess the cumulative impact of the total project on the region. The impact of mine on water resource is expected to be high because it is located on hill and plant is located at the foothill.

As it is Niyamgiri hills are the major water source of the Vamsadhara River and a major tributary of the Nagvalli River. Both rivers supply water to several districts of southern Orissa and Andhra Pradesh. Thirty-six perennial streams originating around the mining lease site provide drinking water and water to irrigate fields in the adjoining villages. Majority of the streams originate from lowermost control of the Bauxite layer.

It is important to understand that Kalahandi district experiences acute water scarcity during major parts of the year and Niyamgiri and its catchments are one of the very few perennial sources of water. Mining on Niyamgiri is therefore a trade-off between water availability for a large area for perpetuity versus 25 odd years of Bauxite mining.

The existing project itself has created a lot of stress due to its water demand. Earlier, the 1 MT refinery project had intended to source all its water from Vamshadhara river. However, the flow in this river (31200 m³/day) was even less than the daily requirement of the company (39700 m³/day).

The refinery itself was struggling to meet its water requirements and therefore it started sourcing its water from Tel River at Kesinga through a 65 km pipeline. In early 2008, Vedanta had installed several deep bore wells along the pipeline because it was not able to meet its water requirements. The Orissa's water resources department sent a team to Lanjigarh and shut most of the wells down.

The six fold increase in production is likely to significantly increase the water consumption at the refinery. It is doubtful if the Tel river has enough flow to sustain this expansion as well as the requirement of people and users dependent on the river.

The EIA report of the expansion project has completely missed out on addressing the issue of cumulative impact on the Tel River and its resultant impact on people and habitat dependent on this river. There is no analysis on the reduction in flow of Tel River due to disappearance of streams originating in Niyamgiri hills or the loss of catchment area for setting the plant.

¹ 0.6 kg/tonne bauxite is the emission factor
: http://www.npi.gov.au/handbooks/approved_handbooks/pubs/mining.pdf

- **Contradictory information on water consumption:** Interestingly, the two EIA reports (1 MT and the expansion of 6 MT) provide contradictory information on the quantity of water consumed by the 1 MT refinery project (see table 2). While the earlier EIA report indicated that it was as high as 39700 m³/day, the expansion EIA report indicates that it is only 14895 m³/day. The EIA reports in both cases have not accounted for the people dependent on the Tel river and other competitive user. The EIA report for expansion has not even given the *river flow data*.

Table 2: Contradictory water information as reported in two EIA reports

1 MTPA EIA	6 MTPA EIA
Water requirement for 1 MTPA - 39700 m ³ /day (see page 9, 1MTPA EIA report)	Water requirement for 1 MTPA – 14895 m ³ /day (see page 21, 6 MTPA EIA report) Total water requirement for 6 MTPA - 56,250 m ³ /day
River flow data: Mentioned in the EIA report	River flow data: No river flow data is mentioned in the report
People dependency on River: No information	People dependency on River: No information

Source: REIA & EMP Report of expansion of Alumina Refinery from 1 MMTPA to 6 MMTPA Capacity Of M/s Vedanta Aluminium Limited, Lanjigarh, Kalahandi, Orissa

- **Wastewater use and disposal:** The proposed expansion EIA report as well as the original EIA report indicates that the refinery is zero discharge plant. The EIA report however does mention that 30 per cent of the total water consumed is generated as wastewater (which includes wastewater from plant, cooling tower blowdown, DM plant etc). If we assume the same ratio of wastewater generation, around 16875 m³ of wastewater would generated every day from a 6 MT refinery. The EIA further states that the “*entire treated wastewater will be reused in the process*”. This means that the company would have to consume 16875 m³day of wastewater in addition to 56250 m³ of water, which it sources from Tel river every day. The question is where are they consuming so much water? It is unlikely that the plant would be able to consume all the wastewater even if they use it for dust suppression, gardening or some other activities. Therefore, there is a high possibility that some amount of wastewater may find its way into the river. There are already complaints from the local community that this is already happening in the existing 1 MT plant.
- **High risk of groundwater contamination:** Another big threat from the project is the possibility of groundwater and surface water contamination from the red mud and flyash disposal site. The EIA report of 1 MTA refinery mentioned that a HDPE lining would be provided in the red mud disposal site. In contrast, in the expansion project no HDPE lining would be provided in the red mud pond, instead a natural liner would be used, which is a mixture soil and bentonite. The area around the plant and waste disposal site has moderate ground depth, which varies from 3 to 4 meter (EIA report refer figure 3.1, page 39). Another statement mentioned in the EIA report indicates that “*from the field permeability tests, permeability data and the nature of the soil (clayey sandy clay), it is apparent that the seepage will be higher*”. This clearly shows the risk of groundwater contamination from the red mud disposal site is high.

The expansion project would generate around 7.7 million tonnes of red mud every year. This would require 890 ha of additional land for disposal. This means that altogether 1073 ha of land is under the red mud disposal site, which is more than 50 per cent of the total land required for the project (i.e. 2007 ha). The red mud ponds are located in the catchments area of Vamsadhara and Nagavali River. Therefore, any leakages from the pond could

significantly affect the water quality as well as reduce the water flow due to reduction in catchment area.

- **Contradictory statement on forest cover:** Both the EIA reports (1MTPA and expansion of 6 MTPA) depict two different values on the forest cover in the area. According to the EIA report of 1 MTPA, around 60 per cent of the study area is under forest cover. On contrary, the EIA report of the expansion project claims that only 14 per cent of the land is under forest.
- **No disclosure on Vanadium sludge in the expansion EIA report:** Although the 1 MTPA EIA report has mentioned about the Vanadium sludge (hazardous waste) and its annual generation (i.e. expected to generate 18000 tonne/year of Vanadium sludge) and suggested management plan for the same. The expansion project has not mentioned anything about it. Using the same estimate, 6 MTPA refinery is likely to produce 108000 tonne of Vanadium sludge every year.