

RECLAMATION OF COAL MINE VOID

Reclamation of Coal Mine Void with Fly Ash

Filling of mine voids with fly ash in an environmental sound process is the most viable option of bulk utilisation. This not only saves huge quantity of land requirement for ash disposal but also reduces associated environmental issues in reclaiming the mined out area for making its gainful use.

Fly ash in bulk quantity can be utilized in stowing of underground mines with fly ash in lieu of sand and filling up abandoned open cast mine voids. This can result in higher percentage of utilisation of generated fly ash.

Fly ash can-

- ♣ Find as a substitute for sand.
- ♣ Reduces water requirement to the tune of 50%.
- ♣ It fills well into the void/cavity as it can easily flow.
- ♣ It has water holding capacity which in turn can facilitate aforestation.

It is examined and analyzed that fly ash are relatively inert. Moreover coal used in Indian thermal power plants has high ash content. As a result enrichment of heavy metal is lower compared to fly ash produced by thermal power plants in developed countries.

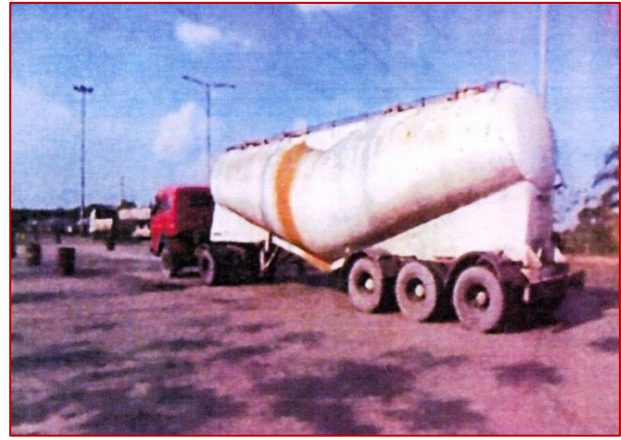
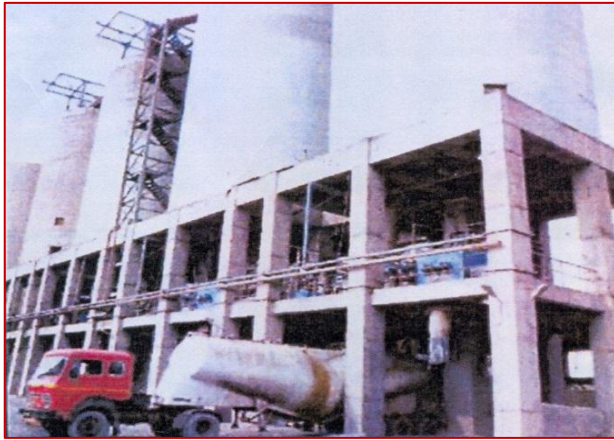
Thermal Power Plants who have been allotted with Mine Void by MCL and MoEF Clearance

Sl. No.	Thermal Power Plant	Mine Void Allotted	Ash Utilisation (in Mcum)	Year of commencement of filling of void	Expected to last till
1	TTPS (NTPC), Talcher	Jagannath OCP & South Balanda	25.14	2005	2025
2	TSTPS (NTPC), Kaniha	Jagannath OCP	17.82	Not yet started	-
3	NALCO, CPP, Angul	Bharatpur OCP	13.0	Not yet started	2021
4	Bhushan Steel Ltd., Angul	Jagannath OCP	17.0	2014	-
5	Nava Bharat Ventures Ltd., Dhenkanal	South Balanda	8.83 Lakh	2008	2023

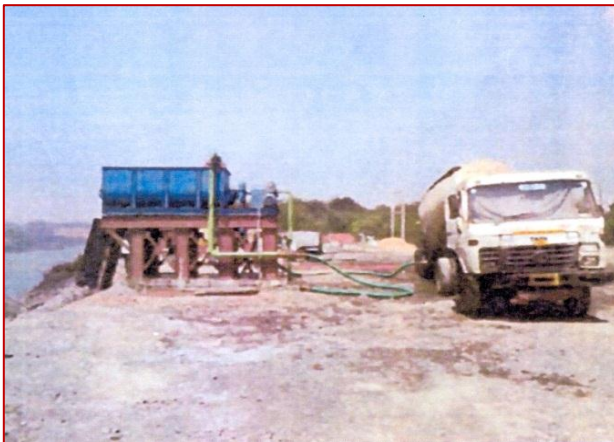
Mcum- Million Cubic Meter

Dry Disposal Mode

The other two power plants (Nava Bharat Ventures Ltd. & Bhusan Energy Ltd.) have been allotted with coal mine voids at Jagannath OCP & South Balanda mine void for disposal of fly ash. Presently the same is disposed by dry disposal mode. The moistened fly ash is transported through covered trucks and tankers. The capacity of the closed tankers is around 22 Tonnes. The same is unloaded into the mine void and water is added to make it slurry form for easy flow to the void. The decanted water from the mine void is pumped back and utilized for slurry making. The following photographs indicate the disposal mode into the mine void by Bhusan Energy Ltd., Dhenkanal.



Fly Ash being collected by the Tanker



Slurry Making at Mine Void Site



Slurry pipeline laid by NALCO (CPP), Angul for pumping lean slurry to Bharatpur Coal Mines



Lean Slurry Disposal of Fly Ash in South Balanda Coal Mine Void by TTPS, Talcher

Abandoned Quarry filling (Murom / Stone / Laterite)

Low laying areas, abandoned quarries, (stone, morum, and laterite) can be reclaimed by fly ash. This can enhance the percentage of ash utilisation in the State. This is already being practiced in the State. All the Collectors and District Magistrates have been requested to identify the abandoned quarries in their districts, so that the thermal power plants can take advantage of the identified quarries for fill-up of the same by fly ash.

Recommendations:

The coal rich state like Odisha is going to be hub for power generation in the country and large areas of private/ government/ agricultural/ forest land shall be required for coal mining, power plants as well as for ash disposal. The Indian coal is high in ash content (40-50%) and plan for addition of 37,000 MW of power plants in Odisha is likely to generate more than 100 MTPA of ash in future. The ash utilisation potential of the state is already low and the ash disposal will require 9,250 Acres of additional private/ government/ agricultural/ forest land for ash disposal, in addition to land required for coal mines and power plants. It will, therefore, be a win-win situation for all the stakeholders if the ash is filled in mine voids and the voids are reclaimed through vegetation.

- It is therefore proposed that the mine closure plan for various mines (coal mines, stone quarries and other mines) should have a mandatory provision that ash shall necessarily be used for backfilling & reclamation.
- In the interest of environment and saving the precious agricultural and forest land, the filling of mine voids with ash should be encouraged.
- It may however, be stipulated that an earth cover of 300 mm should be provided on top and the mining company / thermal power plants made responsible for raising afforestation, maintaining it till maturity and return of the same to State Govt.
- Various studies undertaken on impact of ash filling in the mine voids (ash characterization, leachability studies, hydrogeological studies and analysis of mine pit water and ground water) conclude that the coal ash is not hazardous for filling in mine voids and has no significant impact on ground water quality of surrounding area.
- Lining of the mine voids is not feasible due to deep cuts, steep slopes and water present in voids.

- The fine particles of ash is likely to block the pores of the soil/ aquifers and reduce its permeability due to its pozzalanic property.
- The trace elements in leachate from voids, if any, are likely to undergo chemical adsorption reaction with clay material present in soil and transportation get restricted.
- It is necessary to monitor the ground water quality in the adjoining areas of mine voids as well as sources of ground water in the downstream direction on periodic basis.
- Excess water from the voids after disposal of ash (mine pit water or decanted slurry water), if any should be used in afforestation activities, dust suppression and or recycled to the power project for reuse in ash slurry making.
- Mine void filling with fly ash will not only help in removing scars from the face of the mother earth but also help in creating vegetation cover on top of it. This will also help in increase in biological activities within and above the area leading to increase in organic content of the soil, enhancement of flora and fauna and overall ecological restoration of the area, improving the biodiversity of the area.

Hence, it is recommended that abandoned mine voids be allotted to the Thermal power plants on application and completion of site specified studies on a fast track basis for disposal of fly ash into the mine voids. A detail guideline for the studies and disposal methodology may be developed by Central Pollution Control Board or Ministry of Environment and Forests.

Acknowledgement : TTPS (NTPC), Talcher