

# ALERT

Name of the mine : Bharatpur Opencast Mine  
Owner of the Mine : M/s Mahanadi Coalfields Ltd.  
Date and time of the accident : 23.07.2019, 22:30 Hrs  
Number of persons Killed : 4(Four)



## **Prima facie cause of the accident:**

While men & machinery were deployed for extraction of coal in an area dip-side of a left out rib of coal and overburden having width of about 03 m at top and of height of about 39 m against which backfilling was done upto a height of about 100m, suddenly the rib failed, causing flow of debris including broken rib, dumped material and slush spreading over an area measuring about 210m (length) X 270m (width), burying men and machinery and inflicting fatal injuries to four persons and nine persons escaped with minor injuries.

## **Recommendations:**

1. It is time to tread towards self-regulation to shift the onus of hazard identification on to the “Hazard owners”. It is now required that the mine management should focus on self-regulation and take up pro-active measures to eliminate unsafe conditions and eradicate unsafe practices, to ensure a safe and hazard – free work environment.
2. The presence of the rib on dip-side the dump acts as a barrier. It checks the flow of the collected water, near the dump toe and the natural flow of dumped material, thereby exerting the pressure on the rib, ultimately leading to the failure of the rib. The presence of coal pillars in the workings leads to spontaneous heating of the coal and thereby fire in the coal pillar and causing failures. There are number of occasions when insitu

block of coal(rib) is left un-extracted have failed and collapsed causing flow of debris causing fatal accidents thus management shall not leave insitu block of coal(rib) un-extracted.

3. The top soil should not be mixed with Overburden (OB) and dumped at the bottom or middle of the dump. It should be stacked separately and spread at the top of the dump for plantation as prescribed in Reg. 108(1) of CMR, 2017.
4. The dumped material shall be allowed to settle at not exceeding the natural angle of repose of the material as prescribed in Reg. 108(2) of CMR, 2017. The spoil bank face shall not be retained by artificial means at an angle in excess of its natural angle of repose.
5. The OB should not be dumped in the sump. In unavoidable circumstances, the water and slush in the sump shall be cleared upto the hard floor of the pit. The hard floor of the pit which forms the base of in-pit dump shall be ripped or broken to a depth of 1 to 2m to improve the frictional resistance at the base of the dump before starting of the dumping. It should be filled with OB consisting coarse grained sandstone. It will also facilitate the passage of water through the dump floor, thus preventing accumulation of water at the base of dump.
6. It is advised to complete the scientific study at all opencast mines in respect of method of working, ultimate pit slope, dump slope and monitoring of slope stability forthwith and work the mines accordingly.
7. A Code of practice for method of in-pit dumping, stability and real-time monitoring of dumps including dumpyard management and control shall be prepared and implemented.
8. The real-time monitoring of dumps shall be carried out. Carefully designed real-time monitoring programs should be integrated part of Safety Management Plan (SMP) which are legal binding, and very useful for supplementing safe scientific design methods to detect instability well in advance during progress of the mine so that men and machines can be withdrawn well in advance.
9. As far as practicable, the carbonaceous matter shall not be dumped in OB dump.
10. A code of practice shall be drawn up for dealing with fires in OB dumps.
11. The water shall not be allowed to accumulate over the dumps. Proper leveling of the dumped material should be done.
12. The back filled area shall be kept benched and the distance of any active mine workings (faces) from the toe of the bottom-most back filled face (bench) shall not be less than 100 m or height of the OB dump whichever is higher without prior permission from this directorate based on scientific study.
13. The ultimate high wall should be formed by controlled blasting. The weak strata should be stabilized and secured adequately.
14. In case of failed slopes, the new benches should always be formed, in the failed zone, by pushing back the existing pit crest from top downwards.

The toe of the failed material should not be touched before reforming the benches from top downwards. The fresh benches should be formed in undisturbed slope material.

15. Most of the high walls and dumps were failed in rainy season. The mine management should increase the mine inspections in and around the mine during pre-monsoon period and focus on measures taken for diverting of rain water, drainage system, abnormal flow of water, development of any tension cracks on surface, displacement of benches, etc. There should not be any flow of water over the slopes which increases density and reduces the cohesion and angle of internal friction of the friable strata leading to the slope failure. Additionally, dewatering of potentially unstable zones is also important to minimize hazards related to high wall failures. It is recommended to carry out geo-resistivity or any other survey of the mine to locate potential source of ground water around the high wall and use a combination of vertical bore wells and horizontal drain holes for depressurization. Otherwise the dump would once again get saturated and may lead to a failure. It is recommended to provide adequate & well-planned drainage system in and around the pit in high wall and dump benches to maintain the pit/dump slope stable. Proper cleaning/ desilting and leveling of the drains would be necessary to keep the drains effective.
16. The discontinuous dumping shall be avoided to check water accumulation between heaps as far as practicable. The open cracks developed in the partially developed dump shall be filled and consolidated with the proper leveling of the benches with the help of dozer. It will help to consolidate the dumped material and will minimise the infiltration of water inside the dumps. Proper gradient along the benches, top and floor of the dump shall be ensured. It will facilitate an effective seepage/ flow of water retained in dumps as well as run-off of rainwater to the drains to take the same away from the dump. The drains should be effectively maintained to divert the drained water away from the dump.
17. Afforestation by planting trees on dumps shall be carried out to improve the stability of dumps by preventing erosion.
18. No person shall, or shall be permitted to approach the toe of an active spoil bank where he may be endangered from material rolling down the face. Suitable warning signs at conspicuous places shall also be displayed.
19. No coal or carbonaceous matter or debris or overburden shall be stacked within 100m around the active faces and periphery of the opencast workings.
20. All the persons employed beyond day-light hours in opencast workings, dump yard, CHP, etc. shall be provided with, and shall use, fluorescent jacket and helmet with fluorescent band.