

# REVIEW ON MINE INNUNDATION

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**Abstract** — This paper looks at accidents cause by INNUNDATION which led to loss of man and machinery. It also includes data related to no. of fatalities caused due to INNUNDATION. The paper also discusses the real reasons behind major disastrous INNUNDATION in Indian mines. The no. of fatalities and teaches a lesson about how things goes wrong when laws are not followed. Concept of how to deal with old working areas are also been discussed further.

## Introduction

Mine innundation is one of the sudden occurring disasters that cause a huge loss of man and machinery. Mine innundation means mine flood. The mine floods are extremely dangerous as it does not give time to escape and causes lots of damage, comparing the back histories and records, now we are well knowledgeable and predictable by various gadgets that guide us on how to reduce maximum damages as there is no such technology yet to completely stop mine innundation.

Porous nature of rocks and certain soli also increases the water seepage at faster rate, Porosity of various rocks are as follows

SR NO	ROCKS	POROSITY (%)
1	Soil	50 - 60
2	Sand	35 - 40
3	Pebbles	30 - 40
4	Shell	01 - 10
5	Limestone	01 - 10

**Ways water gets into a mine:** There are various ways water seeps into a mine they are listed as follows-

1. Due to the discharge of water from the water accumulating surface to a small secretory cavity (follicle) or any mining cavity prepared during the development stage.
2. Due to discharge of water from any aquifers or water bodies near mine seam.
3. Due to discharge of water from large boulders or rock joints or any other soil layer due to heavy rain.
4. Due to accidentally entering an abandoned mine that gets flooded.
5. Mining under any water bodies can also cause water entering in a mine.
6. Entrance of water from any fault or cracks.
7. Water which got collected on the surface enters easily at fewer depth mines.
8. Electricity cut or any kind of manual or technical fault that causes the breakdown of the main pump.
9. Breaking of any mines barrier/dam that was built to stop water from flooded region to travel to the working seam.

There are some accidental history records from some mines given below in the tabular form.

Date	Name of mines	No. of fatalities
05/08/1953	Majri	11
10/12/1954	Newton Chikli	63
26/09/1956	Burra Dhemo	28
20/02/1958	Central Bhowra	23
05/01/1960	Damua	16
18/11/1975	Silewara	10
27/12/1975	Chasnala	375
16/09/1975	Central saunda	10
14/09/1983	Huriladih	19
13/11/1989	Mahabir	6
26/09/1995	Gaslitand	64
02/02/2001	Bagdigi	29
16/06/2003	Godavari Khani-7LEP	17
15/06/2005	Central saunda	14

## INDIAN MINE DISASTERS

. There are various types of disasters that occurred in Indian mines which have caused huge losses to man and machinery. One such type of disaster is mine inundation. Various mines in India have faced this disaster out of the largest damage created to mines like Newton Chikli Colliery, Burro Dhemo Colliery, Central Bhowrah Colliery, Damua colliers & Chasnala colliery.

### I. Newton Chikli Colliery:

A horrible accident happened at the mine due to the sudden punching of the coal handle between the current operation and the old operation of a different seam to the other side of the fault. The following data entered to the developing lower seam from an old upper seam goaf that was discarded about 30 years ago on the day of the accident on 12.12.1954.

- A large amount of water.
- colored red muck and sediments.
- Old coal dirt biosolid (slurry).

(d) Blackdamp (mostly consists of CO<sub>2</sub>).

**Cause of risk:** Proper testing of available maps was not performed when approaching a cracked surface of a different seam near the faulty area. Since the distance between the two seams is 13 meters and the error is only 12 meters, the function of the lower seam is combined with the operation of the upper seam which is already flooded. The thickness of the top seam was 3 meters and the thickness of the bottom seam was 1.37 meters.

**The following safety measures were not taken in advance to prevent the tragedy as 62 people were killed -**

- The old discarded mine map was not studied during the renovation of the underground seam development program.
- The location of the fault in the 12-meter throw error was not noted in the operating map.
- Violations of Reg.127 (6) (a) and 127 (6) (b) of C.M.R. The closeness of the old and discarded workings has not been verified by operating heading and placing proceeding flank boreholes in an upward heading.
- The booming water was not taken care of, although workers noticed a large flow of water. (Reg. 127 (5))
- violation of Reg. 127 (2) (iii) and 127 (3).
- The reduction in water level in the vacant pit hole is not done by pumping.
- The dip side function of the lower seam was full of water thus reducing the rate during immersion.
- Lack of supervision by management and directors.

**After the recovery of the mine, the following was discovered;**

- Sixty-two (62) bodies of workers were scattered in various underground areas in workplaces, on transport roads, on sidewalks, in dip sumps, etc.
- The pockets under the tramlines are eroded.
- Heavy roofs fall on roads, especially at intersections.
- Broken ventilator shortcuts.

Burro Dhemmo Colliery is located near Asansol in the Burdwan region. The accident happened on 26.9.1956 and 29 people died as a result of the floods.

## II. BURRO DHEMO COLLIERY

The day before the accident, heavy rains caused heavy rainfall over the mines. There was a large flow of water in the mine. A hole is created in the air shaft where the water begins to enter the Reghunathbati seam.

The accident happened as a result of the collapse of the roof of a narrow gallery at an old work site near the northeastern boundary of the mine. Rainwater runoff had risen to an all-time high, flowing at the mine through a subsidence hole about 5m x 1.6m. – Immersion at the immersion site occurred within minutes, the mine was flooded and this led to the capture of many miners who were in the dip. Exhaust shaft and retreat both disconnected. Twenty-eight people were killed.

In this tragedy, some people escaped miraculously as they retreated to the end of the growing gallery. The air pocket built there not only prevented them from drowning but also provided them with life-saving Oxygen for about three weeks underground – until they were rescued after draining large amounts of water from the mine.

## III. CENTRAL BHOWRAH COLLIERY

Central Bhowrah Colliery is located in the Dhanbad region. There has been a significant disruption of water supply since the old unused use of the combined mine on 20 February. In 1958 at about 5:00 am, 23 people were killed.

**Cause:** The Sowardih Colliery affiliated is operated by open and underground works and has remained waterless. The floor at the crossroads between the 3<sup>rd</sup> East Level and the 2<sup>nd</sup> Dip of the 2<sup>nd</sup> East Level at No. 7 incline of Central Bhowrah

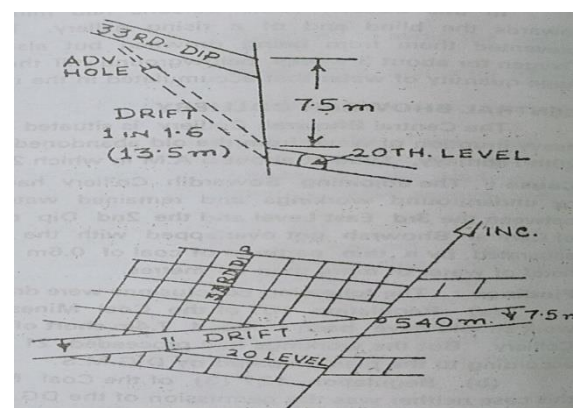
is covered by an old gallery left in Sowardih separated by a small section of only 0.6m coal left. Due to the high-water level of more than 24 meters.

**Findings:** Reached the following conclusion

- Regulation 107 of the Coal Mining Regulations has not been complied with. Work was to be suspended 7.7 meters to reach the common border with the Sowardih Colliery. But operations had continued 21 meters on the Sowardih border according to a plan prepared by D.G.M.S.
- Regulation 127 (3) of the Coal Mining Regulations was not complied with. In this case, too there was no permission from DG.M.S. obtained to extend the work within 60m of any obsolete or discarded work and any pits made however the performance of the Bowrah Central was extended beyond the border. Set aside the question of keeping the 60m barrier between new and no longer working.
- Maps were incorrect. Hidden galleries were not displayed on the maps.

## IV. DAMUA COLLIERY

The accident happened on January 5, 1960, and 16 people drowned. The Damua colliery was processed by incline and a 7.5m throwback was met 54m from the cline's mouth. Operation on the upper side of the error was upgraded to the error



plane. Due to ventilation problems in the development of the throwing side, it has been decided to connect Level 20 on the downtown side 33 meters from the Main Dip and 33<sup>rd</sup> Dip on the upward slope rising 1 to 1.6 and check 3m in advance. Holes. By the time he had flown 6m from the faulty plane, the normal operation had stopped. A borehole was made. Several holes were drilled and several holes were drilled. This has led to the weakening of the sections. A 2-foot [2 m] gap split and suddenly water gushed from the main pool, killing all on the staff.

**Findings:** The following are the results of the Inquisition court;

- a) The supervisor did not take permission from the D.G.M.S. under Regulation 127 (3) of old working approaching water.
- b) The boreholes have not been maintained 3m in advance every 10 in terms of Regulation 127 (5), as after explosion the effective length will be reduced to only 1.2m. There is no hole drilled in the roof. The divorce was only about 2m when the connection was made
- c) The supervisor did not give Sirdars and Overman written instructions to confirm his or her prohibited oral instructions. Continuous explosion after connecting to the borehole.
- d) The provisions of Regulation 127 (1) read with the Reg. 190 were broken as a mistake again a dangerous way to drive a very steep drift 1 in 1.6 vasa taken from a flooded area on a faulty plane.

## V. CHASNALA COLLIERY

Chasnala colliery belongs to M/s Indian Iron and Steel Co. Ltd. and is located in the Dhanbad region. This place is located on the north bank of the Damodar River. There are 17A, 17B, 16, 14A, 14/13, 12/11, and 10 seams in place and the general gradient of seams is 1 in 1.65. The mine is operated by the Horizon mines on the first horizon about 170m underground. There are old jobs in the neighboring mines. A deep, thick coal seam was established in the free-floating area. The tendency to work with Numbers 3 and 4 and H K. was temporary.

It was discontinued in 1949 and allowed to be filled with accumulated water by clicking from strata. About 1-30 PM. On December 27, 1975, a tragic accident killed 375 people as a result of flooding.

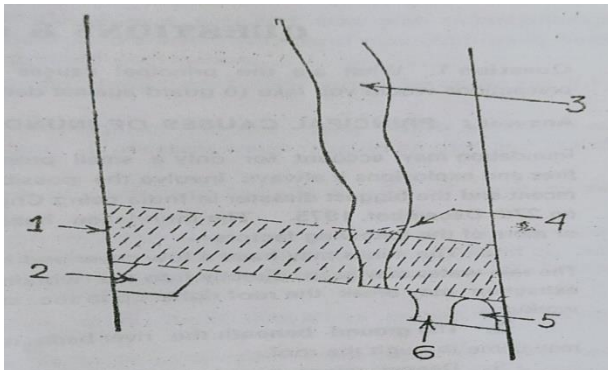
**Cause:** Managers plan to leave a barrier thick enough against older water use. At the bottom of the bar, administrators dial 2 headings, each of which is linked to a hanging wall & footwall. These drives are designed against the age-old use of water immersion thought. No. The 4 inclines of the same owner that was discontinued in 1949 were widened 38m further than that shown in the old system. The risk connection was established with this extension No. 4 incline while driving cross-cut. There was an influx of water. The power of the water was so great that the head of water accumulated that it swept everything in its path causing irreparable waste and turning the mine into a watery grave in a short time

1. Proposed Barrier
2. Footwall drive
3. Old obsolete water resources
4. An ancient class of thought included functions
5. Hanging wall drive
6. Cutting the cross



**Findings:** The findings of the Inquisition are as follows

- a) The air connection (crossing) was opened at a distance of only 27m to 30m from the eastern chimney, instead of 60m, where it was approved by the D.G.M.S.
- b) The beginning of this. A cross-cut from the hanging wall side is preferable concerning the recovery of the northward motion to meet the end of the footwall line.
- c) Precautionary measures to be taken in large quantities of abnormal water in the seam, in any operation within 60m of any unused or abandoned operation have not been complied with.
- d) The increase of number 4 was extended by a distance of about 38m more than indicated in the old system.
- e) The conditions set out in the D.G.M.S permit have not been strictly adhered to: The above findings indicate that in particular, the provisions of Regulation



127 of CMR, 1957 have not been complied with.

## HOW TO APPROACH THE OLD WORKPLACE:

When approaching old operations that do not have a disposal system or where there is reason to suspect that the available system may be inaccurate, great care must be taken to ensure that adequate drainage should be left near flooded areas. It is possible that the old layout does not conform to any geometric pattern as we know it in modern digging methods, and the pillars left by the old miners may be much smaller compared to modern standards. All older systems should be considered as indicators, not the actual location of the old system, but just that the function was somewhere in the area. The safest procedure is to not take the old operating system lightly until it has been proven boring, or otherwise, because of the new performance coming their way. Disadvantages of older systems may include

- (a) omissions to show the full magnitude of the operation,
- (b) omissions about function and location,
- (c) omissions to check and record magnetic meridian variations and to use such variations in an allocating letter job
- (d) diminishing and deterioration of the design material and
- (e) the state of diminished systems.

## CONCLUSION

This paper has exhibited that unintentional immersion is one of the significant perils in mining nearby old waterlogged working or working close hydrogeological irregularities. As of not long ago, prescriptive coal mineshafts guidelines have been utilized to forestall these risks. Notwithstanding, prescriptive guidelines alone are not satisfactory to control all unintentional immersion in the scope of conditions. Notwithstanding the prescriptive coal mineshafts guidelines, more logical examination, risk evaluation methods, and the executive's crisis

plans are expected to control unintentional and unconstrained immersion.

### **LIMITATIONS OF THE STUDY**

There are the some limitations of the study of Review on mine innundation are:

The topics discussed here are taken from various mines and internet searches but due to the incidents mentioned has occurred years ago so proper and accurate data was unavailable so the data which are included are from random people survey and experts articals.

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