



Fly Ash Disposal in Mine Voids and Low-Lying Areas Report of a Field Visit to Bokaro

August 2022

manthan
मंथन अध्ययन केंद्र

Fly Ash Disposal in Mine Voids and Low Lying Areas
Report of a Field Visit to Bokaro

BACKGROUND	3
OBJECTIVE OF THE FIELD VISIT	3
BOKARO TPP AND RELATED INFRASTRUCTURE	4
FIELD OBSERVATIONS.....	5
Kargali and Bokaro OCP.....	5
Quarry No. 1, Kargali OCP	6
Bokaro OCP Phase II.....	9
Bokaro OCP Phase II Second Location.....	11
LOW LYING AREA DUMPING SITE NEAR KONAR DAM.....	12
LOW LYING AREA FLY ASH DUMP SITE, LALPANIYA, TENUGHAT TPS.....	17
TTPS ASH POND.....	23
BTPS ASH POND – TOO MUCH ASH, TOO LITTLE SPACE	25
FINDINGS: GROSS VIOLATIONS AND ENVIRONMENTAL RISKS	26
Pre-2019 Ash disposal in Mine Voids and Low-lying areas.....	27
Post 2019 Ash Disposal in Mine Voids and Low-Lying Area.....	27
BROAD INSIGHTS.....	28

BACKGROUND

The Ministry of Environment, Forest & Climate Change (MoEFCC) issued an Office Memorandum (OM) on 28th August 2019, permitting the use of flyash in filling abandoned mine voids, in low lying area reclamation and as soil conditioner in agriculture. It may be noted that though the Fly Ash Notification 1999 (and amendments) had always permitted the use of fly ash in backfilling of mine and reclamation of low lying areas in line with guidelines issued by various authorities, the Expert Appraisal Committee (EAC) –Thermal of the MoEFCC since around 2012 had been imposing conditions on thermal power plants (TPPs) prohibiting these uses (or only allowing backfilling of mines with lining and prior consent from SPCBs) when according environmental clearance to the TPPs. This OM has now amended all existing environmental clearances and replaced the prohibiting conditions with conditions allowing use of fly ash in mine voids/low lying areas / in agriculture. Along with the OM, new guidelines have been issued by the Central Pollution Control Board (CPCB) which are to be followed when dumping fly ash in mine voids/low lying areas.

The OM and the Guidelines provide a list of conditions that power plant and land owners need to comply with before and after the ‘reclamation’ of low-lying areas using ash. Written consent from land owner, permission from regulatory authority such as SPCB, prevention of pollution, 300-500 mm thick layer of soil cover on top of ash fill are some of the conditions.

Reclamation of area by ash is *not* allowed in flood plain area, Ecologically Sensitive Areas, agriculture land, gochar kishan land, and forest land. The guidelines also have the step-by-step procedure to be carried out while filling low lying areas with ash, including specific thickness and length of layers of materials to be used, levelling, filling, compaction etc. Conditions related to filling of mine voids with ash have also been given, including studies to be carried out and procedure of disposal of ash in abandoned mine voids. Studies to be conducted by power plant before filling ash into mine voids include testing of ash samples for certain parameters (like chemicals or heavy metals), technical and economic feasibility, water quality, etc. A monitoring program for environmental parameters both during ash disposal and after mine void reclamation have also been given. The guidelines suggest 30 cm soil cover for vegetation growth, and state that fruit bearing trees should be avoided.

Necessary clearances are to be obtained by plant and possibly mine authorities from agencies such as Directorate General of Mines Safety (DGMS), SPCB, Indian Bureau of Mines (IBM), Ministry of Coal etc.

OBJECTIVE OF THE FIELD VISIT

Even though the MoEFCC and CPCB are promoting these methods of ash disposal, there are questions about their environmental safety which we are exploring through our research. Other important questions that we are also studying include how local communities view these methods of ash disposal, and whether these methods help ameliorate the tremendous problems caused by ash ponds, or whether they are themselves creating others issues of concern for the local people.

As part of this research, to study these and related questions on the ground, we visited Bokaro, Jharkhand from 6th - 9th April 2022. Thermal power plants around Bokaro have been disposing fly ash in mine voids and on low lying areas since last several years.

The aim of the visit was to understand the experiences of people wherever ash filling in mine voids and low-lying areas has already taken place. This included looking at issues like whether there has been any

impact on groundwater and surface water quality, and on local communities, their fields, cattle etc. in areas where ash is dumped in mine voids and low-lying areas; whether the views of local communities living near mine voids been considered by authorities; and, whether the procedures and safeguards laid down in the OM and Guidelines are being followed.

We visited the following sites along with Gulab Chandra of the Damodar Bachao Abhiyan, who has been active on issue of impacts of coal mines and power plants in the area.

1. Quarry No. 1, Kargali OCP (Central Coalfields Limited)
2. Bokaro OCP Phase 2 (Central Coalfields Limited)
3. Low lying area dump site near Konar Dam
4. Bokaro TPS Ash Pond
5. Tenughat TPS Ash Pond
6. Low lying area dump site near Lalpaniya, Tenughat TPS

BOKARO TPP AND RELATED INFRASTRUCTURE

The Bokaro Thermal Power Station (BTPS) 'A' has one unit of 500 MW capacity, whereas Bokaro Thermal Power Station 'B' had three units of 210 MW capacity each. The BTPS, owned by the Damodar Valley Corporation, is a central government undertaking. The power plant is located on the banks of Konar River in Bokaro Thermal, Bokaro district, Jharkhand, with the ash pond located close to the plant. (See Map 1 below)

The district also has other industries operating in it, including the Bokaro Steel Plant (SAIL). The Bokaro River and Konar River join near the power plant and eventually merge with Damodar River. Ash from BTPS is currently being dumped in some quarries of Central Coalfields Ltd., and power plant authorities have been trying to get permission to dump ash in more mine voids for the last few years.

Table 1: Ash Utilisation Data of BTPS for Last Four Years

Year	FY 2017 - 2018	FY 2018 - 2019	FY 2019 - 2020	FY 2020 - 2021
Fly Ash Generation (MT)	0.8753	0.8274	0.6681	0.7973
Fly Ash Utilisation (MT)	0.7391	0.2989	1.0464	1.0243
Percentage Utilisation- Total (%)	84.44	36.12	156.61	128.47
Mode-wise Utilisation as % of total utilisation				
In manufacture of cement	0	0.93%	4.24%	4.86%
In construction of Highways and roads including flyovers	0	0	14.12%	0
In reclamation of low lying area	0	0	81.64%	95.13%
In mine void filling	98.6%	99.02%	0	0
In agriculture/waste land development	1.40 %	0	0	0

(Source: Central Electricity Authority)

As the table shows, the overwhelming utilisation of ash has been either in minevoid filling, or in low lying area, which is actually a disposal or dumping, rather than “utilisation”. There was ‘zero’ utilization in five modes, these are not mentioned here.

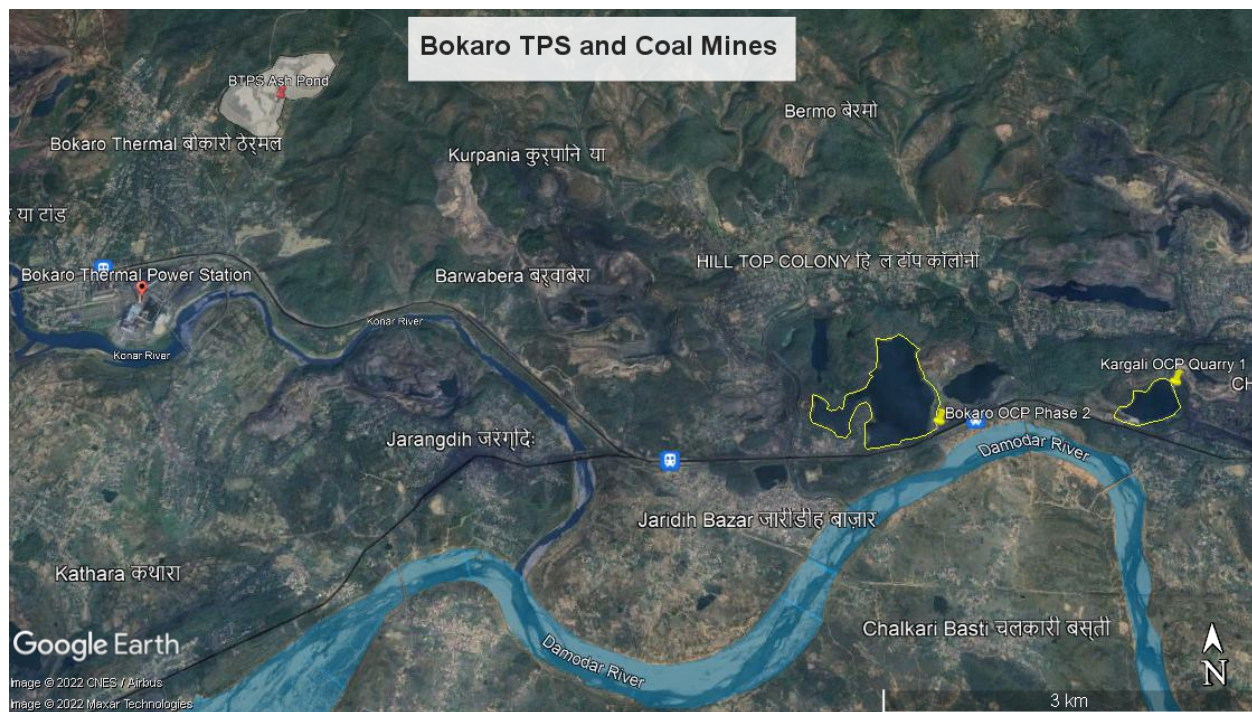


Figure 1: Map 1 - Bokaro TPS and surrounding coal mines

FIELD OBSERVATIONS

Kargali and Bokaro OCP

The Kargali Opencast Project (OCP) as well as the Bokaro OCP comes under Bokaro & Kargali Coalfield of Central Coalfields Limited. The Bokaro and Kargali coal mines are a group of opencast and underground coal mines, operated by Central Coalfields Limited (CCL). According to Global Energy Monitor, the operational mines include: Bokaro, Giridih, Kabribad, Kargali mines, Karo mines, Khas Mahal mines, and the Konar opencast project. Kargali OCP is situated in Bokaro District of Jharkhand state, and operations began in 1920. Its mineable coal reserve is estimated to be 34 MT, according to an Environmental Statement of Kargali Opencast Project 2013-14, submitted by CCL to MoEFCC in June 2014.

Dumping of fly ash in various quarries of the Kargali and Bokaro OCP has been in progress over last several years, and various stages of fly ash dumping (ranging from ongoing active dumping to compaction, tree plantation, building construction on dumped ash) was observed in the Kargali OCP.

Quarry No. 1, Kargali OCP

Quarry No. 1 of Kargali OCP is located approximately 0.5 km away from Ram Vilas High School in Bermo, Bokaro district. It has been non-operational for some years now. Like most abandoned mine voids, Kargali OCP's quarry 1 is filled with water.

As told to us by the local activists, a segment of this mine void was filled with ash and covered with soil about 7-8 years ago. This segment appears now as compacted, with vegetation growing on top of it.



Figure 2: Quarry 1, Kargali OCP- Newly dumped ash in the mine void and another segment with vegetation on top visible

The other segment of the void is currently being filled with flyash from DVC's Bokaro Thermal Power Station (BTPS). We witnessed the process of the mine being filled with ash. Ash is brought to the mine in covered trucks, after which, the covering is removed, and ash in dry form is directly dumped into the section being reclaimed.

The section of the mine being filled is an almost 45 m strip from the edge of the mine. The ash is dumped into the depths of the mine and then as the dumping reaches the surface, a layer of soil is put on the top of the ash. We were told that this layer is about 0.8 m. Local activist said this soil is likely from the nearby forest. The soil was being piled up, and then used for covering the layer of ash and compacting it.

The process of dumping ash here has been going on since about two years, we were told.



Figure 3: Quarry 1, Kargali OCP - Mounds of flyash and soil placed along the void

During the visit, we saw the ash filled trucks arrive and empty the ash in mounds near the edge of the mine void. We also observed the soil dumps nearby. The workers present at the site of filling told us that the first shift of the mine filling at the quarry is from 6 AM to 2 PM, during which, about 70-100 trucks of ash are emptied into it. According to local activist Gulab Chandra, they received permission for the filling in 2019, following a lot of lobbying and DVC and CCL have an MoU. . A worker at the mine void also mentioned that the current ash dumping and soil compaction seem to be carried out beyond the area for which they have permission.

Gulab Chandra mentioned that one of the worst groundwater level reductions over time in Jharkhand has been in Bermo. This is confirmed by a recent report by the Central Ground Water Board (CGWB) *Report on Dynamic Ground Water Resource of Jharkhand (2020)* published in February 2020. The Report notes that out of a total 249 administrative blocks in the state, only 3 are classified as “over-exploited”, the highest level of depletion, and Bermo block is one of the three. (Page 49)

There is little doubt that part of the groundwater depletion is due to the large number of mines in the area. Mines are known to lead to large-scale dewatering [see, for example, MoEFCC’s *Environmental Impact Assessment Guidance Manual for Mining of Minerals*] (though often it is ignored or scale is underestimated). The CGWB report mentioned above also states that “In the present estimation, coal mining industry in Jharkhand has been identified as a major groundwater dewatering source through their activity” (Page 36) and that Bermo block has the second highest number of coal mines among all the blocks in the state.



Figure 4: Quarry 1, Kargali OCP - Ash filled trucks unload ash into mounds along the edge of the void



Figure 5: Quarry 1, Kargali OCP-Ash filled trucks unload ash into piles along edge of mine void

The groundwater depleted by the mine will tend to accumulate in the mine pit once the mining is over as the pumping out of this water is stopped. Thus, the abandoned mine voids act as reservoirs of large

quantities of water (though this may need treatment before allowing any human use). Gulab Chandra explained that given the state of depleting ground water levels, many locals see the mine pit water as an important potential water source, and fear that filling up abandoned mine voids with ash could contaminate this source badly, depriving them of a valuable resource. Gulab Chandra was of the opinion that with ash being mixed into the mine voids, Sulphuric acid may be generated, thereby polluting the water*. Apart from impacts on water, Gulab Chandra also mentioned that the large size of trucks transporting the ash and soil for mine void filling often negatively impact the roads, as they have been designed with a capacity for smaller sized vehicles.

Bokaro OCP Phase II

The Bokaro OCP Phase II is located about 1.8 Km kilometers away from Quarry No. 1 of Kargali OCP. One segment of the void has been filled with ash and covered with soil, but the process has stopped several years ago. The void contains large quantities of water, and the local activists told us that the depth of water in the void would be approximately 80 feet.



Figure 6: Bokaro OCP II - Water in the mine void, ash dump on opposite mine wall visible

At the Bokaro OCP, we saw that parts of the mine void were filled with ash. One part of these dumps was covered with soil, and plantation had been done about a year back, as per the board put up at the site. However, the plantation was in a bad state and it did not appear that most of the plants would survive.

We were told that the species planted were *Acacia* and *Chakaundi* (local names) as well some *sheesham* and *amla*.



Figure 7: Bokaro OCP II- Plantation on the top of ash dump

The plantation area is on one side of the mine void. The entire mine void is filled with water, creating a large water body / water reservoir. However, it is surrounded by ash dumped on several sides.

Ash filling by BTPS began here in 2014, with plans of filling the entire mine void. However, Damodar Bachao Abhiyan, a local civil society group, initiated a campaign to prevent this. Their main demand was to stop the dumping of flyash in the mine void, with the reason that a large source of water which could be used for the people of the district could be lost if filled with ash, and groundwater recharge points in the region might also be impacted. As mentioned above, groundwater level in Bermo has been severely impacted over the years. The team of Damodar Bachao Abhiyan met with officials (CMD) of Central Coalfields Limited (CCL) to voice their concerns in May 2014. On meeting with the CMD they found that no MoUs or formal agreements for ash disposal had been undertaken by DVC and CCL at the time. The authorities, CMD and GM of the mine void seemed unaware of any environmental norms to be followed as well. The people were also informed that the first attempt of filling the void with ash had been done in order to stop the fires burning in the mine void (spontaneous combustion). Soon after the meeting with the local group the ash dumping work was stopped, and project authorities even accepted that the activity could pose a threat to a future water source of the area. However, due to continued ash generation in large quantities, flyash from BTPS seems to be dumped in other areas instead, including very near Konar River and dam, and in the above-mentioned Quarry No. 1, threatening the water resources of the region.



Figure 8: Bokaro OCP II - Abandoned quarry filled with water, vegetation growing on opposite side

According to Gulab Chanda, the Jharkhand State Government's Fisheries Department has been assisting people to carry out fishing (*machlipalan*) in the water in the void for the last 6-7 years. He also mentioned that though the mine void is currently being used for fishing (through a cooperative), the fish grown in the void is often sold at cheaper rates in the market than other fresh water fish, with the reason given that it is grown in the mine void.

The Jharkhand Government's Department of Agriculture, Animal Husbandry and Cooperative (Fisheries Directorate) website states that a total of 1741 aquaculture resources exist in 'Coal Pits and Mines' in Jharkhand. Several news reports highlight the success of fish farming in abandoned coal mine pit water in Ramgarh district. This shows that mine voids are being considered for utilization as fishing resources in Jharkhand, and filling abandoned voids with flyash which can pollute the water and potentially contaminate the fish is a serious risk to the economic activity and livelihoods that are and can be supported by these fisheries.

Bokaro OCP Phase II Second Location

We also briefly stopped at another location of the Bokaro OCP Phase II where ash had been filled in the mine void and then houses constructed on the top of this filling.



Figure 9: Bokaro OCP- Old voids of Bokaro OCP completely 'reclaimed' using ash, houses constructed on top of the filling

LOW LYING AREA DUMPING SITE NEAR KONAR DAM

We visited a large ash dumping site at a distance of about 0.5 Km from the Konar Dam reservoir boundary wall. Along the way, several small to medium dumps of flyash were also seen on the roadsides in the BTPS area..



Figure 10: Ash dumps near Konar Dam - Several small to medium dumps can be found on roads around the Konar Dam

The site visited by the team was a large ash dump, approximately 30 ft. in height (as estimated by us) and spread over 5.76 acres area (measured using Google Earth Pro) It appeared to be an ash dump for 'reclamation' of low-lying land. According to Gulab Chandra, the ash here is also from BTPS. There are old trees surrounding the dump. The way to the dump is lined with old trees throughout, and the ground below the dump (i.e., ground on lower height as seen from on top of the dump) is also covered with trees.



Figure 11: Ash Dump near Konar Dam -Large ash dump covered with soil, with pits at regular intervals for plantation; photo taken from on top of the dump

Large quantities of dry flyash were seen dumped across this location. Further, cracks in the ground at one spot revealed layers of ash mixed with the soil. Some piles of newer soil mixed with ash were also visible.

There is a boundary wall that has been constructed along the bottom of the ash dump. This seems to be for preventing ash from being deposited beyond the dump area, or for preventing ash from flowing with rain water into local water bodies. However, ash that has been carried by water flow has accumulated at the wall, and is reaching a height that could soon be more than that of the boundary wall itself. This means it is only a matter of time before the ash laden waters spill over the boundary wall into the local water bodies and local environment. Gulab Chandra mentioned that outside the boundary wall, there used to be a nala flowing through the region. The nala eventually joins Konar, but seems to have been blocked due to the construction of the ash dump. (There was no water visible at the time of the visit.)



Figure 12: Ash dump near Konar Dam -Cracks in ground reveal layers of ash among layers of soil; flyash piles in the background also visible



Figure 13: Ash dump near Konar Dam- Boundary wall along the edge of the dump at the bottom; ash reaching the level of the boundary wall and trees in surrounding areas also visible

The ash has been dumped on this large area and compacted, and covered with soil. Pits have been dug at regular intervals with what appears to be the intention of planting trees on this dump.



Figure 14: Ash dump near Konar Dam - Piles of ash visible around/on the way to ash dump area near Konar Dam

The irony is that it appears that earlier this area itself was having a dense tree cover which has been destroyed to dump ash. This can be seen from the satellite imagery over the years which is shown below, as well from the dense trees surrounding the dump on all sides. Old satellite imagery from Google Earth shows the ash dump clearly visible in October 2019. Imagery from 2016 shows dense tree cover around the area which is currently the dump. A difference in elevation between dump area and ground surrounding it can also be seen. Another dump of about 1.16 acres located about 62.5 m (measured with Google Earth) can be seen next to this dump on Google Earth.



Figure 15: Satellite Image from 2016 shows dense tree cover



Figure 16: Satellite Image from 2019 shows large ash dump



Figure 17: Satellite image from 2020 shows ash dump increase in size

A team of experts from Regional Office, MoEFCC at Ranchi visited the Bokaro TPS, its ash pond and surrounding areas in November 2019. This was soon after the ash pond of BTPS had breached. The report submitted by the officials mentions their observations from the field visit as well the violations of Environment Clearance (EC) conditions by BTPS. The report mentions that two of the EC conditions regarding dumping of ash near Konar dam were violated by BTPS. The report states :

“1. Additional land than the permitted area is being used for ash dumping (up to above ground level) near Konar dam. This is contrary to EC prescription (Condition 1) ...

“3. Impervious lining has not been provided for the fly ash dumping near Konar dam ...

“6. ...Ash pond was found to be nearly full. Unutilised fly ash was found to be dumped near Konar dam from the ash pond without any protection measure (Condition 11)”

In ‘other observations’ section also, the report states that:

“2. Flyash is being dumped near Konar dam, without any protection measure. The ash was found to be spreading with the rain. The effluents are not in control and the water from the ash dump was flowing with ash. No details furnished on effluent monitoring and impervious lining. “

During our visit, almost all the above concerns of ash dumping near Konar dam without much protection could still be observed, even though more than two years have passed. We cannot confirm that the ash dump site near Konar dam referred to in the MoEFCC report is the same one that we visited, but from location and other indicators, it appears to be the same one. In any case, dumping of fly ash without adequate environmental safeguards is very much seen very near the Konar dam in the areas visited by us.

LOW LYING AREA FLY ASH DUMP SITE, LALPANIYA, TENUGHAT TPS

Tenughat TPS (TTPS) is owned by the Jharkhand state government’s Tenughat Vidyut Nigam Limited. It is located in Lalpaniya in Bokaro district, with an installed capacity of 420 MW. The plant is located near its water source, Tenughat reservoir.

The TTPS has been dumping ash at many locations around the plant on low-lying areas, as a part of the official “utilisation” of ash. We visited one such location to observe the ash dumping and its impacts. This dumping of ash raises several concerns as we noted in our visit, and these concerns have also been highlighted by an official team of the MoEFCC earlier.

Table 2: Ash Utilisation data of Tenughat TPS for four years

Year	FY 2017 - 2018	FY 2018 - 2019	FY 2019 - 2020	FY 2020 - 2021
Fly Ash Generation (MT)	0.6034	0.4931	0.6842	0.5194
Fly Ash Utilization (MT)	0.5373	0.6419	0.4517	0.4773
Percentage Utilisation - total(%)	89%	130%	66%	92%
Mode-wise Utilisation as % of total utilisation				
In reclamation of low lying area	100.00%	99.68%	100.00%	100.00%
Other modes of utilisation	0.0000	0.31%	0.0000	0.0000

(Source: Central Electricity Authority)

As is clear from the table, all the “utilisation” of the fly ash was in the form of dumping it on low lying land. There was ‘zero’ utilization in eight modes, these are not mentioned here



Figure 18: Map 2- Tenughat TPS, ash pond and some surrounding ash dumps which were visited by us



Figure 19: Tenughat Low Lying area ash dumps - Flyash and soil covered ash dump visible near residential buildings

A settlement named *Jhari basti*, located along the railway tracks passing through Lalpaniya, is a settlement surrounded by large ash dumps. The dumping has been done in what is called 'low lying area' by the plant authorities, and appears to be dumped over several years. Where previously people cultivated crops, now there is grass, on land raised about 25- 30 feet above 'ground' level – essentially large dumps of ash covered with soil. Old ash dumps that have been covered with layers of soil can be seen on either side of the railway tracks, and are less than 1 Km from residential buildings.

Locals of Jhari basti mentioned that a lot of agricultural land has been ruined by ash dumping over the years. Even when plant authorities have tried to clear some amount of ash the effort seems ineffective because – as we saw at the site- ash is ever present. There are about 15-20 houses on one side of the railway line, with families who have been living there for over a decade and have experienced the impacts of excessive flyash dumping all around their land. They say that the ash dumping has made their land non-cultivable, '*banjar*', over time, and that they haven't been able to successfully farm for 3 years now, the time from when the ash dumping started near their basti. Satellite imagery over the years also shows that the ash dumping that was visible also began in this location little over 3 years ago. Airborne flyash from ash mounds located few kilometers away as well the local dumps settles on the standing crop, which has adversely affected the crop yields. Ash also settles across the village on people's homes, vehicles, water storage materials etc. Ash has even deposited in the village well. 3-4 buffalos have died after getting stuck in the ash slurry during monsoon time. When it rains, the ash mixed with water flows and eventually makes its way to the Tenughat reservoir. About 12-13 families have been resisting the impact of pollution on their lives by writing to local authorities (SDO), but they have not received relief so far.



Figure 20: Tenughat Low Lying area ash dumps - Ash laden road on the way to Jhari Basti; photo taken from on top of ash dump



Figure 21: Tenughat Low Lying area ash dumps-Ash routinely covers the grazing land in vicinity of Jhari Basti

The locals also mentioned that such dumps are common— around 13 other such large dumps, i.e, ‘low lying land reclamation’ are spread across the region. The extent of ash dumping, increase in elevation due to the same, as well vast area that is being covered with ash and soil layers over the years can be seen in the satellite imagery below. Ash dumping in the area visited by us is visible from images from 2019, and it continues to be visible – with some increases in area- in images dated as recent as April 2022.



Figure 22: Tenughat low lying are ash dumps - Photograph of large ash dump near Jhari Basti above; Satellite Image of same ash dump below (Figure 23)



Figure 23

It should be noted that the objective of filling up low lying area with ash is typically to fill an area which is in lower elevation to bring it to the surrounding ground level. However, the dumps seen by us at Lalpaniya seemed to be large dumps jutting out above ground level.



Figure 24: Satellite Image from 2019 shows ash dump visited by us



Figure 25: Satellite Image from 2021 shows increase in area of ash dump as well as another ash dump in the vicinity



Figure 26: Satellite Image from 2022 shows spread of the ash dumps and proximity to residential colony and Jhari Basti

Official reports also confirm the extent, the illegality and the impacts of these fly ash dumps which we saw and which the people told us about.

An EAC sub-committee from MoEFCC visited the plant and surrounding areas in December 2017. The report submitted by the sub-committee notes excessive dumping of flyash around plant areas, overflow of ash pond and visibly exhausted capacity of ash pond, as well discharge of water (the plant has a once through cooling system) into nearby water bodies and the Tenughat reservoir without any treatment or regular monitoring.

The report also mentions many flyash dumps that are visible in satellite imagery. It states that:

“It is observed that the ash and other waste materials have been openly dumped in heaps on North and NE side of the power plant. This can be clearly seen through google satellite imagery as there are white patches which are indication of open ash dumping. This open dumping of flyash poses serious threat to the water reservoir as the runoff during monsoon will carry flyash and heavy metals and eventually joins the reservoir.”

Due to all the severe environmental problems observed and highlighted by the committee, the EAC rejected the proposal for expansion of the plant until the issues were addressed.

Most important, the sub-committee made the following recommendation which was also upheld by the EAC, that is:

“Ash dumped in the open areas to be immediately removed. Utilisation plan shall be submitted.”

Annexure -3 of the reports details out this recommendation of the sub -committee on removal of ash dumps, stating that,

“These waste dumps shall be immediately removed and kept in a controlled pond. TVNL authorities shall strive for utilization instead of open dumping. Otherwise, construct an ash dyke and store it to prevent leakage.”

However, this recommendation has not been followed at all, as our field observations and narrations by local community members showed. And though over four years have passed since the sub-committee report was submitted, excessive flyash dumps in surrounding areas, fugitive emissions from dry ash on the roads near the ash ponds, as well as nearly filled up ash pond remain as they are, as observed by our team.

The Central Electricity Authority's annual report on flyash ash generation and utilization by thermal power plants in the country for 2021-2022 notes that TTPS 'utilised' total of 0.4773 MT of ash. The report states that this entire quantity has been 'utilised' via the mode of 'reclamation of low-lying areas.' The large dumps spread across Lalpaniya show that it is less of "utilization" and more of reckless dumping of millions of tons of ash, affecting the people and environment in the region and in gross violation of the EAC recommendations.

TTPS ASH POND

The team also visited the TTPS ash pond. We found ash slurry being disposed of in the ash pond in one part. At another part, we also saw pond ash being removed and taken away in trucks. We were told that

this ash is being taken to be disposed in the dumps like the one which we had visited, as there is no space in the ash pond for more ash if existing ash dumped here is not removed.



Figure 27: TTPS Ash Pond - Ash slurry flowing into pond, TTPS chimney visible in background



Figure 28: TTPS Ash Pond- Trucks stationed for loading with flyash at one section of ash pond

We observed that some of the trucks were transporting ash without the mandated covering.

BTPS ASH POND – TOO MUCH ASH, TOO LITTLE SPACE

The ash pond of DVC owned Bokaro Thermal Power Station breached in September 2019 flooding 20 DVC quarters and nearby farmland with ash slurry. According to local residents of the villages surrounding the ash pond, at least 45 acres of agricultural land was flooded with slurry. The official cause of the breach stated by MoEFCC in its site visit report was hydraulic pressure induced by heavy rainfall. However, locals from the villages surrounding the ash pond (Nurinagar, Bazar Tand, Jarwa Basti) contested the claim, stating that the pond had been too full and fear of a breach had been growing for months before it actually happened. We spoke with locals in Bazar Tand, and a senior villager told us he had still not been compensated for the damage caused by the ash slurry breach to his standing crop (rice). Parts of his agricultural land, and that of several others cannot be used like it was before, as it was not adequately cleaned in the aftermath of the breach – all this over two years after the incident occurred. Even routine ash transport causes havoc for residents living less than 1 Km from the ash pond. The locals mentioned that ash carrying trucks pass through their village throughout the day, covering the terraces of all homes in a 1 inch layer of ash. Even though they clean their houses in the morning, by the evening, the house floors and insides also get covered in ash.



Figure 29: BTPS Ash Pond - One section of ash pond with BTPS visible in background

During the visit to the ash pond, we also had a meeting with the BTPS ash pond's Site In-charge (SI). He confirmed what the villagers had alleged after the breach – there is no space for the large quantity of ash that gets generated daily on a continuous basis. Plant authorities are struggling to find alternatives to the ash pond to fulfil this need for space. DVC has been requesting CCL to provide them with abandoned mine voids / quarries to use them for ash dumping but CCL is refusing to do this because CCL says that there is still coal remaining in these abandoned or completed mines and hence, they want to keep the possibility of mining that coal open. In response to an RTI application filed by us, DVC authorities have provided copies of their letters urgently requesting CCL for mine voids for ash filling, in which they state that the BTPS units' operations will have to be stalled if they do not find place i.e., mine

voids, for dumping the ash. The SI confirmed that the situation is desperate and he said, colloquially, that they are living “net to net”, which means that they can put in ash into the pond only to the extent ash is taken out.

The ash pond is nearly full. Ash is dumped into the pond in slurry form, and upon drying it is lifted into bulkers for further transportation. We saw ash filled trucks leaving the pond, and we were informed these were being taken to Kargali OCP. Further, we were told that ash from silos was being taken to Dalmia cements, and the remaining ash dumped in the ash pond.

Divided into two sections, the ash pond impoundments have a capacity of 10 Lakh tonnes each, and 65 hectares total area. The pond stands at about 80m higher ground than the level of the plant and surrounding villages. The SI stated that the pond has been constructed to accommodate only about 20% of the ash being generated by the plant, the rest is supposed to be stored in dry form and transported for further use. However, this is not the case, as is evident from the overflowing ash pond. He mentioned that though they approached many cement factories to transport dry ash, only Dalmia Cements responded. Earlier, flyash was being sent to Bangladesh, but this has stopped now. Even though international transport proved expensive, they continued to do so for some time due to lack of other options of handling the ash. Until September 2020, the TPP also sent ash for highway construction to NH 2, which was being widened. The widening has completed, so that avenue for ash use has been exhausted. We were also informed that demand for ash-based bricks in the region is very low. In line with the Flyash Utilisation Notifications, we were told that DVC pays for all ash transport.

The SI also informed that as recently as January 2022, the plant had to be temporarily shut down due to lack of space in the ash pond to dump the ash. The Central Electricity Authority’s Daily Generation Reports for January 2022 have reported this closure due to ash handling problem. The BTPS A Expansion unit (500 MW) was reported as closed for an entire week between 5th January to 12th January this year, owing to ‘ash handling system problem.’ This is not the first time this plant has had to halt operations due to excessive ash – between March 2019 and March 2022, different units of BTPS have been reported as shut down due to ‘ash handling system problem’ 5 times, sometimes for over 30 days at a time.

FINDINGS: GROSS VIOLATIONS AND ENVIRONMENTAL RISKS

Our visit has revealed that the Bokaro TPP as well as the Tenughat TPP are disposing off ash in minevoids and in low-lying areas in gross violation of various related norms as well as in breach of the orders given by the official agencies like EAC and MoEFCC.

Further, though such disposal started well before 2019 – the year in which MoEFCC issued the OM and Guidelines – it is clear that after 2019 the guidelines given by CPCB along with the OM should be followed for use of ash in low lying area reclamation or mine void filling. We found many of these being violated.

When the projects in Bokaro started using ash for filling empty mine voids or low lying areas, we do not know what conditions or methods were prescribed by the environmental authorities for such disposal. However, it is clear from our observations that this pre-2019 disposal of fly ash in mines and in low-lying areas is having significant impact on the environment and on local communities; and that several official agencies have also independently reached similar findings.

We give some of these in detail below.

Pre-2019 Ash disposal in Mine Voids and Low-lying areas

1. The disposal of ash in the quarries of Kargali and Bokaro OCP is directly leading to the contamination of the mine water. This could pose serious risks if the water is used for human consumption, producing crops, fishing etc.
2. The disposal of fly ash on large areas of so called low-lying land is threatening contamination of water resources around. This specific disposal has been highlighted as a violation of one of the Conditions of Environmental Clearance given to the BTPS by the EAC.
3. EAC has also highlighted that the ash dumps near Konar dam are dumped without any protective measures, ash was found spreading with rains, and effluents are not in control.
4. The disposal of fly ash in dumps around the Tenughat TPS is having a serious impact on the health, lives and livelihoods of local communities.
5. These local communities are raising these issues with the authorities from time to time but are not getting any satisfactory response.
6. The ash being dumped in many locations around the Tenughat TPS is also leading to contamination of water and soil.
7. The MoEFCC regional office has also noted in its inspection visit to the Tenughat TPS, ash pond and nearby areas that the ash pond is leading to severe air, water and land pollution. Ash water is directly discharged to local water bodies. Huge dust clouds are being raised from the ash pond and the flyash cloud is ultimately polluting & silting the reservoir/water bodies and adjoining forests.
8. The MoEFCC Regional office has also noted the many ash dumps all around the Tenughat TPS area, and has warned that this open dumping of flyash poses serious threat to the water reservoir as the runoff during monsoon will carry flyash and heavy metals to the water body.
9. It has also recommended that these waste dumps shall be immediately removed and kept in a controlled pond. TVNL authorities shall strive for utilization instead of open dumping. Otherwise, construct an ash dyke and store it to prevent leakage

Post 2019 Ash Disposal in Mine Voids and Low-Lying Area

The ash disposal into mine voids and low-lying areas is continuing to date. The violations and severe environmental risks noted above remain a concern even for the disposal going on today. In addition, after 2019, such ash disposal needs to follow the OM and the Guidelines, and we noted several violations of the conditions / processes given by the OM and Guideline. We detail them below.

Table 3: Conditions Given in Guidelines/OM and Their Implementation in Bokaro

S.No.	What it says in OM or Guidelines	Violation/ Deviation from Guidelines
1.	"ii. There should at least be clearance of 500 m of safe distance be maintained from River and water body in case of ash disposal in abandoned mines to prevent embankment failures and flyash flowing into the nearby water body." – OM	Distance between location at both Kargali Quarry 1 (where currently ash from BTPS is being dumped) and at Bokaro OCP –II is less than 500 m from Damodar river as measured using Google Earth.

2.	“vi. Surface runoff and supernatant water, in any case shall not be let into the surrounding areas. It shall be collected by providing adequate drains around the mine. The supernatant water along with surface runoff shall be treated and re-used for mixing ash and plant operations.” – OM	We could not see any drains around Kargali Quarry 1 or Bokaro OCP Ph -II
3.	“5.1.3 Prevention of pollution: Suitable methods should be adopted and necessary arrangement should be made to prevent pollution during excavation of pond ash at ash pond, filling area and during transportation of ash.” – Guidelines for low lying area reclamation	All along the route to Konar dam, small to mediums sized dumps (ash from BTPS) can be seen. Massive ash dumps around populated villages near Tenughat TPS are also polluting the environment for many years. There are no arrangements around these filling (or filled) areas to prevent ash run-off with rain water, or to stop ash being blown in the wind. At Tenughat ash pond, we saw fly ash being transported from ash pond to disposal sites in uncovered trucks .
4.	“Reclamation of area by ash shall not be permitted in the following areas: i. Flood plain area/Ecologically Sensitive Areas. ii. Agriculture land / area. iii. Reclamation of Forest land / area is permissible only if clearance from MoEF&CC as per Forest Conservation Act, 1980 is available. iv. Gochar Kisan Land.” – Guidelines for mine void filling	The large ash dump near Konar dam has been made after clearing of dense tree cover In Jhari Basti, cattle grazing area and agricultural fields have been affected by ash dumps that are surrounding them – even if one says that the dump itself is not in agricultural land, all the agricultural/grazing land near it is being affected, so the spirit of the guidelines is still being missed.
5.	“iii. For plantation purpose, preference shall be given to both native species and mixed culture. ... iv. However, fruit bearing species shall be avoided.” – Guidelines, for post mine filling reclamation	Amla is a fruit bearing tree, and as per guidelines this needs to be avoided.

BROAD INSIGHTS

The activities of using ash to fill empty mine voids or low-lying areas in Bokaro, Jharkhand raise several questions about environmental and social impacts. A few broad points are below:

1. Empty mine voids have capacity to store large quantities of water and often have large quantities of water accumulated in them when mining stops. Filling them with ash could pollute them, and thereby contaminate a future water source. In a region where the water sources, both surface and groundwater, are already stressed due to over exploitation and pollution from multiple industries, filling the voids with flyash, which is known to contain several toxic heavy metals risks ruining a water source. This is a serious fear that the local communities have also raised.

2. One of the uses of the water seems to be for fishing. As mentioned in the report, there already seems to be lot of fishing activity in different coal mines/pits in the state of Jharkhand. If, like in case of Bokaro OCP II, fishing is carried out in mine voids where some extent of ash has already been filled, there could be two types of issues. First, contaminants in the fish being consumed by people is a very serious risk for the health of communities, and ash dumping could lead to fishing being disallowed in the mine voids. Second, as mentioned to us by Gulab Chandra, in any case the fish that is grown in the mine void is sold at cheaper rate than other fish, so filling it with ash could add to reasons for reducing the economic value of the fish grown here.
3. The various 'low lying area reclamation' we saw that were filled using ash of BTPS and TTPS, all seemed more like dumps than reclaimed lands. The dumping of ash near habitation in Lalpaniya is adding to the stress of communities which already face the impacts of different types of ash pollution. The dumps seen near Konar dam, are very close to the reservoir. The MoEFCC has noted in previous years that dumping of ash near the Konar dam as well as Konar river has happened and causes severe pollution.
4. Various permissions need to be received and studies need to be conducted for utilizing ash in these two modes. The guidelines list these. The Guidelines also provide details of how the land is to be prepared and how the filling is to be carried out. It is not clear whether the studies that are mandated by the 2019 guidelines are being carried out, as the ash filling has been going on since before 2019. However, with the new procedure in place, the authorities will have to carry out these studies before going ahead further with the ash disposal. They cannot say that the filling has been going on since before 2019 and use it as an excuse to avoid the studies needed as well as the various permissions needed.
5. The impacts due to fly ash disposal in mine voids or on low lying areas on the environment can be reported to the Jharkhand State Pollution Control Board. The guidelines state that:

"In the event of deterioration of environmental quality, the same will be reported to concerned SPCB immediately and suitable preventive/ corrective action will be undertaken."

"Any deviations from the guidelines are to be treated as a violation of Water Act 1974 and Air Act 1981."

However, it does not appear that the JSPCB has taken cognisance of these issues.

Sehr Raheja, Shripad Dharmadhikary.

Manthan Adhyayan Kendra

Contact: manthan.shripad@gmail.com rahejasehr@gmail.com

Photos and Maps: Manthan Adhyayan Kendra Team

* While he did not present any documents/ test reports or any other evidence for this claim, we find it important to include the apprehensions of locals who stand to be directly affected by the issues discussed in this report. This is particularly because acidification of mine discharge due to presence of pyrites (with Sulphur) is a well-known phenomenon. Further, flyash is known to contain several heavy metals. The above-mentioned OM and guidelines for mine void filling with ash provide a list of environmental parameters to be monitored around the ash filled void before and after filling indicating possibility of contamination of water. So, fears expressed by the local people through this and similar statements are not unfounded, and that risks of water pollution could be involved in the

process of ash filling of mine voids. Hence, we find it important to include their apprehensions and suggest that the water be tested as required by the OM and Guidelines.