

BEFORE THE NATIONAL GREEN TRIBUNAL

PRINCIPLE BENCH, NEW DELHI

ORIGINAL APPLICATION NO. 104/2018

IN THE MATTER OF:-

SHIVPAL BHAGAT

APPLICANT

VS.

UOI & ORS.

RESPONDENT

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NAZIMUDDIN
SCIENTIST -E
CENTRAL POLLUTION CONTROL BOARD
PARIVESH BHAWAN, EAST ARJUN NAGAR,
DELHI-110032

DATE: 14.10.2019
PLACE: DELHI

**PRELIMINARY INVESTIGATION INTO ENVIRONMENTAL
CARRYING CAPACITY FOR POLLUTING PROJECTS AND
ALLIED ISSUES IN TAMNAR & GHARGHODA BLOCKS OF
RAIGARH DISTRICT, CHHATTISGARH:**

**Report of Committee appointed by Hon'ble National Green
Tribunal in *Shivpal Bhagat & Ors vs Uoi & Ors (OA 104 of
2018) vide order dt.22.07.2019***

Date of submission: 11 October 2019

1. BACKGROUND

The district of Raigarh is one of the easternmost districts in Chhattisgarh state, with a population of more than 15 lakhs that is predominantly rural (85%) with a significant tribal population (~34%) and forested area (~28%). Within this district, Tamnar and Gharghoda blocks are distinctive in being 5th Schedule Areas predominantly populated by Schedule Tribes (48%-58%), heavily forested, and also blocks in which large coal deposits are located. The existence of these coal deposits has led to the setting up of a number of coal mines and coal-based thermal power plants in this region over the past two-three decades. In spite of the existence of multiple environmental regulations, these activities have generated and continue to generate significant quantity of pollution in multiple forms.

The Hon'ble National Green Tribunal is currently hearing two cases filed by residents of these blocks—Dukalu Ram & Ors vs UoI & Ors (OA 314/2014 CZ), and Shivpal Bhagat & Ors vs UoI & Ors (OA 104/2018). The issues that have emerged in these cases include inter alia illegal mining, blasting resulting into damage to nearby houses, fires in coal mines or coal stockpiles, impact of mining on groundwater, and air pollution caused by mining, thermal power plants, coal washeries and other industries in Tamnar and Gharghoda blocks of Raigarh District in Chhattisgarh.

The Hon'ble National Green Tribunal (Principal Bench) vide order dated 2nd May 2019 had constituted a 4-member committee comprising of members from Indian Institute of Forest Management, Bhopal, Indian Institute of Mines, Dhanbad, Scientist /Engineer from Regional Office, Central Pollution Control Board and Member Secretary Chhattisgarh

Environment Conservation Board as convenor. That committee submitted its report on 28.06.2019 with its observations and monitoring reports of surface water, ground water, drain water, source emission of air pollutants and ambient air quality of Tamnar region in terms of physio-chemical parameters and heavy metals.

The Hon'ble NGT, vide its order dt. 22.07.2019, constituted a new committee consisting of the following:

1. Dr. P.K. Behera, Regional Director, (Nodal Officer) and Dr. R. P. Mishra , Scientist -D Central Pollution Control Board, Bhopal,
2. Dr. Sharachchandra Lele, Distinguished Fellow, ATREE and Member, Expert Appraisal Committee (Coal Mining and Thermal Power, MOEFCC,
3. Dr. Paras Ranjan Pujari, Representative of National Environmental Engineering Research Institute, Nagpur,
4. Dr. Purushottam Sakhare, Representative of MOEF&CC, Regional Office Nagpur, and
5. Shri. R. K. Sharma, Representative of Chhattisgarh Environmental Conservation Board, Regional Office Raigarh.

The Committee was directed to go into certain issues, beyond those already covered in the report of the 4-member committee that submitted a joint inspection report on 28.06.2019. The issues to be looked into by this committee include:

- Conducting carrying capacity [study] of the area,
- Remediation measures,
- Improved quality of soil,

- Adequacy of existing pollution control devices and measures,
- Fly ash management, and
- Ambient air quality with regard to PM2.5.

2. ACTIVITIES CARRIED OUT BY THE COMMITTEE

The Committee carried out a field visit during 19th-22nd August 2019.

The visit included:

- Assembling in Raipur, Chhattisgarh and travelling to Raigarh, and preliminary internal discussions (19th August);
- Meeting with the petitioners and hearing their submissions (20th August);



Figure 1. Committee members meeting with petitioners and their lawyer involved in Shivpal Bhagat & Ors case

- Site visit to villages Kosampalli and Sarasmal, and adjacent SECL-operated coal mine (Gare Palma IV/2&3) to understand issues faced by the villages, and to Gare Palma IV/1 (Operated by SECL) to observe method of fly-ash disposal in backfilling of mine; and to ash dyke of Jindal Power Limited (Power plant) to observe fly-ash disposal therein (20th August);
- Site visit to Gare Palma IV/08 (operated by M/s Ambuja Cement) and Gare Palma sector III (operated by M/s Adani on behalf of CEPGCL- Chhattisgarh) to obtain maps and documents pertaining to their Environmental Clearances and Forest Clearances, and their mine expansion plans (21st August forenoon);
- Site visit to Gare Palma (IV/4&5) (operated by HINDALCO) and village of Kondkhel and discussion with villagers to understand issues regarding water supply, groundwater decline, storm water and mine water disposal. (21st August afternoon);
- Site visit to M/s TRN Thermal Power plant and nearby villages (Nawapara) to observe fly ash disposal in ash dyke and in low-lying areas (21st August evening);
- Site visit to site of fly ash disposal by M/s Mahaveer Power and Coal Beneficiation (Bio-power plant) in agricultural fields and forest lands (21st August evening);
- Internal discussions and return to Raipur (22nd August).

The Committee also collected and perused reports of past committee inspections in the Dukalu Ram case, other materials submitted by the petitioners, maps regarding mine and power plant locations. The Committee collected data on Environmental Clearances, Forest

Clearances and data from Continuous Ambient Air Quality Monitoring Stations (CAAQMS) set up by Thermal Power Plants. The committee has also consulted the following technical reports and datasets to verify the issues raised by the applicant, which are annexed herewith.

1. *Final Technical Report of “Study of Load Carrying Capacity in Raigarh Region” submitted by IIT Kharagpur in October 2018 to Chhattisgarh Environment Conservation Board (CECB)-Raigarh. (Annexure-01).*
2. *Report of “Leaching study of Fly Ash at 2x300 MW Thermal Power Plant of M/s TRN Energy Pvt Ltd” submitted by IIT-ISM, Dhanbad in May 2018 (Annexure-02)*
3. *Report of “Study of the effect of fly ash dumping on ground water surrounding the Gare IV/2&3 coal mines” submitted by IIT Kharagpur in May 2019 to M/s JPL Tamnar (Annexure-03)*
4. *Ambient air quality data generated from CAAQMS operated by Thermal Power Plants in Gharghoda and Tamnar Block for the period January 2017-August 2019 (Annexure-04).*
5. *Final Report of “Investigations on Water Sources in 14 Villages of Tamnar Block of Raigarh District, Chhattisgarh” submitted by CSIR-NEERI to MAHAGENCO in December 2018 (Annexure -05)*

Additional materials which were referred that are available in the public domain are cited appropriately.

3. PRELIMINARY FINDINGS

At the outset, we wish to note three constraints:

- a) the period of two months given by the NGT is only sufficient for a preliminary report, since any actual analysis of environmental consequences of various activities taking place would take much longer (in terms of comprehensive sample collection and analysis);
- b) the season in which the Committee carried out its visit (August-September) is the monsoon season when the level of air pollution is the lowest that may be encountered over the year (because the rains wash out pollutants from the atmosphere) and the level of water pollution is also likely to be the lowest (because stormwater flows and high infiltration lead to significant dilution of pollutant levels in streams or groundwater), thereby rendering any environmental sampling infructuous, and
- c) Conducting an actual carrying capacity study would require observations through a whole 24-month period of all dimensions of pollution (air, water, soil, etc.), to be supplemented by a large number of studies of forests, agriculture and health, requiring substantial investments in instrumentation and analysis, and therefore commitment of financial and human resources far beyond those available with this committee.

In light of the above, we present a set of preliminary findings and recommendations based on them.

3.1 Context of Tamnar and Gharghoda blocks

Tamnar and Gharghoda blocks are located north of Raigarh town, and approximately match the two independent catchments of two major rivers/streams: Kelo river that originates in Ludega hills in Gharghoda block and runs through Tamnar block to empty into Kelo dam immediately north of Raigarh town, and Kurkut river that empties into the Baghaba

dam (and then continues downstream to join the Maand river). The distribution of mines, thermal power plants, etc. in Tamnar and Gharghoda blocks of Raigarh district is given in Figure 1.

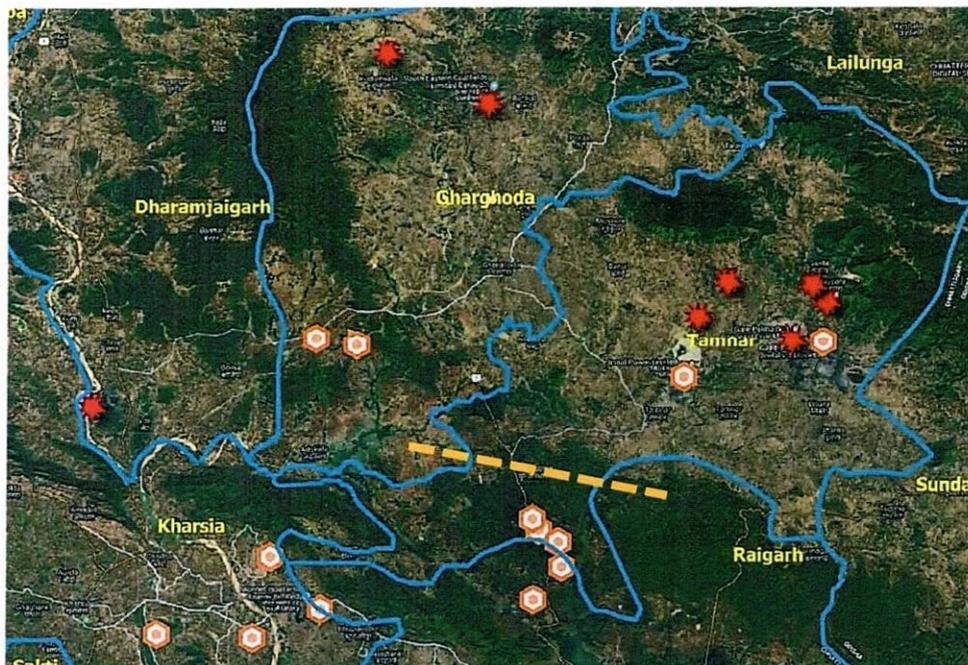


Figure 2. Location of Mines (star) and TPPs/CPPs/Steel plants (hexagons) in Tamnar, Gharghoda and surrounding blocks. Dashed line shows approximate separation of northern and southern portions of Tamnar block as indicated in text below.

It is important to note that in terms of watersheds and airsheds, the two blocks are actually best divided into three regions: a) Gharghoda block, b) the portion of Tamnar block north of Amaghat, which contains all the coal mines, two major and several minor power plants and coal washeries, and c) the portion of Tamnar block to the south of Punjipathar, which contains a large number of sponge iron units, especially clustered around Taraimal village. The two parts of Tamnar block are separated by an intervening forest belt, and are distinct in the types of industrial

activities, and therefore best treated and analysed separately when it comes to determining environmental carrying capacity.

The main projects currently operational in the two blocks are as follows.

1. **Coal Mining** :

The main area of coal reserve in Raigarh District is Gare Palma, Tamnar Block, where coal mines are divided in 04 sectors.

Sector-1: Allotted to Gujrat Mineral Development Corporation (GMDC) and yet to start operation.

Sector-2: Allotted to Maharashtra State Power Generation Company (MAHAGENCO) and yet to start operation.

Sector-3: Allotted to Chhattisgarh Power Generation Company (CGPGCL), where mining operations have recently commenced with Adani group as the mine operator.

Sector-4: This Sector has been divided into 8 mines which have been allotted to different public and private sector companies and their operation status is given in Table 1 below:

Table 1. Details of mines in Gare Palma Sector IV

Sl. No.	Name of Mines	Mining Capacity	Name of Allottee	Operational Status
1.	Gare Palma IV/1 (OCM) Distance from Kosampalli- 4.0km	6.0 MTPA	Initially it was allotted to M/s JSPL and subsequently transferred to SECL, Raigarh on 01.04.2015.	Mine is in operation
2.	Gare Palma IV/2&3 (OCM) Distance from Kosampalli- 3.0km (IV/2) 100m (IV/3)	6.25 MTPA	Initially it was allotted to M/s JPL and subsequently transferred to SECL, Raigarh on 01.04.2015.	Mine is in operation
3.	Gare Palma IV/4 (OCM) Distance from Kosampalli- 4km	1.0 MTPA	Initially it was allotted to Monet Ispat Ltd. and subsequently transferred M/s HINDALCO on 01.04.2015.	Mine is in operation

Sl. No.	Name of Mines	Mining Capacity	Name of Allottee	Operational Status
4.	Gare Palma IV/5 (OCM & UG) Distance from Kosampalli- 4km	1.0 MTPA	Initially it was allotted to Neco Jaiswal and subsequently transferred M/s HINDALCO on 01.04.2015.	Mine is in operation
5.	Gare Palma IV/6 (OCM) Distance from Kosampalli- 3.0km	NA	It was allotted to M/s JSPL. Subsequently de-allotted.	No mining work is being carried out as it has not been allotted to anyone.
6.	Gare Palma IV/7 (OCM) Distance from Kosampalli- 4.5km	NA	Initially it was allotted to Sarda Energy and finally SECL is custodian of the Mine.	Not operation since 3 years.
7.	Gare Palma IV/8 (OCM) Distance from Kosampalli- 2.0km	NA	Allotted to M/s Ambuja Cement Limited	M/s Ambuja Cement Limited has started the mining since October 2018

In addition to above, there are 4 mines owned by SECL in Raigarh district, viz.,

- (a) Chhal (OCM) - Active (3.5 MTPA), located in Dharamjaigarh block,
- (b) Dharam (UG) - Closed,
- (c) Baraud (OCM) - Active (3.5 MTPA) in Gharghoda block,
- (d) Jampali (OCM) - Active (3 MTPA).

Thermal Power Plants and Fly ash generation/utilization

There are a total of 12 power plants in Gharghoda and Tamnar blocks of Raigarh District. Total power generation capacity of all power plants in these blocks are approximately 4669 MW including grid-connected thermal power plants (TPP) and captive power plants (CPP) and Circulating Fluidised-bed Combustion (CFBC)

plants (used as pollution control device in sponge iron plants). The breakup of power plants is as under:

- (a) Major TPP/CPP - 03 (Coal based):
(3400 MW JPL, 576 MW JSPL, 600 MW TRN Energy)
- (b) CFBC - 08 (As control device)
- (c) Bio-Mass Based TPP - 01 (Coal+ rice husk based)

The overall generation of fly ash in **Raigarh district** (bulk of which comes from these 12 plants) comes to around 6,628,283 TPA. Of this, around 97% is reported as being utilized, in which utilization by way of **back filling to mine is 24%, use in low-lying areas is 27%**, and in brick manufacturing is 5% only.

3.2 Major forms of environmental impact due to these activities

The major environmental impacts generated by these activities include:

1. Air pollution from:
 - i) Coal mining activity itself, including fly ash backfilling (in the vicinity of the mine) (primarily particulate matter (PM))
 - ii) Thermal power plants (emissions of SO_x, NO_x, PM)
 - iii) Coal washeries (primarily emissions of PM)
 - iv) Sponge iron and Steel plants (emissions of SO_x, NO_x, PM, CO)
 - v) Road transport of coal (from the mines to coal consumers) and fly ash from the thermal power plants to the mines and other locations of dumping (primarily emissions of PM, but also CO)

2. Water pollution from:
 - i) Storm runoff diverted around coal mines,

- ii) Mine water pumped out of underground and open-cast mines,
 - iii) Potential seepage from ash ponds and dykes, and
 - iv) Washing out and leaching of fly ash from dumping sites in agricultural fields and other so-called 'low-lying areas' into streams and ground water.
3. Groundwater depletion from the mining of coal deposits, which leads to aquifers being punctured when the water table is intercepted during mining;
 4. Soil pollution due to fly ash dumping on agricultural soils;
 5. Loss of forests by opening of open cast mines in forested areas;
 6. Loss of agricultural lands;
 7. Displacement of settlements themselves;
 8. Impact of blasting on housing and consequent risk to life.

3.3 Mitigation measures prescribed and their current status

The Environmental and Forest Clearances given to these projects under the statutes include stipulations regarding the measures to be undertaken to limit or mitigate the levels of pollution and other environmental impacts. These include the following measures, whose on-the-ground implementation is also discussed below:

1. For air pollution:

- a. **Green belt plantations-** Green belt to the extent of 33% of the project area or mine lease area is required to be developed

with the primary aim of reducing air pollution. In practice, there is much variation in the width and extent of plantations. Green belts end up only providing token protection against noise or dust pollution to neighbouring settlements because they are very narrow (7.5m) and always planted after mining operations have started. Further, the belts are often also not located properly; instead of forming a buffer between the mine and the settlement, they are planted at locations away from settlements.

Table 2. Pollution control devices in 4 major power plants

Sl. No.	Name of the Industry	Ariel Distance in km from Kausampalli	Power generation capacity	Pollution control devices
01	M/s Jindal Power Limited	6.0	3400 MW	ESP with pneumatic collection system of fly ash and its transfer to Ash dykes by slurry system with AWRS. Part of fly ash is sent mines for filling.
02	M/s Jindal Steel and Power Limited	5.3	576 MW	ESP with pneumatic collection system of fly ash, and all fly ash generated is 100% utilized in mine filling with OB dump.
03	M/s TRN Energy	24.0	600 MW	ESP with pneumatic collection system of fly ash and its transfer to ash dykes by slurry system with AWRS. However, in 2018-19, 80% of fly ash was actually used for landfilling .
04	M/s Mahaveer Energy and Coal benification Ltd	26.0	12 MW	ESP with pneumatic collection system; the unit reports 100% utilisation in brickmaking; However, this does not match reality (see section 3.3-2b below)

- b. **Installation of Electro-Static Precipitators (ESPs) and Fluidised Gas Desulfurisers (FGDs) in the thermal power plants:** The pollution control devices in place with 4 Major thermal power plants are given in Table 2 above. While FGD installation would reduce SOx emissions, the retro-fitting of FGDs is to be completed by 2022 as per the current MOEFCC notification. As such, none of the TPPs/CPPs in the region have been retro-fitted with FGDs so far.
- c. EC conditions require regular sprinkling of water on roads within mines, OB dump areas and coal yards to minimise coal dust generation. Currently, sprinkling is done using contracted tankers. Fixed sprinkler systems were not observed. The extent of compliance in terms of actual level and regularity of sprinkling is hard to monitor.
- d. The major contributor of dust in ambient air is road dust being generated due to movement of **large number of trucks** for coal transport **on badly damaged and narrow roads in the region**. Coal transport happens in both directions: mines in the region sending coal out to thermal power plants in the region and elsewhere, and TPPs/CPPs and sponge iron plants in the region importing coal from outside the region. Currently, **ECs given for coal mining do not prescribe transport conditions** beyond insisting on black-topped roads in the mine. While ECs for TPPs often prescribe coal transport by rail or closed conveyor belt transport, coal mines are not required to do rail or closed conveyor belt only.

It may be noted that **a railway line is being extended** from Kharsia through Gharghoda to Tamnar block. However this line is still under construction, and there is no clarity as to the expected date of commissioning. All transport to and from Tamnar-Gharghoda blocks is happening by road.

- e. Moreover, where coal mines were earlier linked to specific power plants (such as Gare Palma IV/2&3 being linked to JPL), the discontinuing of coal linkage policy and beginning of e-auctioning instead means that different mines supply coal to different plants at different points, thereby making investment in coal conveyor belts and even rail heads somewhat pointless. Thus, for instance, the closed conveyor belt connecting Gare Palma IV/2&3 to M/s Jindal Power Limited (originally constructed by JPL as the mine was its captive mine) is now not being used, and JPL obtains (60%) of its coal from outside Tamnar area (which would increase further if Jindal Power operated at full installed capacity).

Finally, even when coal transport is done by trucks, the truck are supposed to deploy tarpaulin covers. Significant improvement in compliance on this front appears to have taken place after enforcement by CECB and CPCB in recent years. Nevertheless, this compliance (proper covering of trucks) needs to be improved, and the number of trucks plying on major roads has to be reduced, even as roads require proper construction and maintenance to reduce the fugitive emissions.

- f. **Fire:** EC conditions require limited stocking of coal to reduce chances of coal fires in open cast mines. Similarly, DGMS prescribes and minimizing face of seams/OB dump. Field observations and earlier reports indicate that small fires are still present off and on.

2. For water pollution:

- a. EC requires the construction of **garland drains** around OB dumps with proper settling tanks to avoid discharge of silt in surface water bodies. **In reality**, our observations indicate that garland drains are only dug in temporary form; permanent structures are not created, and settling tanks are often missing.
- b. **Fly ash** has to be prevented from flowing into surface water bodies and from leaching into groundwater. One option is to ensure that fly ash is dumped only in mine voids or used in backfilling of OB dumps. Fly ash notification of 2009¹ **requires that use of minimum 25% of fly ash in OB dump** (external or backfilling area). **In reality**, this is observed only in GPIV/1 and GPIV/2&3. Other mines are as yet not accepting fly ash from local TPPs.

In this connection, CECB issued closure direction to M/s SECL Gare Palma IV/2&3 Tamnar OCM for noncompliance of consent conditions (i.e., not accepting fly ash etc.) in August 2017 and mining activity was closed for 7

¹ Paras 8-i and 8-ii

days. Subsequently, this mine has begun to accept fly ash for backfilling.

CECB also issued closure direction to M/s SECL Jampali OCM for similar reasons, and mining activity was closed for 7 days. Nevertheless, the mine still refuses to accept fly ash for backfilling/OB dump.

They (these mines) have apparently objected on the grounds of risk of ground water pollution. However, recently completed studies by IIT-ISM Dhanbad for M/s TRN Energy Ltd (Annexure 2) and by IIT Kharagpur for M/s JPL (Annexure 3) demonstrate that, if properly disposed in OB dumps, fly ash is highly unlikely to pose any threat to groundwater.

- c. **In the absence of utilisation in mines as an option**, and given limited options for utilisation in cement and road making, a large fraction of the fly ash generated by TPPs/CPPs in Tamnar-Gharghoda region (**at least 27%**) is being dumped in so-called **low-lying areas**. This is being done with the permission of the concerned landowners and Gram Panchayats. However, field observations show that this is being done in a highly unscientific manner. Specifically, M/s Mahaveer Energy and Coal beneficiation Ltd is indulging in extensive and irresponsible disposal of fly ash in village Bhengari as seen in Figure 3 and Figure 4. This is also in contradiction to their report of 100% utilization in brick making.



Figure 3. Extent of fly ash dumping in agricultural lands in Bhengari village, close to Bhengari nala (image on left is pre-dumping (2007) and on right is post-dumping (2019))



Figure 4. 40-feet high fly ash dump by M/s Mahaveer Energy in Bhengari village (in the name of 'low-lying area dump')



Figure 5. Fly ash dumping in 'low-lying' agricultural fields is prone to surface erosion

M/s TRN Energy is also disposing significant quantities of fly ash in agricultural lands, labelled as low-lying areas. As the photograph in Figure 5 shows, such dumping is also likely to result in erosion of fly ash into nearby streams and nallas.

In terms of enforcement, CECB has filed case against M/s Jindal Power Limited, Tamnar in the court of CJM Raigarh for noncompliance of fly ash notification in February 2017. The matter is sub judice. CECB has also levied environmental compensation charge of Rs 3.12 lakhs on M/s TRN Energy Private Limited, Nawapara, Raigarh in July 2018 for land affected by improper disposal of fly ash. Nevertheless, full and continuous enforcement in all locations has not been possible.

The Standard Operating Procedure (SOP) for disposal of fly ash issued recently by MoEF² seeks to address this problem. However, our observations in the field and discussions with enforcement agencies suggest that the capacity to monitor on-the-ground compliance with such SOPs is greatly limited, since 'low-lying area dumps' are spread over hundreds of locations.

3. Ground water depletion:

It is scientifically known that coal mining can cause de-watering of the aquifers. However, currently there is no clear policy on mitigation of ground water depletion by coal mining. The committee sought to examine the status of ground water around the coal mines in this region. However, observations taken during the monsoon do not reveal the true status and moreover, what is required is a long-term rigorous monitoring programme and trend analysis.

4. Soil pollution:

It is clear that large-scale transportation of coal and fly ash by trucks makes fields adjoining major roads susceptible to soil pollution due to the settling of coal dust and fly ash. This problem can only be addressed by reducing road transport and to a small extent by increased enforcement of tarpaulin covering of trucks, which has been discussed above.

² "Guideline for disposal / utilization of fly ash for reclamation of low lying areas and stowing of abandoned mine/quarries", MOEFCC office memorandum no. 22-13/2019-IA.III dt, 28th August 2019.

3.4 Assessment of the net outcome

1. Air pollution especially PM 2.5

Air pollution data are available from different sources and locations. One source is the Continuous Ambient Air Quality Monitoring Systems, set up by the TPPs and steel plants at 14 locations as per EC conditions. The data include measurements of PM10, PM2.5, CO, SOx and NOx. These are available for several years and are attached as Annexure 4. However, there are no such monitors installed around the mines, as this condition was not imposed in the EC. The distribution of CAAQMS stations is therefore inadequate when it comes to measuring air pollution load around mines.

The other sources of information on air quality are:

- a) IIT Kharagpur's full year monitoring during 2016-17 (Annexure 1),
- b) air quality measurements done by CECB in June 2019 at the behest of the 4-member committee set up earlier in this case (already submitted to the NGT), and
- c) data provided by the petitioner based on the Community Environment Monitoring programme of The Other Media, from samples taken at 7 locations in the villages surrounding Gare Palma mines in months of March-April of 2016, May 2017³ and May 2019.

After perusing all these datasets, we find that the IIT Kharagpur study, which includes 2 sampling points (Tamnar town and

³ Reported partly in "Environmental Violations in and around Coalmines, Washeries and Thermal Power Plants of Tamnar & Gharghoda Blocks, Dist. Raigarh, Chhattisgarh", report of Fact Finding Team (<https://www.manthan-india.org/wp-content/uploads/2017/01/CG-FFT-Report-Nov-2016-FINAL-BY-SKD-VER-2-3DEC16.pdf>) and in "Poisoned: Report on the Environmental Sampling around the Coal Mines, Thermal Power Plants and Ash Ponds in Tamnar & Gharghoda Blocks of Raigarh, Chhattisgarh" by Shweta Narayan et al., Aug 2017 (http://www.sipcotcuddalore.com/downloads/Poisoned_English_Version_Aug2017.pdf).

Dongamahua village) in the Tamnar coal mining area, does show PM2.5 levels around 80 micro-gram/cum during summer and winter months. Whereas the data provided by the petitioner reports levels of 170-225 micro-gram/cum or even higher. We do not observe such high values anywhere in the literature except next to highways. Therefore, while air pollution is a matter of concern (since values are indeed crossing the NAAQ standard at certain points during the year in the coal mining area), there is a need for more rigorous and elaborate monitoring of PM 2.5 levels in the areas adjacent to coal mining and other locations in the region of interest.

2. GW depletion

Data on groundwater levels was available from three sources: a) CGWB observation wells, of which there are several in the study region, but from which only current year data were accessible to us; b) data from Piezometers that are set up and monitored by the coal mining companies at a few locations surrounding the mine as per EC conditions, c) a report prepared by Public Health and Engineering Department, Chhattisgarh in 2015 on groundwater depletion in Tamnar block. In addition, oral information was provided by villagers of Kondhkel during our site visit.

Although the ECs stipulate groundwater level monitoring by establishing a network of existing wells and construction of new piezometers, our observations indicate that the compliance is not adequate. For instance, the data from Gare Palma Sector IV/8 being operated by M/S Ambuja was not uploaded to the MoEF server. Piezometers were not installed by the operator at GarePalma IV/7. Most important, the total depth of the piezometers did not match the

mining depth, whereas it is necessary that the total depth of the piezometer be more than the anticipated depth of mining so that the impact on the deeper aquifer is visible in the long run. Thus, it is not possible to use this data for groundwater assessment.

During the site visit to Kondkhel village in the vicinity of Gare Palma IV/4 operated by Hindalco Industries Ltd, villagers reported that the underground mining has affected the water table significantly. The failure of Mark-II hand pumps was also cited as example. While the causal relationship cannot be conclusively established from a short field visit, it is known that underground mining can lead to dewatering of aquifers. Remedial measures for supply of domestic water to settlements have been taken, although there are some quality issues that require to be addressed.

3. Water quality-

River Kelo, the most important River of District Raigarh, originates from Ludega hills in Tehsil-Gharghoda. It flows from North to South towards Raigarh and reaches a place, named Madhav Pali in the state of Orisha where it joins Mahanadi River. The river passes adjacent to M/s Jindal Power Plant (back side of CHP area), Gare Palma IV/2&3 open cast mine, and M/s Nalwa Power and Steel Limited (near fly ash disposal site). Hence possibilities of run-off flow towards River Kelo in monsoon season cannot be ruled out.

CECB is monitoring surface water quality on a monthly basis under the MINARS programme of CPCB at only 3 points (2 on Kelo river near Raigarh town and 1 in Mahanadi river). In addition, industries are required to report surface and groundwater quality data (generated by recognized laboratories) on a regular basis.

In addition, water quality monitoring at 13 locations was conducted by the committee headed by MS CECB and analysis results is submitted with report of the committee in Hon'ble NGT on 28.06.2019. The chemical analysis of water samples for heavy metals indicated the presence of Heavy metal at very low concentration and may not be much problematic.

Our committee could not carry out any water quality sampling and analysis afresh. We draw upon three reports:

a) National Environmental Engineering Research Institute (NEERI), Nagpur has conducted a study of water quality in 14 villages of Tamnar Block in 2018 (attached as Annexure 5),

b) IIT Kharagpur conducted a study of groundwater quality surrounding Gare Palm IV/2&3 mines and submitted a report in May 2019 (attached as Annexure 3),

c) Water quality was sampled at 16 points in June 2019 by CECB on behalf of 4-member committee set up previously in this NGT case.

All three studies report most water quality parameters in most locations to be within permissible limits. Of these three studies, only the NEERI study reports one trace element, viz., Arsenic, at levels above the standard for drinking water in handpumps in most of the villages sampled by them. **The source of this Arsenic is clearly geogenic; the process by which it is now being mobilized is unclear.**

4. Soil pollution

There is an absence of comprehensive data on soil quality. However, there is no evidence of widespread soil pollution other than road sides where heavy truck traffic is observed.

5. Forest loss and livelihood loss

All the mining areas that involve diversion of legally defined forest land have to obtain Forest Clearances, and there is a requirement of compensatory afforestation in lieu of forest loss. The forest clearances obtained by project proponents in the study region have been verified by the committee. The threshold limit for forest loss is difficult to determine.

The green belt, although primarily meant for mitigating air pollution, also provides some compensatory green cover. However, as noted above, the green belts have not been developed properly in most cases. In the matter of Dukalu Ram & Ors vs UoI & Ors (OA 314/2014 CZ) an attempt was made to assess the Eco-system loss in Gare Palma IV/ 2&3 coal mines due to non-development of green belt, using expert opinion from members of ISM and IIFM. The report of the same is on records with Hon'ble National Green Tribunal.

4. RECOMMENDATIONS

Based on the above observations, the committee recommends a set of short-term and long-term measures.

4.1 *Short-term measures*

- a. Requiring all coal mines in Raigarh district to accept fly ash for disposal through OB dump and back-filling. (Action by respective Coal mine companies).
- b. Given the seriousness of improper fly ash dumping in low lying areas, and the practical difficulty in rigorously monitoring the implementation of the recent SOP in the field, no further disposal of fly ash in low-lying areas by TPP/CPP companies to be permitted and all Gram Panchayats in Raigarh district to be directed to stop issuing NOCs for the same.
- c. Requiring that whatever coal is being supplied to JPL and JSPL from Gare Palma IV/2&3 should be transported through the already existing **closed conveyor belts** and no such coal transport should be allowed via trucks. (Action by SECL).
- d. Establishment of monitoring cell by PHED to monitor water quality being used by the residents of villages and provide pre-treatment facility and removal of geogenic contaminants and anthropogenic contaminants before its use as drinking water. Specifically, the quality of water treatment in the mine-supported water supply system in village Kondkhel needs to be ensured by PHED as per drinking water norms.

- e. Installation of adequate number of CCTV and CAAQM stations in coal mining area. Proper records under CCTV coverage shall be maintained by coal mines to ensure movement of covered trucks loaded with coals and regular and comprehensive operation of sprinklers in coal zone, stockyard and all mine roads. CAAQMS shall be connected to CECB/CPCB server, and also displayed on the mine gates for public information. (Action by respective coal mine companies).
- f. Proper repairing and maintenance of roads both inside and outside the mine area to ensure smooth movement of trucks and other load carrying vehicles. (Action by Public Works Department and respective mining companies). Indian Railways to be directed to submit a time-bound action plan for commissioning of the railway line in Tamnar and Gharghoda blocks to ensure all coal transportation by rail.
- g. Proper and free health care facilities with multispecialty treatment system may be provided in all coal mine-adjacent villages as per the recommendations of the committee report of 14.6.2019 in the Dukalu Ram (OA 314/2014 CZ) case. (Action by respective coal mine companies).
- h. Strict vigilance by MOEFCC for green belt development compliance as per EC conditions.
- i. We also recommend that **no further conversion of UG mines to Open Cast mines** be permitted in Tamnar and Gharghoda, keeping in mind the environmental costs in terms

forest loss, major noncompliance in pollution control and social cost (rehabilitation).

4.2 Long-term measures

a) Based on evidence summarised above, the committee is of the opinion that the Tamnar-Gharghoda block region is close to exceeding its environmental carrying capacity. However, the precise extent of current environmental load and the likely impacts of future mining and industrial activities has to be worked out through a detailed and comprehensive **environmental load carrying capacity study, to be carried out by a reputed environmental research institute or a consortium of such institutes over a 24-month period.**

- i) The study must cover dimensions of air pollution (especially PM2.5), water pollution and ground and surface water depletion, soil contamination, forest and biodiversity loss, and social and health impacts.
- ii) Moreover, given the geography of the region, the study must assess the carrying capacity separately for two different sub-regions: the northern Tamnar (coal mining related) block and Gharghoda block. Moreover, since Chhal open cast mine located in southern Dharamjaigarh block is located on the bank of Mand River and therefore in an eco-sensitive zone, a baseline study of this region may also be carried out. The southern Tamnar sub-region has already been studied for environmental load carrying capacity by IIT Kharagpur (report submitted to CECB in 2018) and it has already recommended strict regulation of any further

industrial development in particular parts of the sub-region through a high-level committee.

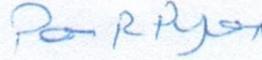
iii) Mode of commissioning of this study may please be decided by the Hon'ble NGT, and necessary directions may please be issued accordingly.

- b) **To reduce the pollution and other impacts caused by road transport** of coal and other minerals, directions may be issued that coal transport by road from coal mines or to thermal power plants in these two blocks will be permitted only for 1 year, after which transport must be done by rail or closed conveyor belt only.
- c) **Condition of greenbelt development** may be incorporated at TOR stage of EC application to ensure that greenbelt work shall be in place at the time of final presentation for obtaining EC, which shall be verified by MOEFCC. Further, while granting TOR, EAC should specify the location of the greenbelt to provide buffer between coal mine and human settlements, and specify a sufficient width of the greenbelt for the same.
- d) Ministry of Coal be directed to include the necessary provisions to **ensure the acceptance of fly ash** in coal mines for disposal through OB dump and back-filling as per fly ash notification of 2009.

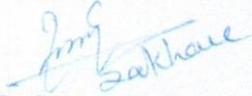
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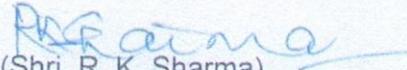
(Dr. Sharachchandra Lele)
Distinguished Fellow, ATREE



(Dr. P. R. Pujari)
Principal Scientist, NEERI



(Dr. P. R. Sakhare)
Scientist-D, MOEF&CC, Nagpur
Raigarh



(Shri. R. K. Sharma)
Regional Officer, CEGB,



(Dr. P. K. Behera)
Regional Director, CPCB, Bhopal
(Nodal Officer)

ANNEXURES

1. Final Technical Report on Study of Load carrying capacity in Raigarh Region (IIT Kharagpur, October 2018)
2. Leaching study of Fly Ash (IIT-Indian School of Mines, Dhanbad, May 2018)
3. Study of the effect of fly ash dumping on ground water surrounding the Gare IV, 2&3 coal mines (Indian Institute of Technology, Kharagpur, May 2019)
4. Investigation on water sources in 14 villages of Tamnar block of Raigarh District (NEERI-Nagpur, December 2018)
5. Ambient air quality data generated from CAAQMS operated by Thermal Power Plants in Gharghoda and Tamnar Block (2017-2019).