Compliance Status of Environmental Clearance of West Bokaro Opencast Coal Mine

Tata Steel Ltd.

A. Specific Conditions

(i) No mining operations shall be undertaken in the forestland until clearance has been obtained under the provisions of FC Act, 1980.

Being complied with.

(ii) The embankment along the River Bokaro shall be designed taking into account the highest flood level, based on past data, along the quarry area at the mine boundary along the River Bokaro so as to guard against mine inundation. The slope of the embankment shall at least 2:1 towards the ML and shall be stabilized by plantation. The height of the embankment shall be at least 5 m higher than the HFL.

The height of the embankment along the Bokaro River is more than 5 m higher than the HFL. The HFL observed was 336 mts while the lower most level of quarry boundary is 346 mts. At the same time 30 mts solid surface has also been left from river to avoid any ingress of water in the mine pit. The slope of embankment is being maintained in the ratio of 2:1 along with plantation for stabilization.

(iii) Topsoil should be stacked properly with proper slope at earmarked site(s) and should not be kept active and shall be used for reclamation and development of green belt.

Wherever top soil is removed during excavation of coal, it is being stacked separately in available mining area, which is being used for spreading on overburden dump surface for plantation and greenbelt development in and around West Bokaro mine. Presently we are operating to deepen the mine pit.

(iv) No new external OB dumps shall be created for storing OB. Monitoring and management of existing reclaimed dumpsites should continue until the vegetation becomes self sustaining. Compliance status should be submitted to the Ministry of Environment & Forests and its Regional office located at Bhubaneswar on and yearly basis.

No further new external OB dumps will be created for storing of OB. Since the mined out area in the operating mines are available which is being used for inpit dumping. The existing reclaimed dump site is being monitored & maintained to sustain vegetation. All the external OB dumps have stabilized over the years and more over, retaining wall has also been provided for further stability. Abandoned dump area has been identified and taken up for reclamation.

Reclaimed OB dump

Coir Matting on slope of Overburden dump

One of the outpit dump area has been taken up for coir matting on the slope. Coir matting, a biodegradable material made up of coconut coir being used to stabilize slope of dump also provided green coverage.

(v) *Catch drains and siltation ponds of appropriate size should be constructed to arrest silt and sediment flows from soil, OB and mineral dumps. The water so collected should be utilized for watering the mine area, roads, green belt development, etc. The drains should be regularly de silted and maintained properly.*

Garland drains (size, gradient and length) and sump capacity should be designed keeping 50% safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine site. Sump capacity should also provided adequate retention period to allow proper settling of silt material.

Some of the dump site located in deep most area followed by mine pit of adequate size to arrest sediment from soil, OB. After proper sedimentation the water is being used in spraying & watering to plants. Construction of garland drain is a regular practice to take care of run-off water in the mining operation. The details of garland drain are top width varies in between 6m to 10m & bottom width is kept at 3m. Depth varies from 2m to 7m. The sump capacity is in order of 48-120 million gallons considering maximum rainfall of 150 mm in 24 hrs which leads to accumulation of 28-48 million gallons water depending upon the catchment area.

Accumulated mine pit water being used in industrial and domestic purpose after necessary treatment. One of the de coaled area of 12 ha in query E site is being used as water storage area to collect rain water, catchment water etc.

Abandoned mine pit being used as water reservoir

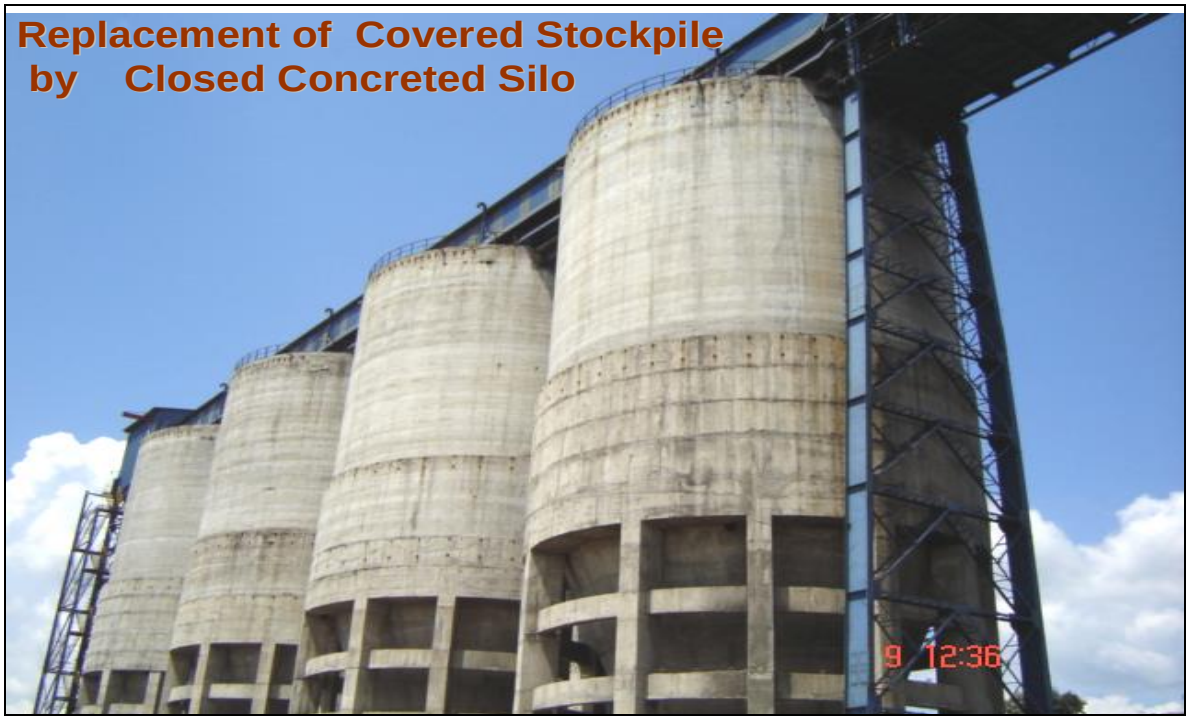
(vi) *Dimension of the retaining wall at the toe of the dumps and OB benches within the mine to check run-off and siltation should be based on the rainfall data.*

Complied with.

(vii) *Crushers at the CHP should be operated with high efficiency bag filters, water sprinkling system should be provided to check fugitive emissions from crushing operations, conveyor system, haulage roads, transfer points, etc.*

Crusher houses are equipped with dry fog dust suppression system to cover conveyor network transfer points & extended further. Water sprinkling on the road being done by fixed type sprinkler system, thus minimizes use of water tanker for spraying.

Dry fog dust suppression – In motion



(viii) *Drills should be wet operated.*

All the drills are provided with water jet system which ensures minimum fugitive dust emission.

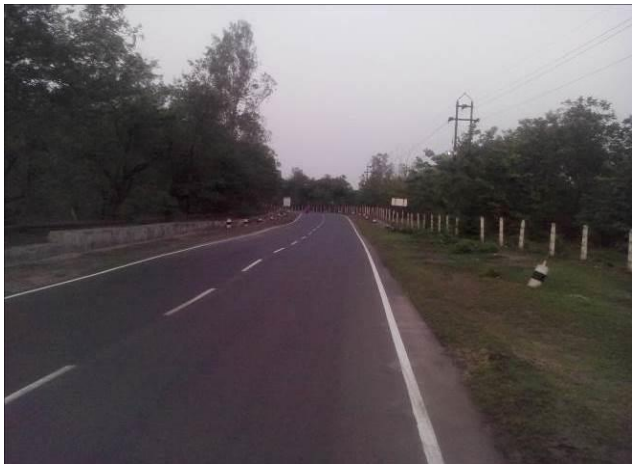
(ix) *Controlled blasting should be practiced only during day time with use of delay detonators. The mitigative measures for control of ground vibrations and to arrest the fly rocks and boulders should be implemented.*

It is being complied with. Controlled blasting is practiced regularly during day time only, by using delay detonators, to further minimize vibration/ dust & formation of fly rocks.

(x) *Area brought under afforestation shall not be less than 1260 ha which includes reclaimed external OB dump (85 ha), backfilled area (974 ha), along ML boundary, along roads, green belt (201 ha), in undisturbed areas and in colony within the mine lease area by planting native species in consultation with the local DFO/ Agriculture Department. The density of the trees should be around 2500 plants per ha.*

Last year we have planted 60,000 nos. saplings to cover an additional area of approximately 31 ha, this year we have a plan to green cover over 35 ha of area by planting 70000 sapling comprising mostly outpit & inpit dump area, avenue plantation, green belt, roads, colony area etc.

TATA Steel has also engaged IUCN for development of integrated biodiversity management in its all mining clusters with action plan for sustainable development.



(xi) *A Progressive Closure Plan shall be implemented by reclamation of quarry area of 974 ha which shall be backfilled and afforested by planting native plant species in consultation with the local DFO/ Agriculture Department. The density of the trees should be around 2500 plants per ha. The balance 20 ha of de coaled area being converted into a water reservoir shall gently slope along the upper benches and stabilized and reclaimed with plantation.*

It will be complied with (progressive). The reclamation of mined out area has been done keeping thrust on plantation of native species. The final void left to be converted into water reservoir where care shall be taken to avoid any stiff slope along the upper benches and also stabilized by plantation all around. One of the mined out pit area is being used as water reservoir.

(xii) *A Conservation Plan for endangered species found in and around the project area shall be formulated and for the medicinal plants (in-situ and ex-situ) shall be prepared and implemented in consultation with the State Forest and Wildlife Departments. Separate funds shall be earmarked for implementation of the various activities there under and the status thereof shall be regularly reported to this Ministry and the MoEF Regional Office, Bhubaneswar.*

The project area doesn't have any endangered species found in and around area. However, some of the plants of having medicinal values are conserved by developing in an area of 1700 sq.m exclusively. Separate fund has been earmarked for implementation of conservation plan along with State Forest and Wildlife Department if any. Some of the species of medicinal importance are as:

Dhatura

Sarpagandha

Tulsi

Vinca rosea

Bryophyllum

Aloe vera

Coleus aromaticus

Hemisdesmus indicus (Annantmull)

Zingiber officinalis

Adhatoda vasica

Cymbopogon citratus

Murraya koenigii

(xiii) No groundwater shall be used for the mining/project activities. Additional water required, if any, shall be met by recycling/reuse of the water from the existing activities and from rainwater harvesting measures.

It is being complied with and maintained. We have been continuing to harvest rain water in our abandoned mine pit and surface structure & recycling of effluent to minimize fresh water requirement. Last year we have been awarded PARYAVARAN PURUSKAR for rain water harvesting by Jharkhand State Pollution Control Board, Ranchi.

(xiv) Regular monitoring of groundwater level and quality should be carried out by establishing a network of existing wells and construction of new peizometers. The monitoring for quantity should be done four times a year in pre-monsoon (May), monsoon (August), post-monsoon (November) and winter (January) seasons and for quality in May. Data thus collected should be submitted to the Ministry of Environment & Forests and to the Central Pollution Control Board quarterly within one month of monitoring.

Regular monitoring of ground water level of existing well is being carried out. The data collected for the month of November 2014 and January 2015 are as follows:

Sl. No.	LOCATION	MONTH	
		November 2014	January 2015
01.	RAJIV NAGAR	3'3"	3'4"
02.	JAIRAAM HOTAL	5'2"	4'6"
03.	SHOPING COMPLEX	4'10"	5'4"
04.	JAGARNATH GOPE	7'8"	8'6"
05.	HOUSING	4'10"	6'5"
06.	MUKUNDA BERA	8'9"	10'7"
07.	DRIVER HUT	7'11"	8'2"

Sl. No.	LOCATION	MONTH	
		November 2014	January 2015
08.	2 NO WELL	5'11"	5'10"
09.	9 NO WELL	2'6"	3'4 "
10.	PUNDI	8'7"	10'2"
11.	DUNI	7'1"	14'4"
12.	BANJI	32'5"	35'6"DRY
13.	KEDLA ROAD	12'2"	13'0"
14.	JHARNA BASTI	4'0"	5'10 "

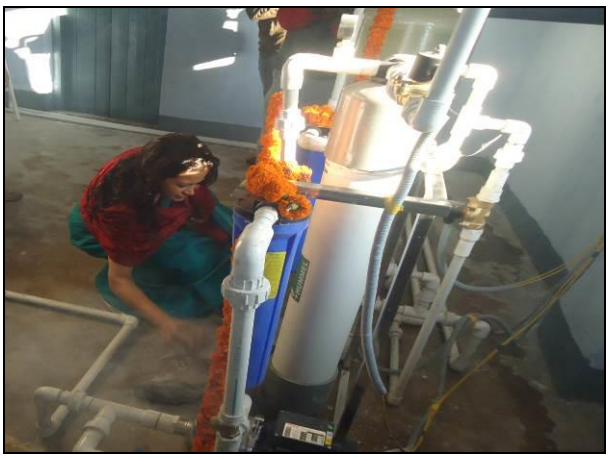
(xv) *The Company shall put up artificial groundwater recharge measures for augmentation of groundwater resource. The project authorities should meet water requirement of nearby village(s) in case the village wells go dry due to dewatering of mine.*

The ground water recharge measures are continuously being taken up. In this year thrust has already been put up to streamline drinking water projects, which includes construction of ponds, bore well, check dams etc. in and around our leasehold areas. The projects also include construction of rain water harvesting structures, installation of water filtration plant, in surrounding villages.

Drinking water project at Bhadwa

Drinking water project near Dhuni

Drinking water facility at Birhore Tola



Water filtration system at Dhuni village

Rainwater Pond at Parsabera

Check dam construction at Rahawan village

Borewell recharge Pit in Bilhore village

Ring well at village Duni

(xvi) ETP should also be provided for workshop, coal washery and CHP. There shall be zero discharge of wastewater from CHP and the coal washeries. Effluents from the tailings pond shall be treated to conform to prescribed standards in case of discharge into any water course outside the lease.

ETP has been provided to all units where there is possibility of generation of wastewater. The wastewater after having necessary treatment is recycled back to the plant. The water from tailing pond after proper de-silting of tailings is recycled back to washeries to maintain zero discharge. Also the quality of water is being analyzed regularly (monthly). Mechanical tailing dewatering system is in operation which is gradually minimizes the use of tailings ponds. The tailing slurry is handled through high frequency screen and belt press to produce dry tailings and recover water for recycling.

Mechanical tailings de-watering system

Coal transport by conveyor belt

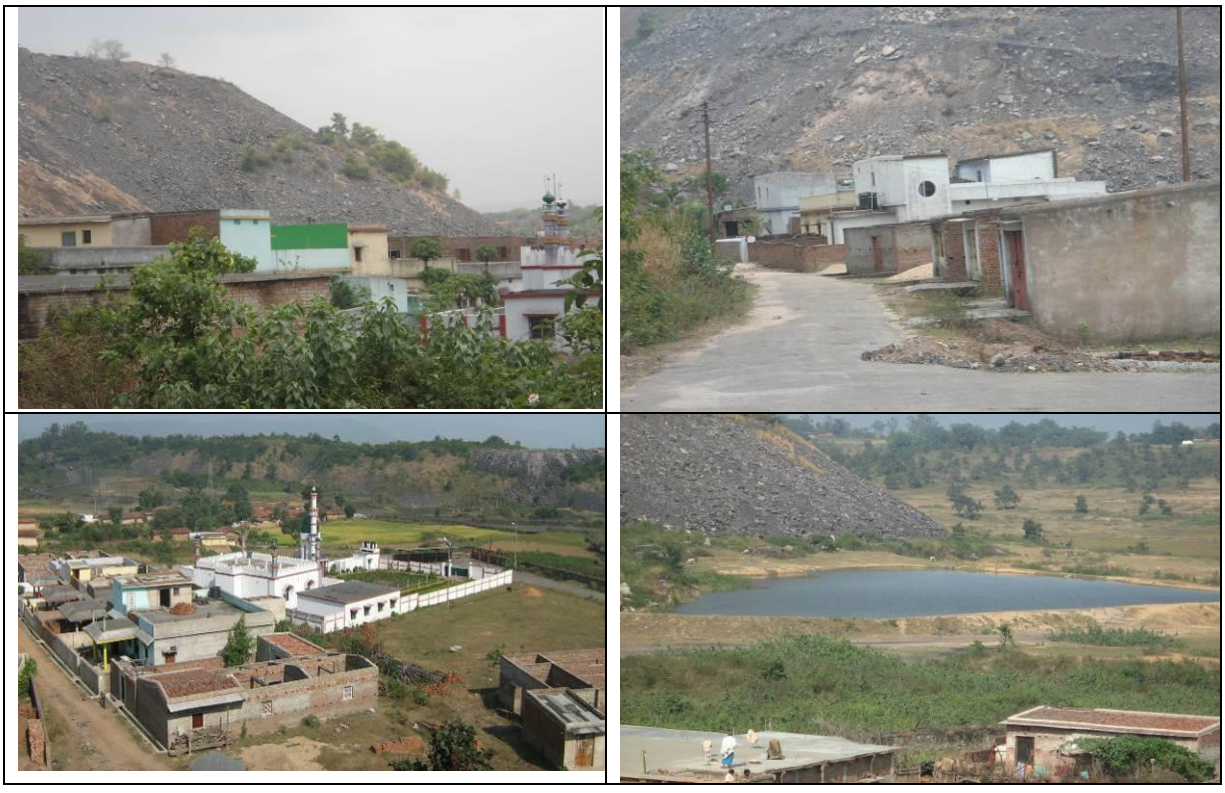
Effluent recycling in washery

(xvii) *An STP shall be provided for the township/colony to treat the domestic effluents to prescribed standards and for their reuse in project activities.*

STP provided in one residential block, water reused in dust suppression of road

(xviii) *R&R shall be based on norms laid down by the State Government and shall not be inferior than that in the National R&R Policy and shall be completed within a specified time - frame.*

The R&R policy designed for the project affected families is adequate & having additional benefits than the National R&R policy. As a part of R&R policy some of the measures taken are as follows:



(xix) *For monitoring land use pattern and for post mining land use, a time series of land use maps, based on satellite imagery (on a scale of 1: 5000) of the core zone and buffer zone, from the start of the project until end of mine life shall be prepared once in 3 years (for any one particular season which is consistent in the time series), and the report submitted to MoEF and its Regional office at Bhubaneswar.*

Land use maps are prepared by M/S SPARC Pvt. Ltd, Bhubaneswar for core and buffer zone on the 1:5000 scale by submitting total no. of 55 nos. map sheets along with this report to the ministry office. The next due will be Dec.-2016.

(xx) A Final Mine Closure Plan along with details of Corpus Fund should be submitted to the Ministry of Environment & Forests for approval 5 years in advance of final mine closure for approval.

It will be complied 5 years in advance of final mine closure plan for approval. An adequate fund has been provided separately for final mine closure activity.

(xxi) Consent to operate shall be obtained before expanding mining operations.

Consent to operate is being obtained regularly.

B. General Conditions

(i) No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment and Forests.

No change in mining technology is done. Presently we have applied to MoEF for production expansion of 9.0 MTPA of coal mine and 4.0 MTPA for Washery-II, keeping all other facilities same. During expansion at few locations high wall mining technique will be practiced by considering geological conditions.

(ii) No change in the calendar plan including excavation, quantum of mineral coal and waste should be made.

Complied with

(iii) Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for SPM, RPM, SO_2 and NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the SPCB.

Consulted with Regional Officer of Pollution Control Board, by considering the predominate wind direction, base line study and Air modeling one station in buffer zone, and 04 station in core zone has been suggested.

(iv) Fugitive dust emissions (SPM and RPM) from all the sources should be controlled regularly monitored and data recorded properly. Water spraying arrangement on haul roads, wagon loading, dump trucks (loading and unloading) points should be provided and properly maintained.

All the strategic locations of operating plants where the possibilities of fugitive dust emissions, has been provided with adequate enclosures, side skirt, chute, seal plate, sealing of transfer points along with adequate dust suppression system. All the sites are monitored regularly (once in a month) and data is kept for record. The haul road, loading and unloading points are provided with pressurized water tanker for water spraying moreover, wagon loading does not require any water spraying since the coal is in moist condition.

Fixed type water spraying system in Washery area

Pressurized water spraying in mines area with chemical dosing

A mobile vacuum cleaner of 20 T capacities is used to recover any spillage during operation immediately. Adequate maintenance of vehicles in done, to avoid any spillage during the transportation.

(v) Data on ambient air quality (SPM, RPM, SO_2 and NOx) should be regularly submitted to the Ministry including its Regional Office at Bhubneshwar and to the State Pollution Control Board and to the Central Pollution Control Board once in six months.

Being complied with regularly as per the specified frequency

Status of Air Quality: Work Zone

Core Zone work place as per G.S.R. 742 (E) • Mines :	Level obtained in µg/ m^3 for the month of October 2014 to March 2015								Remarks
	SPM		**RPM**		**NO_X**		**SO_2**		
	Oct. 14	Mar. 15	Oct. 14	Mar. 15	Oct. 14	Mar. 15	Oct. 14	Mar. 15	
AB	395	278	149	85	45	44	<10	64	The AAQ was found within the prescribed norms.
SE	394	264	148	62	41	56	<10	72	
• Coal Handling Plant (Washery complex)	383	360	153	138	46	38	<10	56	
• Railway Siding Chainpur (QLC)	266	273	113	127	43	43	<10	20	
Limit	**700 µg/ m^3**		**300 µg/ m^3**		**120 µg/ m^3**		**120 µg/ m^3**		

Status of Ambient Air Quality

As per G.S.R. 826 (E)	Level obtained in µg/ m^3 for the month of October 2014 to March 2015								Remarks
	$PM_{2.5}$		**PM_{10}**		**NO_x**		**SO_2**		
Locations	Oct. 14	Mar 15	Oct. 14	Mar. 15	Oct. 14	Mar. 15	Oct. 14	Mar 15	
Mukundabera check post	28	38	46	53	38	33	19	20	The AAQ was found within the prescribed norms.
Banji check post	17	23	59	37	24	<10	17	<10	
Pundi check post	21	32	47	46	30	<10	12	<10	
Limit	**60 µg/m^3**		**100 µg/m^3**		**80 µg/m^3**		**80 µg/m^3**		

Continuous online ambient air quality monitoring system is installed at division and being operational.

(vi) Adequate measures should be taken for control of noise levels below 85 db(A) in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc should be provided with ear plugs/ muffs.

Control measures are being taken up to keep noise level well within limit in working environment by providing adequate enclosure/ separation to the various high noise sources, proper maintenance, provision of control room, operator's cabin etc. In addition all the persons are provided with PPEs such as ear plug/ muff during work. An adequate green belt is also maintained in the area.

New FD Fan with Silencer leads to significant reduction in noise generation

Physiographic Barrier

(vii) *Industrial wastewater (workshop and wastewater from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May 1993 and 31st December 1993 or as amended from time to time before discharge. Oil and grease trap should be installed before discharge of workshop effluents.*

The Industrial wastewaters generated from various operations are handled through effluent management system provided in all operational dept. with the objective to treat the effluent and recycle the clear water. The HEMM maintenance shops have been provided with oil trap arrangement to recover the oil during washing of equipments. The recovered used oil during washing is sold to authorized recycler as per guideline and the effluent generated is checked for quality and recycled -reused in the system.

(viii) *Vehicular emissions should be kept under control and regularly monitored Vehicles used for transporting the mineral should be covered with tarpaulins and optimally loaded.*

Vehicular emission is kept under control by regularly monitoring the vehicles. Overloading of vehicles is avoided during mineral transport. Adequate maintenance of vehicles is done. All the vehicles during transport of material covered with tarpaulin sheet. In future, the mineral transportation will be done by Pipe conveyor.

Transportation of mineral (Coal) in covered truck

Introduced upgraded mode of transportation- Pipe conveyor to eliminate spillage/dust /unsafe condition

(ix) *Environmental laboratory should be established with adequate number and type of pollution monitoring and analysis equipment in consultation with the State Pollution Control Board.*

A full fledged Environmental laboratory is functioning with adequate number of Environmental monitoring and analysis instruments.

(x) *Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects. Occupational health surveillance programme of the workers should be undertaken periodically to observe any contractions due to exposure to dust and to take corrective measures, if needed.*

All the dust prone areas have been provided with dust suppression system to minimize the fugitive dust emission. The operators of various HEMM being operated inside the mines are provided with A/C cabin. In addition dust mask has been provided to the personnel working in dusty area. The persons have been imparted necessary training on safe work practices and appraised the adverse consequences on health in case of any violation of the practices. Occupation health surveillance programme is being conducted on regular basis in our Hospital for health check up as per the coal mines rule. The health awareness programme is also being conducted regularly in all the departments. Fixed type, moving type fog type, water sprinklers are provided in all the working area

(xi) *A separate environmental management cell with suitable qualified personnel should be set up under the control of a Senior Executive, who will report directly to the Head of the company.*

A separate Environment Management Cell is in place with qualified person reporting to Top management.

(xii) *The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year-wise expenditure should be reported to this Ministry and its Regional Office at Bhubaneswar.*

The Environmental Management Cell of West Bokaro division having separate fund for environmental protection measures / compliance to legal requirement. Besides above all other departments are having budgetary provision for environmental protection measures in their working area. The year wise expenditure on the above subject is reported to State pollution control Board. The expenditure occurred during the financial year 2014-2015 is Rs. 1503.80 Lakh.

(xiii) *The Regional Office of this Ministry located at Bhubaneswar shall monitor compliance of the stipulated conditions. The Project authorities shall extend full cooperation to the office(s) of the Regional Office by furnishing the requisite data/ information/monitoring reports.*

It will be complied with.

(xiv) *A copy of the clearance letter will be marked to concerned Panchayat/ local NGO, if any, from whom any suggestion/representation has been received while processing the proposal.*

Complied with.

(xv) *State Pollution Control Board should display a copy of the clearance letter at the Regional Office, District Industry Centre and Collector's Office/ Tehsildar's Office for 30 days.*

Complied with.

(xvi) *The Project authorities should advertise at least in two local newspapers widely circulated around the project, one of which shall be in the vernacular language of the locality concerned within seven days of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution control Board and may also be seen at the website of the ministry of Environment & Forests at http://envfor.nic.in.*

Complied with.