

Regulatory Requirements for Fly ash Utilisation from Thermal Power Plants in India

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Abstract

Fly ash is a combustion by-product of coal/lignite based thermal power plants or any other activity which is using coal/lignite as fuel. Ministry of Environment, Forests and Climate Change has issued notifications for proper utilisation of ash generated due to combustion of coal/lignite. Generation of electricity in India involves to major amount by coal based thermal power plants. As per Central Electricity Authority all India installed capacity of power stations as on 30.04.2020 is 370106.46 MW. The Indian coal is of low grade having high ash content in the order of 30% to 45% generates large quantity of fly ash. The ash utilisation is lower than the generation hence there is surplus ash stock at present and is increasing every year. The management of fly ash has thus been a matter of concern in view of requirement of large area of land for its safe disposal. At present around 60% to 70% of the total fly ash generated by the power sector is being utilised. The remaining is dumped into poorly designed and maintained ash ponds. As per estimates, about a billion tonnes of this toxic ash lie dumped in these ponds, polluting land, air and water. By the year 2021 - 2022, the thermal power sector is estimated to produce 300 million tonnes of fly ash a year and with that, utilisation of all the fly ash being generated is going to become even harder. The NGT considered impact of non-utilization and proper disposal of fly ash by the TPPs on air quality, surface water, ground water, health and environment. Tribunal directed preparation of action plans to achieve 100% utilization of fly ash and for its scientific disposal. The committee comprising MoEF&CC, CPCB and IIT Roorkee was formed to determine the liability of the TPPs for damages on “Polluter Pays” principle and proposed formula for calculating environmental compensation, which was further modified by NGT.

Keywords: Ash ponds, Fly Ash, Indian Coal, Lignite, Thermal Power Plants, Polluter Pays, and Environmental compensation

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INTRODUCTION

Generation of electricity is essential for development of the country and human kind, there are several ways of generation of electricity but thermal power plants (TPP) using coal/lignite as a fuel is the most common way of electricity generation in India. As per Central Electricity Authority all India installed capacity of power stations as on 30.04.2020 is 370106.46 MW. Generation through thermal (coal, lignite, gas, diesel) mode is 230599.57 MW, nuclear mode is 6780.00 MW, hydro mode is 45699.22 MW and renewable energy sources (small hydro power, wind power, bio-power, solar power) mode is 87027.68 MW. In India the coal available is of low grade with ash content in the order of 30% to 45% compared to imported coals where the ash content is low and is in the order of 10% to 15%. Large quantity of ash is thus being generated, which not only requires large area of valuable land for its disposal but it is also major source for pollution of both air and water.

In order to protect the environment, conserve top soil, and promote utilization of ash generated from coal and lignite based TPPs, the Ministry of Environment, Forest and Climate Change (MoEF&CC) has issued notifications on fly ash utilization. First notification was issued on 14.09.1999 which was subsequently amended in year 27.08.2003, 03.11.2009 & 25.01.2016 respectively. The notification contains various directions, including directions regarding mandatory mixing ash in brick manufacturing, mandatory use of ash in low lying land reclamation projects, and mandatory use of ash in stowing and backfilling of mine voids and in mines over burden dumping, within specified distances from TPPs. The salient directions of the notification are present below.

- 1) No person shall within a radius of 100 Kilometres (Kms) from coal or lignite based TPP, manufacture clay bricks or tiles or blocks for use in construction activities without mixing at least 25 % of ash (fly ash, bottom ash or pond ash) with soil on weight to weight basis.
- 2) Every construction agency engaged in construction of buildings within a radius of 300 Kms from coal or lignite based TPP shall use only fly ash based products for construction, such as cement or concrete, fly ash bricks or tiles or clay fly ash bricks or blocks or tiles or cement fly ash bricks or blocks or similar products or a combination or aggregate of them in every construction project. This provision shall be applicable to all construction agencies of central or state or local government and private or public sector and it shall be the responsibility of the agencies either undertaking the construction or approving the design or both to ensure compliance of the provisions and to submit annual returns to the concerned state pollution control board (SPCB) or the pollution control committee (PCC), as applicable.
- 3) The authority for ensuring the use of specified quantity of ash (minimum fly ash content for building materials or products) to qualify as fly ash based products shall be the concerned SPCB or PCC as the case may be. The concerned state government shall be the enforcing and monitoring authority for ensuring compliance of the provisions.

- 4) No agency, person or organization shall, within a radius of 300 Kms from coal or lignite based TPP undertake construction or approve design for construction of roads or flyover embankment with top soil, allow reclamation and compaction of low lying areas with soil, only fly ash shall be used for compaction and reclamation.
- 5) No person or agency shall, within 50 Kms (by road) from coal or lignite based TPP undertake or approve stowing of mines without using at least 25% of fly ash on weight to weight basis, of the total stowing materials used, approve without using at least 25% of fly ash on volume to volume basis of the total materials used for external dump of overburden and same percentage in upper benches of backfilling of open cast mines. The concerned state government or union territory government shall be the enforcing and monitoring authority for ensuring compliance of the provisions.

Summary of MoEF&CC notification S.O. 763 (E) dated 14.09.1999 and S.O. 979 (E) dated 27.08.2003

The S.O.979 (E) dated 27.08.2003 notification is the amendment of the principal notification published vide S.O. 763 (E) dated 14.09.1999. The main aim for issue of the notification was to protect the environment, conserve top soil and prevent the dumping and disposal of fly ash discharged from coal or lignite based TPPs on land. To restrict the excavation of top soil for manufacture of bricks, promoting the utilization of fly ash in the manufacture of building materials and in construction activity within a specified radius of 100 Kms from coal or lignite based thermal power plants. The notification contains the following directions.

Use of fly ash, bottom ash or pond ash in the manufacture of bricks and other construction activities: 1) All manufacturing units of clay bricks or blocks or tiles used in construction activities which are present in 100 Kms radius from coal or lignite TPPs shall mix at least 25% of ash with soil on weight to weight basis. 2) Construction agencies engaged in the construction of buildings within 50 to 100 Kms radius from a coal or lignite based TPP plant shall use fly ash bricks or blocks or tiles or clay fly ash bricks or cement fly ash bricks or blocks or similar products or a combination or aggregate of them in such construction as per the following minimum percentage (by volume) viz. 25% by 31st Aug 2004; 50% by 31st Aug 2005; 75% by 31st Aug 2006; and 100% by 31st Aug 2007. For construction agencies which are with 50 Kms radius the minimum percentage (by volume) is 50% by 31st Aug 2004; 100% by 31st Aug 2005.

Responsibilities of TPPs are 1) To make available ash for at least ten years from the date of this notification, without any payment or any other consideration for above mentioned activities. 2) TPPs commissioned subject to environmental clearance (EC) conditions should submit action plan for full utilisation of fly ash with a period of nine years whereas other TPPs within a period of fifteen years and submit action plan to the Central Pollution Control Board, concerned State Pollution Control Board /

Committee and concerned regional office of the MoEF&CC within a period of six months from the date of publication of this notification.

Summary of MoEF&CC notification S.O. 2804 (E) dated 03.11.2009

The S.O.2804 (E) dated 03.11.2009 notification is the amendment of the principal notification published vide S.O. 763 (E) dated 14.09.1999. It was observed that there was a gradual increase in the use of fly ash in the manufacture of fly ash bricks or fly ash based products from 1.5 million tonne in year 2002-2003 to 3.19 million tonne in 2006-2007 which needs to be further encouraged for achieving the ultimate objective of conservation of top soil and minimise environmental pollution caused due to fly ash. However it was observed that construction agencies are yet to achieve their targets of utilization of fly ash based products even after the 31.08.2007, the date prescribed for 100% utilization of fly ash based products in the said notification of 1999 and it is also observed that many TPPs are also yet to achieve the targets drawn up in the action plans, hence MoEF&CC has amended the principal notification vide MoEF&CC notification S.O. 2804 (E) dated 03.11.2009, the main points of the amendment are as follows.

All construction agencies (Government, Private and Public sector) engaged in construction of buildings within a radius of 100 Kms from a coal or lignite based power plant shall use only fly ash based products for construction, such as cement or concrete, fly ash bricks or blocks or tiles or clay fly ash bricks, blocks or tiles or cement fly ash bricks or blocks or similar products or a combination or aggregate of them in every construction project.

All coal or lignite based TPPs would be free to sell fly ash to the user agencies subject to the pond ash should be made available free of any charge on as is where basis to manufactures of bricks, blocks, or tiles including clay fly ash products, farmers, central and state government agencies, public works departments, for backfilling or stowing of mines and at least 20% of the dry ESP fly ash shall be made available free of charge. The notification also mentioned minimum % of fly ash content for building materials or products to qualify as “fly ash based products” given as Table 1. All coal and / or lignite based TPPs, expansion units in operation before the date of this notification and commissioned after this notification are to achieve the target of fly ash utilization as per the Table 2 and Table 3 respectively.

The unutilized fly ash in relation to the target during a year for TPPs commissioned before this notification, if any shall be utilized within next two years in addition to the targets stipulated for those years and the balance unutilized fly ash accumulated during first five years (first four years for new plants or expansion units commissioned after this notification) shall be utilized progressively over next five years in addition to 100% utilization of current generation of fly ash.

The central electricity authority and other approving agencies may permit the land area for emergency ash pond or fly ash storage area up to 50 hectares for a 500 MW unit, based on 45% ash content coal, or in the same proportion for units in other

capacities taking into account the ash content in coal or lignite to be used.

Table 1: Minimum fly ash content to qualify as “Fly ash based products”

S.No	Building materials or products	Minimum % of fly ash by weight
1	Fly ash bricks, blocks, tiles, etc made with fly ash, lime, gypsum, sand, stone dust etc. (Without clay)	50% of total input materials
2	Paving blocks, paving tiles, checker tiles, mosaic tiles, roofing sheets, pre-cast elements, etc where cement is used as binder	Usage of PPC (IS 1489: Part 1) or PSC (IS 455) or 15% of OPC (IS 269/8112/12269) content
3	Cement	15% of total raw materials
4	Clay based building materials such as bricks, blocks, tiles, etc.	25% of total raw materials
5	Concrete, mortar and plaster	Usage of PPC (IS 1489: Part 1) or PSC (IS 455) or 15% of OPC (IS 269/8112/12269) content

Table 2: Target of fly ash utilization by TPPs established before notification

S.No	Percentage utilization of fly ash	Target date – from issue of this notification
1	At least 50% of fly ash generation	One Year
2	At least 60% of fly ash generation	Two years
3	At least 75% of fly ash generation	Three years
4	At least 90% of fly ash generation	Four years
5	At least 100% of fly ash generation	Five years

Table 3: Target of fly ash utilization by TPPs established after notification

S.No	Percentage utilization of fly ash	Target date – from issue of this notification
1	At least 50% of fly ash generation	One Year
2	At least 70% of fly ash generation	Two years
3	At least 90% of fly ash generation	Three years
4	At least 100% of fly ash generation	Four years

Summary of MoEF&CC notification S.O. 254 (E) dated 25.01.2016

The S.O.254 (E) dated 25.01.2016 notification is the amendment of the principal notification published vide S.O. 763 (E) dated 14.09.1999. The main amendments proposed in the notification are as follows.

The distance between the construction agencies engaged in the construction of building and coal or lignite based TPPs has been modified from 100 Kms to 300 Kms. Restriction of providing 20% of dry fly ash free of cost has been modified stating that it shall not apply to those TPPs which are able to utilise 100% fly ash in the prescribed manner, all TPPs shall install dedicated dry ash silos having separate access roads so as to ease the delivery of fly ash. The cost of transportation of ash for road construction projects, manufacturing of ash based products, use as soil conditioner in agriculture activity within a radius of 100 Kms from a coal or lignite based TPPs shall be borne by TPP and the cost of transportation beyond the radius of 100 Kms and up to 300 Kms shall be shared equally between the user and TPP. The coal or lignite based TPPs in the vicinity of the cities shall promote, support and assist in setting up of ash based product manufacturing units so as to meet requirements of bricks and other building construction materials and also to reduce the transportation.

The time period to comply with the above provision by all concerned authorities is 31st December 2017. The coal or lignite based TPPs shall comply with above provision in addition to 100% utilization of fly ash generated by them before 31st December 2017.

Ash Generation vis-à-vis utilisation

As per Central Electricity Authority (CEA), Ministry of Power, Government of India Annual Report, 2018-2019 the utilization of fly ash has increased from 66.6 MT in year 2008-2009 to 131.87 MT in year 2017-2018. The overall utilization of fly ash in various applications was 67.13% during the year 2017-2018. The details of the fly ash generation and utilization related to 18 states and 167 TPPs for the year April 2017-March 2018 is given in Table 4 and state wise details are given in Table 5. During this period Delhi, Punjab, and Rajasthan have achieved 100% fly ash utilisation. States of Gujarat, Haryana and Jharkhand achieved the fly ash utilisation level was more than 95%. However states of Assam, Bihar, Madhya Pradesh and Telangana utilised less than 45% of fly ash generated.

Table 4 Summary of Fly ash generation in 2017-2018

Detail description	Year 2017-18
Total No. of TPP	167
Installed Capacity (MW)	177070
Coal Consumed (Million Tons)	624.88
Fly Ash generated (Million Tons)	196.44
Fly Ash Utilization (Million Tons)	131.87
Percentage of Utilization	67.13
Percentage of Average Ash Content	31.44

Table 5: State wise status of fly ash generation & utilisation in 2017-18

S.No	State	No. of TPPs	Installed capacity (MW)	Fly ash generation	Fly ash utilisation	Percentage of utilisation
				(MT)		
1	Andhra Pradesh	9	12270	16.20	13.85	85.51
2	Assam	1	250	00.24	00.01	4.53
3	Bihar	4	4770	07.34	03.15	42.78
4	Chhattisgarh	22	19822	27.62	14.80	53.60
5	Delhi	2	840	00.33	00.67	205.79
6	Gujarat	10	13792	03.14	03.00	95.65
7	Haryana	5	5540	06.12	06.08	99.43
8	Jharkhand	7	4812	06.51	06.32	97.12
9	Karnataka	6	8680	04.34	02.42	55.79
10	Madhya Pradesh	10	16420	20.45	08.51	41.63
11	Maharashtra	20	23156	20.89	14.21	68.05
12	Odisha	6	6388	13.19	08.73	66.22
13	Punjab	5	6020	04.82	04.93	102.19
14	Rajasthan	6	5285	06.34	06.66	104.94
15	Tamilnadu	14	12460	10.43	06.99	67.07
16	Telangana	6	2883	05.60	02.53	45.26
17	Uttar Pradesh	18	19570	25.25	13.84	54.82
18	West Bengal	16	14112	17.58	15.11	85.96
	Total	167	177070	196.44	131.86	67.13

The status of fly ash utilization by 167 TPPs with respect to the MoEF&CC notification in the year 2017 – 2018 is given in Table 6. All TPPs grouped into 6 categories based on the level of fly ash utilization and the same are given in Table 7. During the year 2017 – 2018 the maximum utilization was by cement sector followed by use in reclamation of low lying areas and many other activities, the details of various modes of utilisation is given in Table 8. The trend of fly ash generation and utilisation after issue of MoEF&CC notification S.O.979 (E) dated 27.08.2003 is given in Table 9. During the year 2003-2004 to year 2017-2018 the fly ash generation has increased from 96.28 MT to 196.44 MT whereas fly ash utilisation has increased from 28.29 MT to 131.87 MT.

Fly ash generation as well as utilisation has generally been increasing since year 1996-1997. The fly ash generation in year 1996-1997 is 68.88 MT and utilisation was 6.64 MT i.e. 9.63% only. The fly ash generation during year 2003-2004 is 96.28 MT and utilisation is 28.29 MT i.e. 29.39%. After issue of MoEF&CC principal notification and its amendments for fly ash utilisation the fly ash utilisation for various uses has been increased at regularly and the fly ash utilization during the year 2017 – 2018 was around 67.13%.

Table 6: Status of fly ash utilization as per MoEF&CC notification for the Year 2017-18

S.No	Description	No. of TPP
1	No of TPPs achieved the target of fly ash utilisation	69
2	No of TPP not been able to achieve the target of fly ash utilisation	93
3	No of TPP not generated any significant fly ash or any fly ash	05
Total		167

Table 7: Range of fly ash utilisation

S.No	Level of fly ash utilisation	No. of power plants
1	100% & more than 100%	60
2	Less than 100% and up to 90%	23
3	Less than 90% and up to 70%	28
4	Less than 70% and up to 50%	16
5	Less than 50%	35
6	No of TPPs which have not generated any significant Fly Ash or any Fly Ash	5
Total		167

Table 8: Mode of fly ash utilisation

S.No	Mode of utilisation	Quantity of fly ash utilisation	
		MT	Percentage (%)
1	Cement	50.291	25.60
2	Mine Filling	12.516	06.37
3	Bricks & Tiles	17.694	09.01
4	Reclamation of low lying area	20.578	10.48
5	Ash Dyke Raising	13.550	06.90
6	Roads & Flyovers	06.673	3.40
7	Agriculture	00.573	0.29
8	Concrete	1.297	0.66
9	Hydro Power Sector	0.008	0.004
10	Others	8.686	4.42
11	Utilised Fly Ash	64.574	32.87
	Total	196.441	100.004

Table 9: Trend of fly ash generation & utilisation after MoEF&CC Notification S.O. 979(E) date 27.08.2003

S.No	Year	Fly ash generation (MT)	Fly ash utilisation	
			MT	%
1	2003-04	96.28	28.29	29.39
2	2004-05	98.57	37.49	38.04
3	2005-06	98.97	45.22	45.69
4	2006-07	108.15	55.01	50.86
5	2007-08	116.94	61.98	53.00
6	2008-09	116.69	66.64	57.11
7	2009-10	123.54	77.33	62.60
8	2010-11	131.09	73.13	55.79
9	2011-12	145.41	85.05	58.48
10	2012-13	163.56	100.37	61.37
11	2013-14	172.87	99.62	57.63
12	2014-15	184.14	102.54	55.69
13	2015-16	176.74	107.77	60.97
14	2016-17	169.25	107.10	63.28
15	2017-18	196.44	131.87	67.13

Fly ash utilisation for various uses

Some of the areas where fly ash is being used to the large extent in our country is given below.

Cement industries: Fly ash is being used by Cement industry as a pozzolanic material in manufacturing of Portland Pozzolana Cement. It saves both precious lime stone and coal.

Reclamation of low lying areas: Fly ash is used as a substitute of soil/sand for reclamation of low lying areas thereby saving top soil.

Construction of roads / flyovers / ash dykes: Fly ash is being used in construction of roads / flyovers and the raising of ash dykes. It has a large potential for fly ash utilisation.

Back filling & Stowing: Fly ash is being used for backfilling of open cast mines and stowing of underground mines which results in saving of top fertile soil and precious river sand. Especially pit head power plants have large potential for fly ash utilisation in this activity.

Building Materials like Bricks, Blocks and Tiles: Fly ash utilisation in manufacturing of fly ash based building products like bricks, blocks, tiles etc., which results in saving of fertile top soil. Fly ash based bricks/blocks/tiles are as good as clay based conventional building products.

Agriculture: Fly ash is being used as manure in agriculture sector as it has many micronutrients. The progressive utilisation of fly ash in agricultural sector is increasing year after year.

Strategies to increase the utilisation of fly ash:

- Phase wise renovation and modernization of all the old units below 660 MW which are running using subcritical technology to supercritical technology.
- Strictly implementing use of raw /blended /beneficiated /washed coal with ash content not exceeding 34%.
- TPPs which are not ensuring dry fly ash collection, storage and disposal facilities need to develop the same using advanced technology available in the market.
- Use of fly ash in the construction of embankments for laying railway lines, national highways has significant potential for large scale utilization of fly ash.
- Thermal Power Plants have to ensure the utilisation of fly ash and fly ash based building products within the TPP for the development of infrastructure like construction of buildings, roads & reclamation of low lying areas.

Legal Implications for not confirming MoEF&CC Notifications

To raise concern of management of fly ash generated by the TPPs an original application numbers 117/2014, 499/2014 and 102/2014 were filled before the National Green Tribunal (NGT), Principal Bench, New Delhi and the directions on the above applications were given during hearing held on 20.11.2018 and 27.01.2020 and date of uploading on the website is 12.02.2020. The applicant claims to be interested in protection of environment and forest, he claims to be aggrieved by non-implementation of notifications issued by the MoEF&CC for proper utilization of fly ash generated by the coal and lignite based TPPs, non-utilisation and improper disposal of fly ash leads to increase in air pollution and causes severe health problems. It also affects horticulture and agriculture crops, pollution of surface water and ground water. Major pollutants in fly ash are arsenic and mercury; both the pollutants are injurious for the land and the water bodies. Thus there is a need for 100% utilization of fly ash by all possible means such as conversion to ash based products, preventing its washing away or flying in the air. MoEF&CC has failed to ensure proper monitoring mechanism inspite of issuing notification on the fly ash management. NITI Aayog also constituted a committee headed by Joint Secretary, MoEF&CC, Government of India on 12.06.2018 to develop a focused strategy for best utilization of fly ash to manufacture end products, revising existing notifications / guidelines, transportation of fly ash, better utilization in MSME Sector, cement and allied industries, use of mobile app in data base, guidelines for ash parks, regulation of red bricks, incentives for 100% utilization, incentives to TPPs for new innovations. Draft report was circulated by MoEF&CC on 16.10.2018. The committee noted that the existing notification needed review and the same were not being fully implemented.

The tribunal considered impact of non-utilization and proper disposal of fly ash by the TPPs on air quality, surface water, ground water, health and environment. Tribunal directed preparation of action plans to achieve 100% utilization of fly ash and for its scientific disposal. This is also resulting in failure to enforce the mandate of law under Air Act, 1981; Water Act, 1974 and Environment (Protection) Act, 1986, apart from damage caused to the environment and public health. This is also infringement of “Sustainable Development” and “Precautionary” Principles. The tribunal constituted a joint committee comprising MoEF&CC, CPCB and IIT Roorkee to determine the liability of the TPPs for damages on “Polluter Pays” principle on 20.11.2018 and also directed interim compensation for the TPPs who are failed to dispose of 100% fly ash upto 31.12.2017. The committee may give its report within two months from the date of its assuming charge to the MoEF&CC. Pending submission of the report; tribunal instructed all TPPs who have failed to dispose of 100% fly ash up to 31.12.2017, to deposit damages for environment restoration as follows.

- TPPs upto capacity of 500 MW Cost of damage Rs.1 Crore
- TPPs upto capacity of 1000 MW Cost of damage Rs.3 Crore
- TPPs upto beyond capacity of 1000 MW Cost of damage Rs.5 Crore

The above amount may be deposited with CPCB within one month, failing which interest @ 12 per annum will be payable for the delayed period. The amount may be

spent on restoration and restitution of the environment. No damages will be payable by the TPPs which have utilized 100% of the ash generated by it in accordance with law upto 31.12.2017 and disposing it in scientific manner. In case any such claim is found to be false by the committee, the amount of penalty payable may be upto five times.

The joint committee has filed its report on 20.12.2019 on the subject of action plan to achieve 100% fly ash utilization by the TPPs and liability of the TPPs to pay compensation. As per CPCB about 77% of total fly ash generated per annum is utilized. This indicates a gap in terms of 23% which needs immediate action. In terms of legacy waste, the total quantum is 1647 million tonnes as on 31.03.2019. The committee recommended one year time to achieve 100% utilization of fly ash where the utilization currently was more than 85% and two years for the remaining and compensation should be imposed only on non-pit head TPPs. It also recommended that rising of ash dyke of ash pond may be considered as fly ash utilization during initial five years. Thereafter TPPs can use fly ash for strengthening of ash dyke as per engineering requirement but can claim only 5-7% of fly ash generation as utilization. With regard to utilization of unutilized accumulated fly ash (pond ash), the recommendation is to permit three years for non-pit head TPPs and four years for pit head TPPs apart from current utilization with effect from April 2021.

DETERMINATION OF ENVIRONMENTAL COMPENSATION (EC)

The formula suggested by the joint committee is based on CPCB formula used in earlier direction of NGT for levying the environmental compensation penalty due to non-compliance of the environmental standards / violation of any directions by industries.

$$EC = PI \times R \times N \times F \times LF = \text{Rs.}30000 \text{ per day } (80 \times 250 \times 1.5) \times N \times LF$$

EC = Environmental compensation/penalty (Rs)

PI = Pollution index of industrial sector (80 for red category of industries)

R = Rs.in per day (Rs.250)

N = Number of days of violations

F = Scale of operation of industrial sector, small 0.5, medium 1.0 and large 1.5

LF = Location factor, 1.5 if industry is located in critically polluted area/urban area / ecologically sensitive area, otherwise 1

In light of the above environmental compensation (Rs.30000 per day x 330 days per year = Rs.9900000, say Rs.1 crore per year), it is proposed that, EC may be imposed based on annual basis for non-compliance of fly ash notification after 31.12.2017 as below.

A) EC for year 2018

$$EC = \text{Rs.1 crore/year } C \times P \times LF$$

C = Capacity factor 1 for 500 MW and MW/500 for other capacity

P = Non – compliance during the year i.e. (100 % utilization during the year /100)

LF = Location factor, 1.5 if industry is located in critically polluted area / urban area / ecologically sensitive area, otherwise 1.

B) Annual EC for year 2019 onwards

$$EC = \text{Rs.1 crore/year } C \times P' \times LF$$

P' = Overall non-compliance in terms of multiple factor of annual generation i.e. total accumulated fly ash at the end of year divided by annual generation at full capacity.

Temporary storage upto 90 days of generation of fly ash shall be allowed and no environmental compensation will be imposed for accumulated quantity.

The NGT considered the above report and made some changes in EC calculation as they have over looked certain scientific aspects, the changes suggested are location factor should be taken to 1.5 for all situations as the principal contributor to the environment degradation in the area is the TTP. Further, the capacity factor has been taken 1 for 350 MW and MW/350 for other capacity, instead of taking 500 MW as a base. The revised formula is as follows.

$$EC = PI \times R \times N \times F \times LF = \text{Rs.30000 per day } (80 \times 250 \times 1.5) \times N \times LF$$

EC = Environmental compensation / penalty (Rs.)

PI = Pollution index of industrial sector (80 for rend category of industries)

R = Rupees per day (Rs.250)

N = Number of days of violations

F = Scale of operations of industrial sector, small 0.5, medium 1.0 and large 1.5

LF = Location factor 1.5 for all situations as the principal contributor to environmental degradation in area is TPP

From the above formula considering 330 days per year, the said figure would come to Rs.9900000 or say Rs.1 crore per annum.

C) EC for 2018 and 2019

$$EC = \text{Rs.1 crore/year} \times C \times P \times LF$$

C = Capacity factor 1 for 350 MW and MW/350 for other capacity

P = Non-compliance during the year i.e. (100 % utilization during the year /100)

LF = Location factor 1.5 for all situations as the principal contributor to environmental degradation in area is TPP

D) EC for 2020

$$EC = \text{Rs.1 crore/year} \times C \times P' \times LF$$

P' = Overall non-compliance in terms of multiple factor of annual generation i.e total accumulated fly ash at the end of year divided by annual fly ash generation at full capacity

Temporary storage upto 90 days of generation of fly ash shall be allowed and no environmental compensation will be imposed for accumulated quantity.

DIRECTIONS GIVEN BY NGT

- a. The TPPs may take prompt steps for scientific disposal of fly ash in accordance with the statutory notification issued by the MoEF&CC under the provisions of EP ACT requiring 100% utilization and disposal of fly ash.
- b. For the non-compliant TPPs, environmental compensation needs to be determined with effect from the cut-off date 31.12.2017 as stipulated in the notification dated 27.01.2016
- c. CPCB may accordingly compute and levy environmental compensation in accordance with the formula referred to above with respect to individual TPPs in accordance with law and submit compliance report to this tribunal.
- d. CPCB guidelines of May 2019 for utilization /disposal of fly ash for reclamation of low lying areas and stowing / back filling of abandoned mines / quarries may be complied.
- e. Task force of Ministry of Power and Ministry of Coal may recommend list of abandoned mines / quarries for mine back filling purposes to the CPCB. CPCB may notify the same accordingly for use by the TPPs as per applicable guidelines and permission from state PCBs/PCCs.
- f. A committee comprising of CPCB and IIT Roorkee may assess the environmental damage with regard to the breach sites of TPPs in Singrauli area and submit its recommendation within three months. CPCB shall be at liberty to engage any other technical expert for this purpose.
- g. The committee comprising of Collector, CPCB and Member Secretary of MP

State Pollution Control Board may assess the damage with regard to the breach sites in Singrauli area to the crop and agricultural productivity and ensure effective restoration / remediation of affective sites within three months.

- h. CPCB may ensure implementation of action plans approved by it in accordance with timeline as provided in the statute
- i. A joint committee comprising of MoEF&CC, CPCB, IIT Roorkee and any other member considered necessary may submit quarterly progress report on recommendations of Expert Committee of NITI Aayog for enhanced utilization of fly ash in various sectors: mines, roads, cement, industries and bricks, etc., along with implementation status.
- j. The present order is subject to proceedings pending before the Hon'ble Supreme Court and where stay is operative, this order will not operate till stay continues and thereafter abide by orders of Hon'ble Supreme Court.

CONCLUSION & RECOMMENDATIONS

All TPPs has to take prompt steps for scientific disposal of fly ash in accordance with the existing statutory notifications issued by MoEF&CC under the provisions of EP Act requiring 100% utilisation and disposal of fly ash. Non-compliant of TPPs in use of 100% utilization of fly ash after 31.12.2017 is an infringement of “Sustainable Development” and “Precautionary” principals, as a consequence of continuing air and water pollution, “polluter Pays” principle needs to be invoked as per Section 20 of the National Green Tribunal Act, 2010. To calculate the environmental compensation a formula has been proposed taking into consideration various factors viz. capacity of the project, number of days of violations, pollution index of industrial sector (red category), scale of operation of industrial sector (small, medium and large) and location factor

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