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Dr. Rashid Hassan,
Advisor,
Ministry of Environment, Forests and Climate Change,
Government of India,
New Delhi.

Subject: Comments on the Draft Notification on Amendment to Environment (Protection) Rules 1986 regarding Water Consumption and Emissions from Coal Thermal Power Plants

Dear Shri Hassan,

We write to you on behalf of Manthan Adhyayan Kendra, a group studying water and energy issues in the context of equitable, just and sustainable development. In particular, Manthan has been studying in detail issues related to coal and water since last several years. The details about Manthan and the undersigned can be found on our website.

Please find below our comments on the above mentioned proposed amendments to EPA Rules 1986. We have restricted our comments to some overall comments and comments on water consumption and mercury emissions.

A. OVERALL COMMENTS

1. We welcome this initiative to set formal standards for emissions and water use of coal thermal power plants as these plants have many serious impacts and that too on a large scale as coal is the dominant source of electricity in India.
2. **As an overarching suggestion, we urge that the Ministry should also give, as an integral part of the standards / norms, a document giving in detail the reasoning and logic, and data behind each of the proposed norms.** This would include technical reasons, health and medical impact related reasons, environmental impacts related reasons, economics and cost benefit related aspects etc. This would help everyone understand the thinking and logic behind the proposals and therefore help providing much better and more useful comments. Further, such a document would also be very important when changes are to be made to the standards due to variety of reasons like technological improvements, changing societal aspirations etc.

3. We would also like to suggest that on receiving the comments, the Ministry should collate the comments and put these up on the website along with its own thinking on the comments and how this and the comments have shaped its final decision.
4. In the Draft Notification, we see that for several parameters, the norms are given for plants operating or to be installed in specific time periods. These are given as pre-2003, 2003 to 2006, and after 2017. This leaves a big gap of the years from 2006 to 2017, and leaves out a large number of plants outside the purview of the notification. We are sure that this is not the intention. If it is, we urge that this should not be done, and that plants commissioned during this period should also be brought under the purview of the standards. Or is it a typographical error, and the middle time interval is to be 2003 to 2016 and not 2006? This may be clarified.
5. In the notification, the time periods mention TPP (units) "installed" before or after such and such date. Since the word installed may lead to differing interpretations, we suggest the use of the word "commissioned" which has a well understood meaning. You could also use "date of commercial operation or synchronisation".

B. WATER CONSUMPTION

These comments pertain to the proposed norms for water consumption, under Sec 5 (a).

1. We welcome the setting up of formal standards for specific water consumption. This is very necessary as coal thermal power plants consume large quantities of water and this has significant impact on the water resources and other water uses.
2. The norm that all coal thermal power plants with once through cooling will have to go for Cooling Tower based systems is welcome.
3. The norm that existing plants with cooling towers shall reduce their specific water consumption upto 3.5 cu.m per MWh is good, **but we urge that this should be further reduced to maximum of 3 cu.m per MWh**. The report by CEA on Minimisation of Water (CEA 2012) has clearly indicated (Page 9) how specific water consumption can be brought down to the level of 3 cu.m/MWh.
4. We also urge that these plants should be required to move to Zero Liquid Discharge as is being required for the plants installed after 2017.
5. The requirement for all plants installed after 2017 to meet specific water consumption norms of 2.5 cu.m / MWh is good and welcome.
6. For all the above (for Sec 5(a) 1,2,3) it should be clarified that the specific water consumption includes water for all needs and uses of the power plant including potable water, colony supply and not just water for cooling needs.
7. The requirement that all new plants post 2017 move to Zero Liquid Discharge (ZLD) is also welcome. However, since the guidelines for ZLD are yet to be finalised, it would be **important to explicitly include certain conditions of ZLD in this notification itself**. Otherwise there could be several loopholes which would defeat the very purpose of ZLD. We suggest that the following should be included in the notification as a part of the concept of ZLD:

- a. The plant boundary definition should be made clear as the ZLD means no liquid discharge outside the plant boundary.
- b. **We urge that the ash pond should be inside the plant boundary** otherwise, the large amounts of leakage, surreptitious discharge etc. from ash ponds render the notion of ZLD meaningless. Given that the rules require all fly ash to be utilised to the extent of 100%, it is expected that only bottom ash would be disposed in the ash pond. Thus, there should be little problem in accommodating the ash pond inside the plant boundary.
- c. **ZLD means that there should not be any forceful injection into groundwater or recharge into ground water by any other means of the liquids generated by the plant.**
- d. **ZLD should strictly mean recycling the treated effluents back for re-use in industrial or domestic purposes but excluding any use or disposal or release in ambient environment. To clarify further, this also means that recycled water should not be used for dust suppression, green-belt development, watering trees/ gardening, irrigation etc.**
- e. Since the treatment of effluents is likely to generate solid waste that will have several different contaminants, it is critical that this be disposed-off safely as per the norms for solid waste disposal / hazardous waste disposal as applicable.

C. MERCURY EMISSION STANDARDS

1. The setting of standards for emission of mercury from coal TPPs is a welcome step as till now, there were no standards for the same.
2. However, no basis or rationale is given for adopting this limit, which is considerable more relaxed than standards in the US or EU. We urge that the justification for the limit be also formally presented as a part of the standard. We have already made this point as a general point earlier, but in case of mercury standards, this becomes important because of the fact that the proposed standards appear to be too weak.
3. The proposed standard, at 0.03 mg/Nm³, appear to be weak. A report by Central Institute of Mining and Fuel Research (CIMFR 2014) gives mercury emission from three TPPs in India, namely NTPC, Talcher, CEB, Korba and CESC, Budge Budge. (CIMFR 2014: 27). The values for Hg in flue gas were found respectively to be 14.84, 11.50 and 4.24 micro-gram per Nm³ or 0.01484, 0.01150 and 0.00424 mg/Nm³. While this is a very small sample, it is still indicative of the fact that current mercury emissions appear to be much lesser than the proposed limit.

Given this, it is unlikely that the new standards will require existing or new plants to take any measures, additional or otherwise. There will be no push to reduce any emissions, and thus even the existing total emissions of mercury are unlikely to be reduced.

This will have serious consequences for there is evidence that even current emissions of mercury are leading to mercury contamination of water and land in areas around thermal power plants, and this is leading to excessive levels of mercury in human beings, with all the resultant health impacts. This is of particular significance in areas where coal thermal power plants are clustered.

For example, see the study by Centre for Science and Environment (Ramakant *et al* 2012), which documents the excessive levels of mercury in soil, groundwater and surface water bodies like local lakes and *nallahs* in the area around the Rihand dam, which is one of the earliest clusters of coal thermal power stations in the country. More worrying, the study also finds levels of mercury in human hair and blood that exceed safe limits in significant number of samples. This study has also been reported in Down to Earth (Juneja 2012).

Thus, there is a need to have a much stricter standard than what is being proposed.

Similarly, with more plants coming online, the total emissions of mercury would continue to grow. The CIMFR report, even with its very limited sample and conservative assumptions based on this limited sample¹ estimates that total mercury emissions to atmosphere in India from thermal power plants rose from 18.73 t/year to 26.56 t/year (CIMFR 2014:35), and projects it to go up to 59.28 t/year in 2016 and 95.82 t/year in 2021. Since the proposed standards will not require any power plants to reduce their emissions, it is unlikely that they will reduce this projected increase in mercury emissions.

This too calls for a much stricter standard than what is being proposed, to the extent and with the aim of significantly reducing total mercury emissions in the country and also containing the local level impacts.

4. Another issue of concern is that significant part of the mercury from the feed coal remains with the fly ash, and in case of FGD, with the FGD sludge/water/gypsum. The amount would vary depending on several conditions. The CIMFR report (Page 27) notes a study of NTPC power plants where the amount of feed coal mercury that ends up in fly ash ranges from 26.29% to 48.50%.

The *Technical EIA Guidance Manual for Thermal Power Plants* by the Ministry of Environment and Forests (Gol 2010:Annexure 1, page i) states that

“Upon combustion, coal flyash tends to have a higher concentration of mercury, and estimates indicate that Indian coal ash has an average mercury concentration of 0.53 mg/kg, based on measurements from a few selected power plants.”

This is a significant level of fly ash concentration and a huge cause for concern as fly ash management in the country is highly problematic. Large quantities of fly ash routine are dumped on land, farms, and in and around water bodies; many fly ash ponds are unlined, and leakage from ash ponds is also a regular occurrence. Breaches are also not uncommon. Ash pond decant is many times discharged to the local water bodies. Dry ash deposition - from uncovered transport, from wind-borne ash dust from ash ponds - on farms, homes, fields and water also takes place frequently. The risks from leaching of mercury and other pollutants from fly ash and contamination of water sources are quite high. This has serious implications for health of the communities that depend on the water from these water bodies and on the fish from these water bodies.

¹ An Output Distribution Factor (amount of Hg in feed coal that is finally emitted to atmosphere) value of 0.58 as against an ODF value of 0.9 as per UNEP Tool Kit. (CIMFR 2014: 9)

The *Technical EIA Guidance Manual for Thermal Power Plants*(Gol 2010: Annexure I, page i) warns:

“A growing concern in India is the release of various toxic trace elements such as mercury(Hg), arsenic (As), lead (Pb), cadmium (Cd), etc., from power plants through the disposal and dispersal of coal ash. *Among the various toxic elements mercury emissions from coal based TPP are of particular concern, mercury emitted in flue gases or in flyash/bottomash that is disposed off in ash ponds enters the hydrological system, wherein the mercury can be methylated. Then this methyl-mercury can then enter the human food chain, mainly through consumption of fish* (Shah et al., 2008). Thus this food chain exposure pathway to mercury at high levels can harm the brain, heart, kidneys, lungs, and immune system of people of all ages”. (Emphasis added).

Given this, there is an urgent need to have proper norms for mercury in fly ash, and in general a much better ash management regime, in addition to norms for emissions of mercury.

5. Similar is the case with the FGD gypsum and sludge. There have to be accompanying norms for the disposal of this, else there are risks from the mercury leaching out and entering the biological systems.
6. Sometimes a case is made for washing of coal as a means to control mercury emissions by reducing the mercury in feed coal. While this offers some benefits, it should be noted that washing does not eliminate pollutants, it only separates the same. The washery rejects would then have much higher levels of mercury as compared to raw coal. The status of disposal of washery rejects in India is also highly problematic with these rejects often dumped in the open. The case with washery slurry is equally bad, with even slurry from supposed “zero liquid discharge” plants being discharged into rivers. The case of washeries around the Damodar river in Dhanbad / Jharia are an example of this. Thus, there is need for proper and stringent standards for the management of washery rejects and slurry too.
7. Hence, we urge that apart from the emissions, there is a need to track the pathway of the remaining mercury too and provide proper standards and regulations for the same. Without that, the emission norms would remain of limited effectiveness.
8. It is also necessary that the measurement period be indicated as an integral part of the mercury emission norms. **We would strongly urge that there should be a continuous emission monitoring system for mercury emissions, and then suitable averages / median values / high values from this can be taken for assessment of compliance with norms.**
9. We also suggest that while there are advantages, there are also problems with norms which are on the basis of flue gas volume. We would suggest that the same norms be also expressed in terms of some performance related parameter, for example, on per MWh output. This is the practice in the USA and has several advantages. The compliance requirement should make it mandatory to meet both the norms.
10. Compliance is a serious problem with most environmental norms. These norms will be of little use if compliance cannot be ensured. As a part of that, we urge that all the data from the emissions monitoring should be public, and be available on a real time basis on the website of the plant and the appropriate pollution control board.

11. Lastly, we also suggest that there should be a requirement for the plant to maintain a mercury balance –of total mercury entering the plant via feed coal and other means and where this mercury ends up - and submit this to the MoEF every month / quarter, as also make it public, including on the website. This would be useful to ensure compliance and also help monitor how much mercury is ending up in the environment where it can cause damage.

We would be happy to provide any clarifications and further inputs on these.

Thanking you,

Sincerely,



Shripad Dharmadhikary,
Jinda Sandbhor

Manthan Adhyayan Kendra

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